

COLLECTED PAPERS OF
CHARLES SANDERS PEIRCE

VOLUME V
PRAGMATISM AND PRAGMATICISM
AND

VOLUME VI
SCIENTIFIC METAPHYSICS

EDITED BY
CHARLES HARTSHORNE
AND
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VOLUME V

PRAGMATISM AND PRAGMATICISM

Errata

- 5.7n§ for 3,491 read 3.491
5.17, lines 21 and 22 for direr fault to find with read direr fault with
5.22n1 for $(-2)^{n2}$ read $(-2)^n$
5.71n1 (p. 49) note is concluded at the bottom of p. 50
5.155n‡ for 3.532 read 3.532n§
p. 123 transpose footnotes and footnote symbols
p. 185, section heading for §5 read §4
5.318n* (p. 190) for 1868 read 1869
p. 199 transpose last two footnotes
5.340 (p. 212, line 15) for That it is, read That is,
5.391n† for 383 read 382
5.416, line 24 for -n read an
5.436 (p. 291, line 17) for th-n read than
5.436n† for vol. 9 read Widener Library
5.441n1 for vol. 8 read 7.21ff
5.453 (p. 306, line 1) for vol. 9 read 8.7-38
5.494n† (p. 343) for 1906 read 1907
5.533n* for 1.616 read 1.611
5.604n* for 1869 read 1892-1893
5.611 (p. 428, line 19) for definite read definitive
p. 432: Index s.n. Stewart delete 611
p. 432: Index, add Steward, J. A., 611
p. 454: Index s.v. Truth for 25 read 26

INTRODUCTION

Peirce's punctuation and spelling have, wherever possible, been retained. Titles supplied by the editors for papers previously published are marked with an ^E, while Peirce's titles for unpublished papers are marked with a ^P. Peirce's titles for previously published papers and the editors' titles for unpublished papers are not marked. Remarks and additions by the editors are enclosed in light-face square brackets. The editors' footnotes are indicated by various typographical signs, while Peirce's are indicated by numbers. Paragraphs are numbered consecutively throughout the volume. At the top of each page the numbers signify the volume and the first paragraph of that page. All references in the indices are to the numbers of the paragraphs.

The department and the editors desire to express their gratitude to Dr. Henry S. Leonard and Miss Margaret Unangst for their assistance with the proofs, references and editorial footnotes.

HARVARD UNIVERSITY
MARCH, 1934.

EDITORIAL NOTE

According to William James, the philosophical doctrine known as pragmatism was originated by Charles Sanders Peirce. The present volume contains practically everything of importance which Peirce is known to have written concerning his famous theory of "how to make ideas clear." There is, however, a short passage in a review, written in 1871, of Frazer's edition of the *Works of Berkeley*, quoted below for its historical interest:

A better rule [than Berkeley's] for avoiding the deceits of language is this: Do things fulfil the same function practically? Then let them be signified by the same word. Do they not? Then let them be distinguished. If I have learned a formula in gibberish which in any way jogs my memory so as to enable me in each single case to act as though I had a general idea, what possible utility is there in distinguishing between such a gibberish and formula and an idea? Why use the term *a general idea* in such a sense as to separate things which, for all experiential purposes, are the same? (*North American Review*, vol. 113, p. 469.)

About half of the present volume consists of previously unpublished papers. Their significance lies in the light which they throw upon certain obscure aspects of pragmatism. For anyone other than Peirce himself, the attempt to summarize the gist of his pragmatic point of view will inevitably be difficult and perhaps impossible. It is here attempted only provisionally and subject to the reader's own judgment.

In the first place, we learn more specifically than hitherto what Peirce regarded as the alternative to a pragmatic theory of meaning. This alternative was the traditional philosophical view that the abstract explains the concrete, and that the most abstract ideas are ultimate and unanalyzable (see 177, 207, 289, 294, 500ff). Pragmatism or pragmaticism (Peirce's term to indicate his divergencies from other pragmatists) was

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thus Peirce's way of insisting that abstractions must give an account of themselves, and must do it in terms of concrete experience. He held this position as early as 1868 (cf. 289, 294f, 504n). Only simple qualities of sense or feeling, or blind reactions between these, can be indefinable; concepts are relational and definable.

In the second place, it is impossible that abstract generalities should be defined, as older empiricisms affirmed, in terms of mere qualities of sensation or emotion. For these qualities are incommunicable (at least in the present state of science; cf. 506) and particular (cf. 299ff, 312); whereas intellectual meanings or concepts must be public and general (312, 467).

Thirdly, that which is most general and public is a habit of behavior (486) directed towards an end (135, 491). The element of generality, which is never absent from the given (181ff, 212, 299ff, 371n), reaches its maximum in purpose; that is, a value capable of being embodied in a wide variety of existents (3, 433).

Fourthly, logic is subsidiary to ethics and esthetics (108ff). The ultimate meaning of an intellectual conception is given by its conceivable bearings upon deliberate or self-controlled conduct; but conduct that is fully deliberate in this sense is ethical and the end which it realizes is esthetic (129ff, 533). Thus pragmatism does not subordinate contemplative values to those of expediency (3, 402n, 429).

Fifthly, pragmatism is conceived to be a method in logic rather than a principle of metaphysics. It provides a maxim which determines the admissibility of explanatory hypotheses (195ff).

Sixthly, it entails scholastic realism, which in its final pragmatic interpretation (503) means the ascription of purposive habits to nature (107, 603).

The first book of the volume contains the *Pragmatism Lectures* of 1903 which deal primarily with questions of phenomenology, epistemology and value. The second book contains previously published papers. The first three papers show the drift towards pragmatism which characterized Peirce's thought in 1868. Papers IV to VII contain the published accounts of pragmatism on the basis of which his theory

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has hitherto been judged. Except for the first five papers of the second book, all of the selections in the volume date from 1898 (in most cases from 1903-1907), and all the unpublished papers which compose the third book of the volume are from this later period. There are other topics more or less tenuously related to pragmatism which are discussed at some length in the volume, *e.g.*, the doctrine of critical commonsensism (books II and III; 265 containing the earliest statement); logical theory (318-341; 574-604), and philosophical terminology (413, 610f); while in volume 2, book II, and volume 4, book II, there are papers dealing with other matters which were conceived by Peirce to be particularly germane to the topic of pragmatism. The preface to volume 4 may serve perhaps as a useful guide to relate the papers in volumes 2-4 with those in the present volume, which itself reveals its affiliations with volume 1.

BRYN MAWR COLLEGE
UNIVERSITY OF CHICAGO
MARCH, 1934.

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PREFACE

§1. A DEFINITION OF PRAGMATIC AND PRAGMATISM*^E

1. *Pragmatic anthropology*, according to Kant,† is practical ethics.

Pragmatic horizon is the adaptation of our general knowledge to influencing our morals.

2. The opinion that metaphysics is to be largely cleared up by the application of the following maxim for attaining clearness of apprehension: "Consider what effects, that might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object."

[The doctrine that the whole "meaning" of a conception expresses itself in practical consequences, consequences either in the shape of conduct to be recommended, or in that of experiences to be expected, if the conception be true; which consequences would be different if it were untrue, and must be different from the consequences by which the meaning of other conceptions is in turn expressed. If a second conception should not appear to have other consequences, then it must really be only the first conception under a different name. In methodology it is certain that to trace and compare their respective consequences is an admirable way of establishing the differing meanings of different conceptions.]‡

3. This maxim was first proposed by C. S. Peirce in the *Popular Science Monthly* for January, 1878 (xii. 287);§ and he explained how it was to be applied to the doctrine of reality. The writer was led to the maxim by reflection upon Kant's *Critic of the Pure Reason*. Substantially the same way of dealing with ontology seems to have been practised by the Stoics.

* From "Pragmatic and Pragmatism," *Dictionary of Philosophy and Psychology*, ed. by J. M. Baldwin, The Macmillan Co., New York; vol. 2, pp. 321-322 (1902).

† *Anthropologie in pragmatischer Hinsicht*, Vorrede.

‡ This paragraph was contributed by William James.

§ See 402; 526n.

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The writer subsequently saw that the principle might easily be misapplied, so as to sweep away the whole doctrine of incommensurables, and, in fact, the whole Weierstrassian way of regarding the calculus. In 1896 William James published his *Will to Believe*,* and later† his *Philosophical Conceptions and Practical Results*, which pushed this method to such extremes as must tend to give us pause. The doctrine appears to assume that the end of man is action — a stoical axiom which, to the present writer at the age of sixty, does not recommend itself so forcibly as it did at thirty. If it be admitted, on the contrary, that action wants an end, and that that end must be something of a general description, then the spirit of the maxim itself, which is that we must look to the upshot of our concepts in order rightly to apprehend them, would direct us towards something different from practical facts, namely, to general ideas, as the true interpreters of our thought. Nevertheless, the maxim has approved itself to the writer, after many years of trial, as of great utility in leading to a relatively high grade of clearness of thought. He would venture to suggest that it should always be put into practice with conscientious thoroughness, but that, when that has been done, and not before, a still higher grade of clearness of thought can be attained by remembering that the only ultimate good which the practical facts to which it directs attention can subserve is to further the development of concrete reasonableness‡; so that the meaning of the concept does not lie in any individual reactions at all, but in the manner in which those reactions contribute to that development. Indeed, in the article of 1878, above referred to, the writer practised better than he preached; for he applied the stoical maxim most unstoically, in such a sense as to insist upon the reality of the objects of general ideas in their generality.§

4. A widely current opinion during the last quarter of a century has been that reasonableness is not a good in itself,

* *New World*, pp. 327–47; reprinted in 1897 in *The Will to Believe, and Other Essays in Popular Philosophy*.

† In 1898; *University of California Chronicle*; reprinted in 1920 in *Collected Essays and Reviews*, ed. by R. B. Perry.

‡ See 433 and vol. 1, bk. IV, ch. 4.

§ See 402n³, 429.

but only for the sake of something else. Whether it be so or not seems to be a synthetical question, not to be settled by an appeal to the principle of contradiction — as if a reason for reasonableness were absurd. Almost everybody will now agree that the ultimate good lies in the evolutionary process in some way. If so, it is not in individual reactions in their segregation, but in something general or continuous. Synecism* is founded on the notion that the coalescence, the becoming continuous, the becoming governed by laws, the becoming instinct with general ideas, are but phases of one and the same process of the growth of reasonableness. This is first shown to be true with mathematical exactitude in the field of logic, and is thence inferred to hold good metaphysically. It is not opposed to pragmatism in the manner in which C. S. Peirce applied it, but includes that procedure as a step.

§2. THE ARCHITECTONIC CONSTRUCTION OF PRAGMATISM†

5. . . . Pragmatism was not a theory which special circumstances had led its authors to entertain. It had been designed and constructed, to use the expression of Kant,‡ architectonically. Just as a civil engineer, before erecting a bridge, a ship, or a house, will think of the different properties of all materials, and will use no iron, stone, or cement, that has not been subjected to tests; and will put them together in ways minutely considered, so, in constructing the doctrine of pragmatism the properties of all indecomposable concepts§ were examined and the ways in which they could be compounded. Then the purpose of the proposed doctrine having been analyzed, it was constructed out of the appropriate concepts so as to fulfill that purpose. In this way, the truth of it was proved.¶ There are subsidiary confirmations of its truth; but it is believed that there is no other independent way of strictly proving it. . . .

6. But first, what is its purpose? What is it expected to accomplish? It is expected to bring to an end those prolonged

* See vol. 6, bk. I, B.

† From "Pragmatism" [1], c. 1905.

‡ See *Kritik der reinen Vernunft*, A832, B860.

§ See 1.294ff.

¶ Cf. 27, 469ff.

disputes of philosophers which no observations of facts could settle, and yet in which each side claims to prove that the other side is in the wrong. Pragmatism maintains that in those cases the disputants must be at cross-purposes. They either attach different meanings to words, or else one side or the other (or both) uses a word without any definite meaning. What is wanted, therefore, is a method for ascertaining the real meaning of any concept, doctrine, proposition, word, or other sign. The object of a sign is one thing; its meaning is another. Its object is the thing or occasion, however indefinite, to which it is to be applied. Its meaning is the idea which it attaches to that object, whether by way of mere supposition, or as a command, or as an assertion.

7. Now every simple idea is composed of one of three classes; and a compound idea is in most cases predominantly of one of those classes. Namely, it may, in the first place, be a quality of feeling, which is positively such as it is, and is indescribable; which attaches to one object regardless of every other; and which is *sui generis* and incapable, in its own being, of comparison with any other feeling, because in comparisons it is representations of feelings and not the very feelings themselves that are compared.* [Or, in the second place, the idea may be that of a single happening or fact, which is attached at once to two objects, as an experience, for example, is attached to the experiencer and to the object experienced.†] Or, in the third place, it is the idea of a sign or communication conveyed by one person to another (or to himself at a later time) in regard to a certain object well known to both. . . .‡ Now the bottom meaning of a sign cannot be the idea of a sign, since that latter sign must itself have a meaning which would thereby become the meaning of the original sign. We may therefore conclude that the ultimate meaning of any sign consists either in an idea predominantly of feeling or in one predominantly of acting and being acted on.§ For there ought to be no hesitation in assenting to the view that all those ideas which attach essentially to two objects take their rise from the

* Cf. 1.303ff; 41ff.

† Cf. 1.322ff; 45ff.

‡ Cf. 1.337ff; 59ff.

§ Cf. 3,491.

experience of volition and from the experience of the perception of phenomena which resist direct efforts of the will to annul or modify them.

8. But pragmatism does not undertake to say in what the meanings of all signs consist, but merely to lay down a method of determining the meanings of intellectual concepts, that is, of those upon which reasonings may turn. Now all reasoning that is not utterly vague, all that ought to figure in a philosophical discussion involves, and turns upon, precise necessary reasoning. Such reasoning is included in the sphere of mathematics, as modern mathematicians conceive their science. "Mathematics," said Benjamin Peirce, as early as 1870, "is the science which draws necessary conclusions";* and subsequent writers have substantially accepted this definition, limiting it, perhaps, to precise conclusions. The reasoning of mathematics is now well understood.† It consists in forming an image of the conditions of the problem, associated with which are certain general permissions to modify the image, as well as certain general assumptions that certain things are impossible. Under the permissions, certain experiments are performed upon the image, and the assumed impossibilities involve their always resulting in the same general way. The superior certainty of the mathematician's results, as compared, for example, with those of the chemist, are due to two circumstances. First, the mathematician's experiments being conducted in the imagination upon objects of his own creation, cost next to nothing; while those of the chemist cost dear. Secondly, the assurance of the mathematician is due to his reasoning only concerning hypothetical conditions, so that his results have the generality of his conditions; while the chemist's experiments relating to what will happen as a matter of fact are always open to the doubt whether unknown conditions may not alter. Thus, the mathematician knows that a column of figures will add up the same, whether it be set down in black ink or in red; because he goes on the assumption that the sum of any two numbers of which one is M and the other one more than N will be one more than the sum of M and N ; and this

* "Linear Associative Algebra," §1, *American Journal of Mathematics*, vol. 4, pp. 97-229 (1881).

† See also 4.233ff.

assumption says nothing about the color of the ink. The chemist assumes that when he mixes two liquids in a test-tube, there will or will not be a precipitate whether the Dowager Empress of China happens to sneeze at the time, because his experience has always been that laboratory experiments are not affected by such distant conditions. Still, the solar system is moving through space at a great rate, and there is a bare possibility that it may just then have entered a region in which sneezing has very surprising force.

9. Such reasonings and all reasonings turn upon the idea that if one exerts certain kinds of volition, one will undergo in return certain compulsory perceptions. Now this sort of consideration, namely, that certain lines of conduct will entail certain kinds of inevitable experiences is what is called a "practical consideration." Hence is justified the maxim, belief in which constitutes pragmatism; namely,

In order to ascertain the meaning of an intellectual conception one should consider what practical consequences might conceivably result by necessity from the truth of that conception; and the sum of these consequences will constitute the entire meaning of the conception.

10. Many plausible arguments in favor of this doctrine could easily be adduced; but the only way hitherto discovered of really proving its truth, without in any measure begging the question, is by following the thorny path that we have thus very roughly sketched.

§3. HISTORICAL AFFINITIES AND GENESIS*

11. . . . Any philosophical doctrine that should be completely new could hardly fail to prove completely false; but the rivulets at the head of the river of pragmatism are easily traced back to almost any desired antiquity.

Socrates bathed in these waters. Aristotle rejoices when he can find them. They run, where least one would suspect them, beneath the dry rubbish-heaps of Spinoza. Those clean definitions that strew the pages of the *Essay concerning Humane Understanding* (I refuse to reform the spelling), had been washed out in these same pure springs. It was this medium,

* From "Pragmatism (Editor [3])," c. 1906. For the remainder, see bk.III, ch.1.

and not tar-water, that gave health and strength to Berkeley's earlier works, his *Theory of Vision* and what remains of his *Principles*. From it the general views of Kant derive such clearness as they have. Auguste Comte made still more — much more — use of this element; as much as he saw his way to using. Unfortunately, however, both he and Kant, in their rather opposite ways, were in the habit of mingling these sparkling waters with a certain mental sedative to which many men are addicted — and the burly business men very likely to their benefit, but which plays sad havoc with the philosophical constitution. I refer to the habit of cherishing contempt for the close study of logic.

12. So much for the past. The ancestry of pragmatism is respectable enough; but the more conscious adoption of it as *lanterna pedibus* in the discussion of dark questions, and the elaboration of it into a method in aid of philosophic inquiry came, in the first instance, from the humblest *souche* imaginable. It was in the earliest seventies* that a knot of us young men in Old Cambridge, calling ourselves, half-ironically, half-defiantly, "The Metaphysical Club," — for agnosticism was then riding its high horse, and was frowning superbly upon all metaphysics — used to meet, sometimes in my study, sometimes in that of William James. It may be that some of our old-time confederates would today not care to have such wild-oats-sowings made public, though there was nothing but boiled oats, milk, and sugar in the mess. Mr. Justice Holmes, however, will not, I believe, take it ill that we are proud to remember his membership; nor will Joseph Warner, Esq.† Nicholas St. John Green was one of the most interested fellows, a skillful lawyer and a learned one, a disciple of Jeremy Bentham. His extraordinary power of disrobing warm and breathing truth of the draperies of long worn formulas, was what attracted attention to him everywhere. In particular, he often urged the importance of applying Bain's‡ definition of belief, as "that upon which a man is prepared to act." From this definition, pragmatism is scarce more than a corollary; so that I am disposed to think of

* To judge from the *Letters of William James*, vol. 2, p. 233, there was a meeting of this club in the autumn of 1874.

† A friend of William James, who worked with Mr. Justice Holmes on Kent's *Commentaries*.

‡ Cf. *The Emotions and the Will*, ch. 11, p. 505, 3d ed. (1875).

him as the grandfather of pragmatism. Chauncey Wright,* something of a philosophical celebrity in those days, was never absent from our meetings. I was about to call him our corypheus; but he will better be described as our boxing-master whom we — I particularly — used to face to be severely pummelled. He had abandoned a former attachment to Hamiltonianism to take up with the doctrines of Mill, to which and to its cognate agnosticism he was trying to weld the really incongruous ideas of Darwin. John Fiske and, more rarely, Francis Ellingwood Abbot, were sometimes present, lending their countenances to the spirit of our endeavours, while holding aloof from any assent to their success. Wright, James, and I were men of science, rather scrutinizing the doctrines of the metaphysicians on their scientific side than regarding them as very momentous spiritually. The type of our thought was decidedly British. I, alone of our number, had come upon the threshing-floor of philosophy through the doorway of Kant, and even my ideas were acquiring the English accent.

13. Our metaphysical proceedings had all been in winged words (and swift ones, at that, for the most part), until at length, lest the club should be dissolved, without leaving any material *souvenir* behind, I drew up a little paper expressing some of the opinions that I had been urging all along under the name of pragmatism. This paper was received with such unlooked-for kindness, that I was encouraged, some half dozen years later, on the invitation of the great publisher, Mr. W. H. Appleton, to insert it, somewhat expanded, in the *Popular Science Monthly* for November, 1877 and January, 1878, not with the warmest possible approval of the Spenserian editor, Dr. Edward Youmans. The same paper appeared the next year in a French redaction in the *Revue Philosophique* (Vol. VI, 1878, p. 553; Vol. VII, 1879, p. 39). In those medieval times, I dared not in type use an English word to express an idea unrelated to its received meaning. The authority of Mr. Principal Campbell† weighed too heavily upon my conscience. I had not yet come to perceive, what is so plain today, that if philosophy is ever to stand in the ranks of the sciences, literary elegance must be sacri-

* See 64.

† Author of a textbook on rhetoric in use at Harvard College in Peirce's day.

ficed — like the soldier's old brilliant uniforms — to the stern requirements of efficiency, and the philosopher must be encouraged — yea, and required — to coin new terms to express such new scientific concepts as he may discover, just as his chemical and biological brethren are expected to do. Indeed, in those days, such brotherhood was scorned, alike on the one side and on the other — a lamentable but not surprising state of scientific feeling. As late as 1893, when I might have procured the insertion of the word pragmatism in the *Century Dictionary*, it did not seem to me that its vogue was sufficient to warrant that step.¹

¹ *Pragmatism*. It is a singular instance of that over-modesty and unyielding self-underestimate on my part of which I am so justly proud as my principal claim to distinction that I should have omitted *pragmatism*, my own offspring, with which the world resounds. See Baldwin's *Dictionary* where is my original definition of 1878 and an exegesis, not very deep, of William James. Pragmatism is a method in philosophy. *Philosophy* is that branch of positive science (*i.e.*, an investigating theoretical science which inquires what is the fact, in contradistinction to pure mathematics which merely seeks to know what follows from certain hypotheses) which makes no observations but contents itself with so much of experience as pours in upon every man during every hour of his waking life. The study of philosophy consists, therefore, in reflexion, and *pragmatism* is that method of reflexion which is guided by constantly holding in view its purpose and the purpose of the ideas it analyzes, whether these ends be of the nature and uses of action or of thought.

“. . . the whole subsequent argument has already had its main lines mapped out by our introductory discussion of that *Wellanschauung* which Professor James has called *pragmatism*.” — F. C. S. Schiller (in *Personal Idealism*, edited by Henry Cecil Sturt, 1902, p. 63).

The passage of Professor James here alluded to is as follows: “. . . Mr. Charles Sanders Peirce has rendered thought a service by disentangling from the particulars of its application the principle by which these men were instinctively guided, and by singling it out as fundamental and giving to it a Greek name. He calls it the principle of *pragmatism*.” — William James, *The Varieties of Religious Experience*, 1902, p. 444.

It will be seen [from the original statement] that *pragmatism* is not a *Wellanschauung* but is a method of reflexion having for its purpose to render ideas clear.

Pragmatic, a., Having the character of pragmatism, as a method in philosophy.

Pragmatist, n., in philosophy, one who professes to practice pragmatism. Thus Schiller of Oxford, author of *Riddles of the Sphinx*, is a pragmatist, although he does not very thoroughly understand the nature of pragmatism. — From Peirce's personal interleaved copy of the *Century Dictionary*, c. 1902.

BOOK I
LECTURES ON PRAGMATISM^{P*}

* Delivered at Cambridge, Massachusetts, March 26 to May 17, 1903; James described them in his *Pragmatism*, p. 5, as "flashes of brilliant light relieved against Cimmerian darkness." He states that they were delivered at the Lowell Institute; the available records, however, show that they were given in Sever Hall, Harvard, under the auspices of the Harvard department of philosophy.

PRAGMATISM AND PRAGMATICISM

LECTURE I

PRAGMATISM: THE NORMATIVE SCIENCES

§1. TWO STATEMENTS OF THE PRAGMATIC MAXIM

14. A certain maxim of Logic which I have called *Pragmatism* has recommended itself to me for divers reasons and on sundry considerations. Having taken it as my guide in most of my thought, I find that as the years of my knowledge of it lengthen, my sense of the importance of it presses upon me more and more. If it is only true, it is certainly a wonderfully efficient instrument. It is not to philosophy only that it is applicable. I have found it of signal service in every branch of science that I have studied. My want of skill in practical affairs does not prevent me from perceiving the advantage of being well imbued with pragmatism in the conduct of life.

15. Yet I am free to confess that objections to this way of thinking have forced themselves upon me and have been found more formidable the further my plummet has been dropped into the abyss of philosophy, and the closer my questioning at each new attempt to fathom its depths.

I propose, then, to submit to your judgment in half a dozen lectures an examination of the *pros* and *cons* of pragmatism by means of which I hope to show you the result of allowing to both *pros* and *cons* their full legitimate values. With more time I would gladly follow up the guiding thread so caught up and go on to ascertain what are the veritable conclusions, or at least the genera of veritable conclusions to which a carefully rectified pragmatism will truly lead. If you find what I say acceptable, you will have learned something worth your while. If you can refute me, the gain will be chiefly on my side; but even in that I anticipate your acknowledging, when I take my leave of you, that the discussion has not been without profit; and in future years I am confident that you will

recur to these thoughts and find that you have more to thank me for than you could understand at first.

16. I suppose I may take it for granted that you all know what *pragmatism* is. I have met with a number of definitions of it lately, against none of which I am much disposed to raise any violent protest. Yet to say exactly what pragmatism is describes pretty well what you and I have to puzzle out together.

We must start with some rough approximation of it, and I am inclined to think that the shape in which I first stated [it] will be the most useful one to adopt as matter to work upon, chiefly because it is the form most personal to your lecturer, and [upon] which for that reason he can discourse most intelligently. Besides pragmatism and personality are more or less of the same kidney.

17. I sent forth my statement in January 1878; and for about twenty years never heard from it again. I let fly my dove; and that dove has never come back to me to this very day. But of late quite a brood of young ones have been fluttering about, from the feathers of which I might fancy that mine had found a brood. To speak plainly, a considerable number of philosophers have lately written as they might have written in case they had been reading either what I wrote but were ashamed to confess it, or had been reading something that some reader of mine had read. For they seem quite disposed to adopt my term *pragmatism*. I shouldn't wonder if they were ashamed of me. What could be more humiliating than to confess that one has learned anything of a logician? But for my part I am delighted to find myself sharing the opinions of so brilliant a company. The new pragmatists seem to be distinguished for their terse, vivid and concrete style of expression together with a certain buoyancy of tone as if they were conscious of carrying about them the master key to all the secrets of metaphysics.

Every metaphysician is supposed to have some radical fault to find with every other, and I cannot find any direr fault to find with the new pragmatists than that they are *lively*. In order to be deep it is requisite to be dull.

18. On their side, one of the faults that I think they might find with me is that I make pragmatism to be a mere maxim

of logic instead of a sublime principle of speculative philosophy. In order to be admitted to better philosophical standing I have endeavored to put pragmatism as I understand it into the same form of a philosophical theorem. I have not succeeded any better than this:

Pragmatism is the principle that every theoretical judgment expressible in a sentence in the indicative mood is a confused form of thought whose only meaning, if it has any, lies in its tendency to enforce a corresponding practical maxim expressible as a conditional sentence having its apodosis in the imperative mood.

But the Maxim of Pragmatism, as I originally stated it, *Revue philosophique* VII, is as follows:

Considérer quels sont les effets pratiques que nous pensons pouvoir être produits par l'objet de notre conception. La conception de tous ces effets est la conception complète de l'objet. [p. 48.]

Pour développer le sens d'une pensée, il faut donc simplement déterminer quelles habitudes elle produit, car le sens d'une chose consiste simplement dans les habitudes qu'elle implique. Le caractère d'une habitude dépend de la façon dont elle peut nous faire agir non pas seulement dans telle circonstance probable, mais dans toute circonstance possible, si improbable qu'elle puisse être. Ce qu'est une habitude dépend de ces deux points: quand et comment elle fait agir. Pour le premier point: quand? tout stimulant à l'action dérive d'une perception; pour le second point: comment? le but de toute action est d'amener au résultat sensible. Nous atteignons ainsi le tangible et le pratique comme base de toute différence de pensée, si subtile qu'elle puisse être. [p. 47.]

§2. THE MEANING OF PROBABILITY

19. The utility of the maxim, provided it is only true, appears in a sufficient light in the original article. I will here add a few examples which were not given in that paper.

There are many problems connected with probabilities which are subject to doubt. One of them, for example, is this: Suppose an infinitely large company of infinitely rich men sit down to play against an infinitely rich bank at a game of

chance, at which neither side has any advantage, each one betting a franc against a franc at each bet. Suppose that each player continues to play until he has netted a gain of one franc and then retires, surrendering his place to a new player.

The chance that a player will ultimately net a gain of a franc may be calculated as follows:

Let X_L be a player's chance, if he were to continue playing indefinitely, of ever netting a gain of 1 franc.

But after he has netted a gain of 1 franc, his chance of doing which is X_1 , he is no richer than before, since he is infinitely rich. Consequently his chance of winning the second franc, after he has won the first, is the same as his chance of winning the first franc. That is, it is X_1 and his chance of winning both is $X_2 = (X_1)^2$. And so in general, $X_L = (X_1)^L$.

Now his chance of netting a gain of 1 franc, X_1 , is the sum of the chances of the two ways in which it may come about; namely by first winning the first bet of which the chance is $\frac{1}{2}$, and by first losing the first bet and then netting a gain of 2 francs of which the chance is $\frac{1}{2}X_1^2$.

Therefore

$$X_1 = \frac{1}{2} + \frac{1}{2}X_1^2$$

or
$$X_1^2 - 2X_1 + 1 = 0$$

or
$$(X_1 - 1)^2 = 0.$$

But if the square of a number is zero, the number itself is zero. Therefore

$$X_1 - 1 = 0$$

or
$$X_1 = 1.$$

Consequently, the books would say it was dead certain that any player will ultimately net his winning of a franc and retire. If so it must be certain that *every* player would win his franc and would retire.

Consequently there would be a continual outflow of money from the bank. And yet, since the game is an even one, the banker would not net any loss. How is this paradox to be explained?

20. The theory of probabilities is full of paradoxes and puzzles. Let us, then, apply the maxim of pragmatism to the solution of them.

In order to do this, we must ask *What is meant by saying that the probability of an event has a certain value, p?* According

to the maxim of pragmatism, then, we must ask what practical difference it can make whether the value is p or something else. Then we must ask how are probabilities applied to practical affairs. The answer is that the great business of insurance depends upon it. Probability is used in insurance to determine how much must be paid on a certain risk to make it safe to pay a certain sum if the event insured against should occur. Then, we must ask how can it be safe to engage to pay a large sum if an uncertain event occurs. The answer is that the insurance company does a very large business and is able to ascertain pretty closely out of a thousand risks of a given description how many in any one year will be losses. The business problem is this. The number of policies of a certain description that can be sold in a year will depend on the price set upon them. Let p be that price, and let n be the number that can be sold at that price, so that the larger p is, the smaller n will be. Now n being a large number a certain proportion q of these policies, qn in all, will be losses during the year; and if l be the loss on each, qnl will be the total loss. Then what the insurance company has to do is to set p at such a figure that $pn - qln$ or $(p - ql)n$ shall reach its maximum possible value.

The solution of this equation is:

$$p = ql + \frac{\delta p}{\delta n}(n)$$

where $\frac{\delta p}{\delta n}$ is the amount by which the price would have to be

lowered in order to sell one policy more. Of course if the price were raised instead of lowered just one policy fewer would be sold.

For then by so lowering the profit from being

$$(p - ql)n$$

[it] would be changed to

$$\left(p - ql - \frac{\delta p}{\delta n}\right)(n + 1)$$

that is to

$$(p - ql)n + p - ql - \frac{\delta p}{\delta n}(n + 1)$$

and this being less than before $ql + \frac{\delta p}{\delta n}(n+1) > p$

and by raising it, the change would be to

$$\left(p - ql + \frac{\delta p}{\delta n}\right)(n-1)$$

that is to

$$(p - ql)n - p + ql + \frac{\delta p}{\delta n}(n-1)$$

and this being less than before

$$p > ql + \frac{\delta p}{\delta n}(n-1)$$

so since p is intermediate between

$$ql + \frac{\delta p}{\delta n}n + \frac{\delta p}{\delta n} \text{ and } ql + \frac{\delta p}{\delta n}n - \frac{\delta p}{\delta n}$$

and $\frac{\delta p}{\delta n}$ is very small, it must be close to the truth to write

$$p = ql + \frac{\delta p}{\delta n}(n).$$

21. This is the problem of insurance. Now in order that probability may have any bearing on this problem, it is obvious that it must be of the nature of a *real fact* and not a mere *state of mind*. For facts only enter into the solution of the problem of insurance. And this fact must evidently be a fact of statistics.

Without now going into certain reasons of detail that I should enter into if I were lecturing on probabilities, it must be that probability is a *statistical ratio*; and further, in order to satisfy still more special conditions, it is convenient, for the class of problems to which insurance belongs, to make it the statistical ratio of the number of experiential occurrences of a specific kind to the number of experiential occurrences of a generic kind, in the long run.*

In order, then, that probability should mean anything, it will be requisite to specify to what *species* of event it refers and to what *genus* of event it refers.

* Cf. 2.661f.

It also refers to a *long run*, that is, to an indefinitely long series of occurrences taken together in the order of their occurrence in possible experience.

In this view of the matter, we note, to begin with, that a given species of event considered as belonging to a given genus of events does not necessarily have any definite probability. Because [it may be the case that] the probability is the ratio of one infinite multitude to another. Now infinity divided by infinity is altogether indeterminate, except in special cases.

22. It is very easy to give examples of events that have no definite probability. If a person agrees to toss up a cent again and again forever and beginning as soon as the first head turns up whenever two heads are separated by any odd number of tails in the succession of throws, to pay 2 to that power in cents, provided that whenever the two successive heads are separated by any even number of throws he receives 2 to that power in cents,¹ it is impossible to say what the probability will be that he comes out a winner. In half of the cases after the first head the next throw will be a head and he will receive $(-2)^0 = 1$ cent. Which since it happens half the time will be in the long run a winning of $\frac{1}{2}$ a cent per head thrown.

But in half of the other half the cases, that is in $\frac{1}{4}$ of all the cases, one tail will intervene and he will have to receive $(-2)^1 = -2$ cents, i.e., he will have to pay 2 cents, which happening $\frac{1}{4}$ of the time will make an average loss of $\frac{1}{2}$ a cent per head thrown.

But in half the remaining quarter of the cases, i.e., of all the cases, two tails will intervene and he will receive $(-2)^2 = 4$ cents which happening one every eight times will be worth $\frac{1}{2}$ a cent per head thrown and so on; so that his account in the long run will be $\frac{1}{2} - \frac{1}{2} + \frac{1}{2} - \frac{1}{2} + \frac{1}{2} - \frac{1}{2} + \frac{1}{2} - \frac{1}{2}$ *ad infinitum*, the sum of which may be $\frac{1}{2}$ or may be *zero*. Or rather it is quite indeterminate.

If instead of being paid $(-2)^n$ when n is the number of intervening tails, he were paid $(-2)^{n^2}$ the result would be he would probably either win or lose enormously without

¹ I.e., he receives $(-2)^{n^2}$ cents if n tails intervene between two successive heads.

there being any definite probability that it would be winning rather than losing.

I think I may recommend this game with confidence to gamblers as being the most frightful ruin yet invented; and a little cheating would do everything in it.

23. Now let us revert to our original problem* and consider the state of things after every other bet. After the second, $\frac{1}{4}$ of the players will have gained, gone out, and been replaced by players who have gained and gone out, so that a number of francs equal to half the number of seats will have been paid out by the bank, $\frac{1}{4}$ of the players will have gained and gone out and been replaced by players who have lost, making the bank even; $\frac{1}{4}$ of the players will have lost and then gained, making the bank and them even; $\frac{1}{4}$ of the players will have lost twice, making a gain to the bank of half as many francs as there are seats at the table. The bank then will be where it was. Players to the number of three-quarters of the seats will have netted their franc each; but players to the number of a quarter of the seats will have lost two francs each and another equal number one franc each, just paying for the gains of those who have retired.

That is the way it will happen every time.

Just before the fifth bet of the players at the table, $\frac{3}{8}$ will have lost nothing, $\frac{1}{4}$ will have lost one franc, $\frac{1}{4}$ two francs, $\frac{1}{16}$ three francs and $\frac{1}{16}$ four francs. Thus some will always have lost a good deal. Those who sit at the table will among them always have paid just what those who have gone out have carried away.

24. But it will be asked: How then can it happen that *all* gain? I reply that I never said that all would gain, I only said that the probability was 1 that anyone would ultimately gain his franc. But does not probability 1 mean certainty? Not at all, it only means that the ratio of the number of those who ultimately gain to the total number is 1. Since the number of seats at the table is infinite the ratio of the number of those who never gain to the number of seats may be zero and yet they may be infinitely numerous. So that probabilities 1 and 0 are very far from corresponding to certainty *pro* and *con*.†

* See 19.

† Cf. 1.88, 2.647.

§3. THE MEANING OF "PRACTICAL" CONSEQUENCES

25. If I were to go into practical matters, the advantage of pragmatism, of looking at the substantial practical issue, would be still more apparent. But here pragmatism is generally practised by successful men. In fact, the genus of efficient men [is] mainly distinguished from inefficient precisely by this.

26. There is no doubt, then, that pragmatism opens a very easy road to the solution of an immense variety of questions. But it does not at all follow from that, that it is true. On the contrary, one may very properly entertain a suspicion of any method which so resolves the most difficult questions into easy problems. No doubt Ockham's razor is logically sound. A hypothesis should be stripped of every feature which is in no wise called for to furnish an explanation of observed facts. *Entia non sunt multiplicanda praeter necessitatem*; only we may very well doubt whether a very simple hypothesis can contain every factor that is necessary. Certain it is that most hypotheses which at first seemed to unite great simplicity with entire sufficiency have had to be greatly complicated in the further progress of science.

27. What is the *proof* that the possible practical consequences of a concept constitute the sum total of the concept? The argument upon which I rested the maxim in my original paper* was that *belief* consists mainly in being deliberately prepared to adopt the formula believed in as the guide to action. If this be in truth the nature of belief, then undoubtedly the proposition believed in can itself be nothing but a maxim of conduct. That I believe is quite evident.

28. But how do we know that belief is nothing but the deliberate preparedness to act according to the formula believed?

My original article carried this back to a psychological principle. The conception of truth, according to me, was developed out of an original impulse to act consistently, to have a definite intention. But in the first place, this was not very clearly made out, and in the second place, I do not think it

* See 394ff.

satisfactory to reduce such fundamental things to facts of psychology. For man could alter his nature, or his environment would alter it if he did not voluntarily do so, if the impulse were not what was advantageous or fitting. Why has evolution made man's mind to be so constructed? That is the question we must nowadays ask, and all attempts to ground the fundamentals of logic on psychology are seen to be essentially shallow.

29. The question of the nature of belief, or in other words the question of what the true logical analysis of the act of judgment is, is the question upon which logicians of late years have chiefly concentrated their energies. Is the pragmatistic answer satisfactory?

Do we not all perceive that *judgment* is something closely allied to *assertion*?* That is the view that ordinary speech entertains. A man or woman will be heard to use the phrase, "I says to myself." That is, *judgment* is held to be either no more than an *assertion to oneself* or at any rate something very like that.

30. Now it is a fairly easy problem to analyze the nature of *assertion*.† To find an easily dissected example, we shall naturally take a case where the assertive element is magnified — a very formal assertion, such as an affidavit. Here a man goes before a notary or magistrate and takes such action that if what he says is not true, evil consequences will be visited upon him, and this he does with a view to thus causing other men to be affected just as they would be if the proposition sworn to had presented itself to them as a perceptual fact.

We thus see that the act of assertion is an act of a totally different nature from the act of apprehending the meaning of the proposition and we cannot expect that any analysis of what assertion is (or any analysis of what *judgment* or *belief* is, if that act is at all allied to assertion), should throw any light at all on the widely different question of what the apprehension of the meaning of a proposition is.

31. What is the difference between making an *assertion* and *laying a wager*? Both are acts whereby the agent deliberately subjects himself to evil consequences if a certain proposi-

* Cf. 2.334, 2.435ff.

† Cf. 2.332ff, 3.432f.

tion is not true. Only when he offers to bet he hopes the other man will make himself responsible in the same way for the truth of the contrary proposition; while when he makes an *assertion* he always (or almost always) wishes the man to whom he makes it to be led to do what he does. Accordingly in our vernacular "I will bet" so and so, is the phrase expressive of a private opinion which one does not expect others to share, while "You bet" is a form of assertion intended to cause another to follow suit.

32. Such then seems at least in a preliminary glance at the matter to be a satisfactory account of assertion. Now let us pass to judgment and belief. There can, of course, be no question that a man will act in accordance with his belief so far as his belief has any practical consequences. The only doubt is whether this is *all* that belief is, whether belief is a mere nullity so far as it does not influence conduct. What possible effect upon conduct can it have, for example, to believe that the diagonal of a square is incommensurable with the side? Name a discrepancy ϵ no matter how small, and the diagonal differs from a rational quantity by much less than that. Professor Newcomb in his calculus and all mathematicians of his rather antiquated fashion think that they have proved two quantities to be equal when they have proved that they differ by less than any assignable quantity. I once tried hard to make Newcomb say whether the diagonal of the square differed from a rational fraction of the side or not; but he saw what I was driving at and would not answer. The proposition that the diagonal is incommensurable has stood in the textbooks from time immemorial without ever being assailed and I am sure that the most modern type of mathematician holds to it most decidedly. Yet it seems quite absurd to say that there is any objective practical difference between commensurable and incommensurable.*

33. Of course you can say if you like that the act of expressing a quantity as a rational fraction is a piece of conduct and that it is in itself a practical difference that one kind of quantity can be so expressed and the other not. But a thinker must be shallow indeed if he does not see that to admit a species of practicality that consists in one's conduct about

* Cf. 3,203f, 539, 541.

words and modes of expression is at once to break down all the bars against the nonsense that pragmatism is designed to exclude.

What the pragmatist has his pragmatism for is to be able to say: here is a definition and it does not differ at all from your confusedly apprehended conception because there is no *practical* difference. But what is to prevent his opponent from replying that there is a practical difference which consists in his recognizing one as his conception and not the other? That is, one is expressible in a way in which the other is not expressible.

Pragmatism is completely volatilized if you admit that sort of practicality.

§4. THE RELATIONS OF THE NORMATIVE SCIENCES*

34. It must be understood that all I am now attempting to show is that Pragmatism is apparently a matter of such great probable concern, and at the same time so much doubt hangs over its legitimacy, that it will be well worth our while to make a methodical, scientific, and thorough examination of the whole question, so as to make sure of our ground, and obtain some secure method for such a preliminary filtration of questions as pragmatism professes to furnish.

Let us, then, enter upon this inquiry. But before doing so let us mark out the proposed course of it. That should always be done in such cases, even if circumstances subsequently require the plan to be modified, as they usually will.

Although our inquiry is to be an inquiry into truth, whatever the truth may turn out to be, and therefore, of course, is not to be influenced by any liking for pragmatism or any pride in it as an American doctrine, yet still we do not come to this inquiry, any more than anybody comes to any inquiry, in that blank state that the lawyers pretend to insist upon as desirable, though I give them credit for enough common-sense to know better.

35. We have some reason already to think there is some truth in pragmatism although we also have some reason to

* Cf. 108f., 1.191, 1.574, 1.611f.

think that there is something wrong with it. For unless both branches of this statement were true we should do wrong to waste time and energy upon the inquiry we are undertaking.

I will, therefore, presume that there is enough truth in it to render a preliminary glance at ethics desirable. For if, as pragmatism teaches us, what we think is to be interpreted in terms of what we are prepared to do, then surely *logic*, or the doctrine of what we ought to think, must be an application of the doctrine of what we deliberately choose to do, which is Ethics.

36. But we cannot get any clue to the secret of Ethics — a most entrancing field of thought but soon broadcast with pitfalls — until we have first made up our formula for what it is that we are prepared to admire. I do not care what doctrine of ethics be embraced, it will always be so. Suppose, for example, our maxim of ethics to be Pearson's* that all our action ought to be directed toward the perpetuation of the biological stock to which we belong. Then the question will arise, On what principle should it be deemed such a fine thing for this stock to survive — or a fine thing at all? Is there nothing in the world or *in posse* that would be admirable *per se* except copulation and swarming? Is swarming a fine thing at all, apart from any results that it may lead to? The course of thought will follow a parallel line if we consider Marshall's ethical maxim: Act to restrain the impulses which demand immediate reaction, in order that the impulse-order determined by the existence of impulses of less strength, but of wider significance, may have full weight in the guidance of your life. Although I have not as clear an apprehension as I could wish of the philosophy of this very close, but too technical, thinker, yet I presume that he would not be among those who would object to making Ethics dependent upon Esthetics. Certainly, the maxim which I have just read to you from his latest book† supposes that it is a fine thing for an impulse to have its way, but yet not an equally fine thing for one impulse to have its way and for another impulse to have

* See his *Grammar of Science*, Introduction, pp. 26–27, where he seems to say that society must not allow a bad stock to perpetuate itself.

† Henry Rutgers Marshall's *Instinct and Reason*, p. 569, Macmillan Co. (1898).

its way. There is a preference which depends upon the *significance* of impulses, whatever that may mean. It supposes that there is some ideal state of things which, regardless of how it should be brought about and independently of any ulterior reason whatsoever, is held to be good or fine. In short, ethics must rest upon a doctrine which, without at all considering what our conduct is to be, divides ideally possible states of things into two classes, those that would be admirable and those that would be unadmirable, and undertakes to define precisely what it is that constitutes the admirableness of an ideal. Its problem is to determine by analysis what it is that one ought deliberately to admire *per se* in itself regardless of what it may lead to and regardless of its bearings upon human conduct. I call that inquiry *Esthetics*, because it is generally said that the three normative sciences are logic, ethics, and esthetics, being the three doctrines that distinguish good and bad; *Logic* in regard to representations of truth, *Ethics* in regard to efforts of will, and *Esthetics* in objects considered simply in their presentation. Now that third Normative science can, I think, be no other than that which I have described. It is evidently the basic normative science upon which as a foundation, the doctrine of ethics must be reared to be surmounted in its turn by the doctrine of logic.

37. But before we can attack any normative science, any science which proposes to separate the sheep from the goats, it is plain that there must be a preliminary inquiry which shall justify the attempt to establish such dualism. This must be a science that does not draw any distinction of good and bad in any sense whatever, but just contemplates phenomena as they are, simply opens its eyes and describes what it sees; not what it sees in the real as distinguished from figment — not regarding any such dichotomy — but simply describing the object, as a phenomenon, and stating what it finds in all phenomena alike. This is the science which Hegel made his starting-point, under the name of the *Phänomenologie des Geistes* — although he considered it in a fatally narrow spirit, since he restricted himself to what *actually* forces itself on the mind and so colored his whole philosophy with the ignorance of the distinction of essence and existence and so gave it the nominalistic and I might say in a certain sense the *pragma-*

toidal character in which the worst of the Hegelian errors have their origin. I will so far follow Hegel as to call this science *Phenomenology* although I will not restrict it to the observation and analysis of *experience* but extend it to describing all the features that are common to whatever is *experienced* or might conceivably be experienced or become an object of study in any way direct or indirect.*

38. Hegel was quite right in holding that it was the business of this science to bring out and make clear the *Categories* or fundamental modes. He was also right in holding that these *Categories* are of two kinds; the Universal Categories all of which apply to everything, and the series of categories consisting of phases of evolution.

As to these latter, I am satisfied that Hegel has not approximated to any correct catalogue of them. It may be that here and there, in the long wanderings of his *Encyclopædia* he has been a little warmed by the truth. But in all its main features his catalogue is utterly wrong, according to me. I have made long and arduous studies of this matter, but I have not been able to draw up any catalogue that satisfies me. My studies, † if they are ever published, will I believe be found helpful to future students of this most difficult problem, but in these lectures I shall have little to say on that subject. The case is quite different with the three Universal Categories, which Hegel, by the way, does not look upon as Categories at all, or at least he does not call them so, but as three stages of thinking. In regard to these, it appears to me that Hegel is so nearly right that my own doctrine might very well be taken for a variety of Hegelianism, although in point of fact it was determined in my mind by considerations entirely foreign to Hegel, at a time when my attitude toward Hegelianism was one of contempt. There was no influence upon me from Hegel unless it was of so occult a kind as to entirely escape my ken; and if there was such an occult influence, it strikes me as about as good an argument for the essential truth of the doctrine, as is the coincidence that Hegel and I arrived in quite independent ways substantially to the same result.

39. This science of Phenomenology, then, must be taken

* See vol. 1, bk. III for a detailed study of phenomenology.

† Cf. 43, 1.525.

5.40] PRAGMATISM AND PRAGMATICISM

as the basis upon which normative science is to be erected, and accordingly must claim our first attention.

This science of Phenomenology is in my view the most primal of all the positive sciences. That is, it is not based, as to its principles, upon any other *positive science*. By a *positive science* I mean an inquiry which seeks for positive knowledge; that is, for such knowledge as may conveniently be expressed in a *categorical proposition*. Logic and the other normative sciences, although they ask, not what *is* but what *ought to be*, nevertheless are positive sciences since it is by asserting positive, categorical truth that they are able to show that what they call good really is so; and the right reason, right effort, and right being, of which they treat, derive that character from positive categorical fact.

40. Perhaps you will ask me whether it is possible to conceive of a science which should not aim to declare that something is positively or categorically true. I reply that it is not only possible to conceive of such a science, but that such science exists and flourishes, and Phenomenology, which does not depend upon any other *positive science*, nevertheless must, if it is to be properly grounded, be made to depend upon the Conditional or Hypothetical Science of *Pure Mathematics*, whose only aim is to discover not how things actually are, but how they might be supposed to be, if not in our universe, then in some other.* A Phenomenology which does not reckon with pure mathematics, a science hardly come to years of discretion when Hegel wrote, will be the same pitiful club-footed affair that Hegel produced.

* See 4.232f.

LECTURE II*

THE UNIVERSAL CATEGORIES

§1. PRESENTNESS†

41. . . . Be it understood, then, that what we have to do, as students of phenomenology, is simply to open our mental eyes and look well at the phenomenon and say what are the characteristics that are never wanting in it, whether that phenomenon be something that outward experience forces upon our attention, or whether it be the wildest of dreams, or whether it be the most abstract and general of the conclusions of science.

42.‡ The faculties which we must endeavor to gather for this work are three. The first and foremost is that rare faculty, the faculty of seeing what stares one in the face, just as it presents itself, unreplaced by any interpretation, unsophisticated by any allowance for this or for that supposed modifying circumstance. This is the faculty of the artist who sees for example the apparent colors of nature as they appear. When the ground is covered by snow on which the sun shines brightly except where shadows fall, if you ask any ordinary man what its color appears to be, he will tell you white, pure white, whiter in the sunlight, a little greyish in the shadow. But that is not what is before his eyes that he is describing; it is his theory of what *ought* to be seen. The artist will tell him that the shadows are not grey but a dull blue and that the snow in the sunshine is of a rich yellow. That artist's observational power is what is most wanted in the study of phenomenology. The second faculty we must strive to arm ourselves with is a resolute discrimination which fastens itself like a bulldog upon the particular feature that we are studying, follows it wher-

* Second draught. On the first page Peirce wrote "This won't do; it will have to be rewritten"; but no later draught of this part has been found. The third draught is given in 59-65.

† Cf. 1.300ff.

‡ Cf. 1.43.

ever it may lurk, and detects it beneath all its disguises. The third faculty we shall need is the generalizing power of the mathematician who produces the abstract formula that comprehends the very essence of the feature under examination purified from all admixture of extraneous and irrelevant accompaniments.

43. A very moderate exercise of this third faculty suffices to show us that the word *Category* bears substantially the same meaning with all philosophers. For Aristotle, for Kant, and for Hegel, a category is an element of phenomena of the first rank of generality. It naturally follows that the categories are few in number, just as the chemical elements are. The business of phenomenology is to draw up a catalogue of categories and prove its sufficiency and freedom from redundancies, to make out the characteristics of each category, and to show the relations of each to the others. I find that there are at least two distinct orders of categories, which I call the particular and the universal. The particular categories form a series, or set of series, only one of each series being present, or at least predominant, in any one phenomenon. The universal categories, on the other hand, belong to every phenomenon, one being perhaps more prominent in one aspect of that phenomenon than another but all of them belonging to every phenomenon. I am not very well satisfied with this description of the two orders of categories, but I am pretty well satisfied that there are two orders. I do not recognize them in Aristotle, unless the predicaments and the predicables are the two orders. But in Kant we have Unity, Plurality, and Totality not all present at once; Reality, Negation, and Limitation not all present at once; Inherence, Causation, and Reaction not all present at once; Possibility, Necessity, and Actuality not all present at once. On the other hand Kant's four greater categories, Quantity, Quality, Relation, and Modality, form what I should recognize as Kant's Universal Categories. In Hegel his long list which gives the divisions of his *Encyclopædia* are his Particular Categories. His three stages of thought, although he does not apply the word *Category* to them, are what I should call Hegel's Universal Categories. My intention this evening is to limit myself to the Universal, or Short List of Categories, and I may say, at once, that I consider Hegel's three stages

as being, roughly speaking, the correct list of Universal Categories. . . .

44. When anything is present to the mind, what is the very first and simplest character to be noted in it, in every case, no matter how little elevated the object may be? Certainly, it is its *presentness*. So far Hegel is quite right. Immediacy is his word. To say, however, that presentness, presentness as it is present, present presentness, is *abstract*, is Pure Being, is a falsity so glaring, that one can only say that Hegel's theory that the abstract is more primitive than the concrete blinded his eyes to what stood before them. Go out under the blue dome of heaven and look at what is present as it appears to the artist's eye. The poetic mood approaches the state in which the present appears as it is present. Is poetry so abstract and colorless? The present is just what it is regardless of the absent, regardless of past and future. It is such as it is, utterly ignoring anything else. Consequently, it cannot be *abstracted* (which is what Hegel means by the abstract) for the abstracted is what the concrete, which gives it whatever being it has, makes it to be. The present, being such as it is while utterly ignoring everything else, is *positively* such as it is. Imagine, if you please, a consciousness in which there is no comparison, no relation, no recognized multiplicity (since parts would be other than the whole), no change, no imagination of any modification of what is positively there, no reflexion — nothing but a simple positive character. Such a consciousness might be just an odour, say a smell of attar; or it might be one infinite dead ache; it might be the hearing of a piercing eternal whistle. In short, any simple and positive quality of feeling would be something which our description fits that it is such as it is quite regardless of anything else. The quality of feeling is the true psychical representative of the first category of the immediate as it is in its immediacy, of the present in its direct positive presentness. Qualities of feeling show myriad-fold variety, far beyond what the psychologists admit. This variety however is in them only insofar as they are compared and gathered into collections. But as they are in their presentness, each is sole and unique; and all the others are absolute nothingness to it — or rather much less than nothingness, for not even a recognition as absent things or as fictions is accorded

to them. The first category, then, is Quality of Feeling, or whatever is such as it is positively and regardless of aught else.

§2. STRUGGLE*

45. The next simplest feature that is common to all that comes before the mind, and consequently, the second category, is the element of *Struggle*. It is convenient enough, although by no means necessary, to study this, at first, in a psychological instance. Imagine yourself making a strong muscular effort, say that of pressing with all your might against a half-open door. Obviously, there is a sense of resistance. There could not be effort without an equal resistance any more than there could be a resistance without an equal effort that it resists. Action and reaction are equal. If you find that the door is pushed open in spite of you, you will say that it was the person on the other side that acted and you that resisted, while if you succeed in pushing the door to, you will say that it was you who acted and the other person that resisted. In general, we call the one that succeeds by means of his effort the *agent* and the one that fails the *patient*. But as far as the element of Struggle is concerned, there is no difference between being an agent and being a patient. It is the result that decides; but what it is that is deemed to be the result for the purpose of this distinction is a detail into which we need not enter. If while you are walking quietly along the sidewalk a man carrying a ladder suddenly pokes you violently with it in the back of the head and walks on without noticing what he has done, your impression probably will be that he struck you with great violence and that you made not the slightest resistance; although in fact you must have resisted with a force equal to that of the blow. Of course, it will be understood that I am not using force in the modern sense of a moving force but in the sense of Newton's *actio*†; but I must warn you that I have not time to notice such trifles. In like manner, if in pitch darkness a tremendous flash of lightning suddenly comes, you are ready to admit having received a shock and being acted upon, but that you reacted you may be inclined to deny. You certainly did so, however, and are conscious of having

* Cf. 1.322ff.

† See his *Philosophiæ Naturalis Principia Mathematica*, liber I, def. IV.

done so. The sense of shock is as much a sense of resisting as of being acted upon. So it is when anything strikes the senses. The outward excitation succeeds in producing its effect on you, while you in turn produce no discernible effect on it; and therefore you call it the agent, and overlook your own part in the reaction. On the other hand, in reading a geometrical demonstration, if you draw the figure in your imagination instead of on paper, it is so easy to add to your image whatever subsidiary line is wanted, that it seems to you that you have acted on the image without the image having offered any resistance. That it is not so, however, is easily shown. For unless that image had a certain power of persisting such as it is and resisting metamorphosis, and if you were not sensible of its strength of persistence, you never could be sure that the construction you are dealing with at one stage of the demonstration was the same that you had before your mind at an earlier stage. The main distinction between the Inner and the Outer Worlds is that inner objects promptly take any modifications we wish, while outer objects are hard facts that no man can make to be other than they are. Yet tremendous as this distinction is, it is after all only relative. Inner objects do offer a certain degree of resistance and outer objects are susceptible of being modified in some measure by sufficient exertion intelligently directed.*

46. Two very serious doubts arise concerning this category of struggle which I should be able completely to set to rest, I think, with only a little more time. But as it is, I can only suggest lines of reflexion which, if you perseveringly follow out, ought to bring you to the same result to which they have brought me. The first of these doubts is whether this element of struggle is anything more than a very special kind of phenomenon, and withal an anthropomorphic conception and therefore not scientifically true.

The other doubt is whether the idea of Struggle is a simple and irresolvable element of the phenomenon; and in opposition to its being so, two contrary parties will enter into a sort of [alliance] without remarking how deeply they are at variance with one another. One of these parties will be composed of those philosophers who understand themselves as wishing to

* Cf. 1.321, 3.363, 3.527, 4.157.

reduce everything in the phenomenon to qualities of feeling. They will appear in the arena of psychology and will declare that there is absolutely no such thing as a specific sense of effort. There is nothing, they will say, but feelings excited upon muscular contraction, feelings which they may or may not be disposed to say have their immediate excitations within the muscles. The other party will be composed of those philosophers who say that there can be only one absolute and only one irreducible element, and since *Nous* is such an element, *Nous* is really the only thoroughly clear idea there is. These philosophers will take a sort of pragmatistic stand. They will maintain that in saying that one thing acts upon another, absolutely the only thing that can be meant is that there is a *law* according to which under all circumstances of a certain general description certain phenomena will result; and therefore to speak of one thing as acting upon another *hic et nunc* regardless of uniformity, regardless of what will happen on all occasions, is simple nonsense.

47. I shall have to content myself with giving some hints as to how I would meet this second double-headed objection, leaving the first to your own reflexions. In the course of considering the second objection, the universality of the element of struggle will get brought to light without any special arguments to that end. But as to its being unscientific because anthropomorphic, that is an objection of a very shallow kind, that arises from prejudices based upon much too narrow considerations. "Anthropomorphic" is what pretty much all conceptions are at bottom; otherwise other roots for the words in which to express them than the old Aryan roots would have to be found. And in regard to any preference for one kind of theory over another, it is well to remember that every single truth of science is due to the affinity of the human soul to the soul of the universe, imperfect as that affinity no doubt is.* To say, therefore, that a conception is one natural to man, which comes to just about the same thing as to say that it is anthropomorphic, is as high a recommendation as one could give to it in the eyes of an Exact Logician.¹

* Cf. 1.121, 1.316, 2.750.

¹ I would not have anybody accept any doctrine of logic simply because minute and thorough criticism has resulted in making me perfectly confident

48. As for the double-headed objection, I will first glance at that branch of it that rests upon the idea that the conception of action involves the notion of law or uniformity so that to talk of a reaction regardless of anything but the two individual reacting objects is nonsense. As to that I should say that a law of nature left to itself would be quite analogous to a court without a sheriff. A court in that predicament might probably be able to induce some citizen to act as sheriff; but until it had so provided itself with an officer who, unlike itself, could not discourse authoritatively but who could put forth the strong arm, its law might be the perfection of human reason but would remain mere fireworks, *brutum fulmen*. Just so, let a law of nature — say the law of gravitation — remain a mere uniformity — a mere formula establishing a relation between terms — and what in the world should induce a stone, which is not a term nor a concept but just a plain thing, to act in conformity to that uniformity? All other stones may have done so, and this stone too on former occasions, and it would break the uniformity for it not to do so now. But what of that? There is no use talking reason to a stone. It is deaf and it has no reason. I should ask the objector whether he was a nominalist or a scholastic realist. If he is a nominalist, he holds that laws are mere generals, that is, formulæ relating to mere terms; and ordinary good sense ought to force him to acknowledge that there are real connections between individual things

of its truth. But I will not allow this scruple to prevent my saying that for my part — who am characterized in some of the books as a sceptic in philosophy and have even been called a modern Hume [“David Hume Redivivus,” Pt. I of “Mr. Charles S. Peirce’s Onslaught on the Doctrine of Necessity” by Paul Carus in *The Monist*, vol. 2, pp. 560ff.] — I have after long years of the severest examination become fully satisfied that, other things being equal, an anthropomorphic conception, whether it makes the best nucleus for a scientific working hypothesis or not, is far more likely to be approximately true than one that is not anthropomorphic. Suppose, for example, it is a question between accepting Telepathy or Spiritualism. The former I dare say is the preferable working hypothesis because it can be more readily subjected to experimental investigation. But as long as there is no reason for believing it except phenomena that Spiritualism is equally competent to explain, I think Spiritualism is much the more likely to be approximately true, as being the more anthropomorphic and natural idea; and in like manner, as between an old-fashioned God and a modern patent Absolute, recommend me to the anthropomorphic conception if it is a question of which is the more likely to be about the truth. [See vol. 6, bk. II, chs. 4 and 7.]

regardless of mere formulæ. Now any real connection whatsoever between individual things involves a reaction between them in the sense of this category. The objector may, however, take somewhat stronger ground by confessing himself to be a scholastic realist, holding that generals may be real. A law of nature, then, will be regarded by him as having a sort of *esse in futuro*. That is to say they will have a present reality which consists in the fact that events *will* happen according to the formulation of those laws. It would seem futile for me to attempt to reply that when, for example, I make a great effort to lift a heavy weight and perhaps am unable to stir it from the ground, there really is a struggle on this occasion regardless of what happens on other occasions; because the objector would simply admit that on such an occasion I have a quality of feeling which I call a feeling of effort, but he would urge that the only thing which makes this designation appropriate to the feeling is the regularity of connection between this feeling and certain motions of matter.

49. This is a position well enough taken to merit a very respectful reply. But before going into that reply, there is an observation which I should like to lay before the candid objector. Your argument against this category of Struggle is that a struggle regardless of law is not *intelligible*. Yet you have just admitted that my so-called sense of effort involves a peculiar quality of feeling. Now a quality of feeling is not intelligible, either. Nothing can be less so. One can *feel* it, but to comprehend it or express it in a general formula is out of the question. So it appears that unintelligibility does not suffice to destroy or refute a Category. Indeed, if you are to accept scholastic realism, you would seem to be almost bound to admit that *Nous*, or intelligibility, is itself a category; and in that case far from non-intelligibility's refuting a category, intelligibility would do so — that is, would prove that a conception could not be a category distinct from the category of *Nous*, or intelligibility. If it be objected that the unintelligibility of a Quality of Feeling is of a merely privative kind quite different from the aggressive and brutal anti-intelligibility of action regardless of law, the rejoinder will be that if intelligibility be a category, it is not surprising but rather

inevitable that other categories should be in different relations to this one.

50. But without beating longer round the bush, let us come to close quarters. Experience is our only teacher. Far be it from me to enunciate any doctrine of a *tabula rasa*. For, as I said a few minutes ago, there manifestly is not one drop of principle in the whole vast reservoir of established scientific theory that has sprung from any other source than the power of the human mind to *originate* ideas that are true. But this power, for all it has accomplished, is so feeble that as ideas flow from their springs in the soul, the truths are almost drowned in a flood of false notions; and that which experience does is gradually, and by a sort of fractionation, to precipitate and filter off the false ideas, eliminating them and letting the truth pour on in its mighty current.

51. But precisely how does this action of experience take place? It takes place by a series of surprises. There is no need of going into details. At one time a ship is sailing along in the trades over a smooth sea, the navigator having no more positive expectation than that of the usual monotony of such a voyage, when suddenly she strikes upon a rock. The majority of discoveries, however, have been the result of experimentation. Now no man makes an experiment without being more or less inclined to think that an interesting result will ensue; for experiments are much too costly of physical and psychical energy to be undertaken at random and aimlessly. And naturally nothing can possibly be learned from an experiment that turns out just as was anticipated. It is by surprises that experience teaches all she deigns to teach us.

In all the works on pedagogy that ever I read — and they have been many, big, and heavy — I don't remember that any one has advocated a system of teaching by practical jokes, mostly cruel. That, however, describes the method of our great teacher, Experience. She says,

Open your mouth and shut your eyes

And I'll give you something to make you wise;
and thereupon she keeps her promise, and seems to take her pay in the fun of tormenting us.

52. The phenomenon of surprise in itself is highly instructive in reference to this category because of the emphasis it

puts upon a mode of consciousness which can be detected in all perception, namely, a double consciousness at once of an *ego* and a *non-ego*, directly acting upon each other.* Understand me well. My appeal is to observation — observation that each of you must make for himself.

53. The question is what the *phenomenon* is. We make no vain pretense of going beneath phenomena. We merely ask, what is the content of the *Percept*? Everybody should be competent to answer that of himself. Examine the Percept in the particularly marked case in which it comes as a surprise. Your mind was filled [with] an imaginary object that was expected. At the moment when it was expected the vividness of the representation is exalted, and suddenly, when it should come, something quite different comes instead. I ask you whether at that instant of surprise there is not a double consciousness, on the one hand of an Ego, which is simply the expected idea suddenly broken off, on the other hand of the Non-Ego, which is the strange intruder, in his abrupt entrance.

54. The whole question is what the *perceptual facts* are, as given in direct perceptual judgments. By a perceptual judgment, I mean a judgment asserting in propositional form what a character of a percept directly present to the mind is.† The percept of course is not itself a judgment, nor can a judgment in any degree resemble a percept. It is as unlike it as the printed letters in a book, where a Madonna of Murillo is described, are unlike the picture itself.

55. You may adopt any theory that seems to you acceptable as to the psychological operations by which perceptual judgments are formed. For our present purpose it makes no difference what that theory is. All that I insist upon is that those operations, whatever they may be, are utterly beyond our control and will go on whether we are pleased with them or not. Now I say that taking the word "criticize" in the sense it bears in philosophy, that of apportioning praise and blame, it is perfectly idle to criticize anything over which you can exercise no sort of control. You may wisely criticize a reasoning, because the reasoner, in the light of your criticism, will certainly go over his reasoning again and correct it if your

* Cf. 1.334.

† Cf. 115ff, 151ff, 4.539, 4.541.

blame of it was just. But to pronounce an involuntary operation of the mind *good* or *bad*, has no more sense than to pronounce the proportion of weights in which hydrogen and chlorine combine, that of 1 to 35.11 to be *good* or *bad*. I said it was idle; but in point of fact "nonsensical" would have been an apter word.

If, therefore, our careful direct interpretation of perception, and more emphatically of such perception as involves surprise, is that the perception represents two objects reacting upon one another, that is not only a decision from which there is no appeal, but it is downright nonsense to dispute the fact that in perception two objects really do so react upon one another.

56. That, of course, is the doctrine of Immediate Perception which is upheld by Reid, Kant, and all dualists who understand the true nature of dualism, and the denial of which led Cartesians to the utterly absurd theory of divine assistance upon which the preëstablished harmony of Leibniz is but a slight improvement. Every philosopher who denies the doctrine of Immediate Perception — including idealists of every stripe — by that denial cuts off all possibility of ever cognizing a *relation*. Nor will he better his position by declaring that all relations are illusive appearances, since it is not merely true knowledge of them that he has cut off, but every mode of cognitive representation of them.

57.* When a man is surprised he knows that he is surprised. Now comes a dilemma. Does he know he is surprised by direct perception or by inference? First try the hypothesis that it is by inference. This theory would be that a person (who must be supposed old enough to have acquired self-consciousness) on becoming conscious of that peculiar quality of feeling which unquestionably belongs to all surprise, is induced by some reason to attribute this feeling to himself. It is, however, a patent fact that we never, *in the first instance*, attribute a Quality of Feeling to ourselves. We first attribute it to a *Non-Ego* and only come to attribute it to ourselves when irrefragable reasons compel us to do so. Therefore, the theory

* 57 and 58 occur as part of a digression at the end of "Lecture IV." That part of the notebook repeats much of the foregoing, and, with the exception of what follows, is not being published.

would have to be that the man first pronounces the surprising object a *wonder*, and upon reflection convinces himself that it is only a wonder in the sense that he is *surprised*. That would have to be the theory. But it is in conflict with the facts which are that a man is more or less placidly *expecting* one result, and suddenly finds something in contrast to that forcing itself upon his recognition. A duality is thus forced upon him: on the one hand, his expectation which he had been attributing to Nature, but which he is now compelled to attribute to some mere inner world, and on the other hand, a strong new phenomenon which shoves that expectation into the background and occupies its place. The old expectation, which is what he was familiar with, is his inner world, or *Ego*. The new phenomenon, the stranger, is from the exterior world or *Non-Ego*. He does not conclude that he *must* be surprised because the object is so *marvellous*. But on the contrary, it is because of the duality presenting itself as such that he [is] led by generalization to a conception of a quality of marvellousness.

58. Try, then, the other alternative that it is by direct perception, that is, in a direct perceptual judgment, that a man knows that he is surprised. The perceptual judgment, however, certainly does not represent that it is he himself who has played a little trick upon himself. A man cannot startle himself by jumping up with an exclamation of *Boo!* Nor could the perceptual judgment have represented anything so out of nature. The perceptual judgment, then, can only be that it is the *Non-Ego*, something over against the *Ego* and bearing it down, is what has surprised him. But if that be so, this direct perception presents an *Ego* to which the smashed expectation belonged, and the *Non-Ego*, the sadder and wiser man, to which the new phenomenon belongs. . . .

§3. LAWS: NOMINALISM*

59. Thus far, gentlemen, I have been insisting very strenuously upon what the most vulgar common sense has every disposition to assent to and only ingenious philosophers have been able to deceive themselves about. But now I come to a category which only a more refined form of common sense is

* Third draught. Cf. 1.337ff.

prepared willingly to allow, the category which of the three is the chief burden of Hegel's song, a category toward which the studies of the new logico-mathematicians, Georg Cantor and the like, are steadily pointing, but to which no modern writer of any stripe, unless it be some obscure student like myself, has ever done anything approaching to justice. . . .

60. There never was a sounder logical maxim of scientific procedure than Ockham's razor: *Entia non sunt multiplicanda praeter necessitatem*. That is to say; before you try a complicated hypothesis, you should make quite sure that no simplification of it will explain the facts equally well. No matter if it takes fifty generations of arduous experimentation to explode the simpler hypothesis, and no matter how incredible it may seem that that simpler hypothesis should suffice, still fifty generations are nothing in the life of science, which has all time before it; and in the long run, say in some thousands of generations, time will be economized by proceeding in an orderly manner, and by making it an invariable rule to try the simpler hypothesis first. Indeed, one can never be sure that the simpler hypothesis is not the true one, after all, until its cause has been fought out to the bitter end. But you will mark the limitation of my approval of Ockham's razor. It is a sound maxim of *scientific procedure*. If the question be what one ought to *believe*, the logic of the situation must take other factors into account. Speaking strictly, *belief* is out of place in pure theoretical science, which has nothing nearer to it than the establishment of doctrines, and only the provisional establishment of them, at that.* Compared with living *belief* it is nothing but a ghost. If the captain of a vessel on a lee shore in a terrific storm finds himself in a critical position in which he must instantly either put his wheel to port acting on one hypothesis, or put his wheel to starboard acting on the contrary hypothesis, and his vessel will infallibly be dashed to pieces if he decides the question wrongly, Ockham's razor is not worth the stout belief of any common seaman. For stout belief may happen to save the ship, while *Entia non sunt multiplicanda praeter necessitatem* would be only a stupid way of spelling Shipwreck. Now in matters of real practical con-

* Cf. 1.635.

cern we are all in something like the situation of that sea-captain.

61. *Philosophy*, as I understand the word, is a positive theoretical science, and a science in an early stage of development. As such it has no more to do with belief than any other science. Indeed, I am bound to confess that it is at present in so unsettled a condition, that if the ordinary theorems of molecular physics and of archæology are but the ghosts of beliefs, then to my mind, the doctrines of the philosophers are little better than the ghosts of ghosts. I know this is an extremely heretical opinion. The followers of Haeckel are completely in accord with the followers of Hegel in holding that what they call philosophy is a practical science and the best of guides in the formation of what they take to be Religious Beliefs. I simply note the divergence, and pass on to an unquestionable fact; namely, the fact that all modern philosophy is built upon Ockhamism; by which I mean that it is all nominalistic and that it adopts nominalism because of Ockham's razor. And there is no form of modern philosophy of which this is more essentially true than the philosophy of Hegel. But it is not modern philosophers only who are nominalists. The nominalistic *Weltanschauung* has become incorporated into what I will venture to call the very flesh and blood of the average modern mind.

62. The third category of which I come now to speak is precisely that whose reality is denied by nominalism. For although nominalism is not credited with any extraordinarily lofty appreciation of the powers of the human soul, yet it attributes to it a power of originating a kind of ideas the like of which Omnipotence has failed to create as real objects, and those general conceptions which men will never cease to consider the glory of the human intellect must, according to any consistent nominalism, be entirely wanting in the mind of Deity. Leibniz, the modern nominalist *par excellence*, will not admit that God has the faculty of Reason; and it seems impossible to avoid that conclusion upon nominalistic principles.

63. But it is not in Nominalism alone that modern thought has attributed to the human mind the miraculous power of originating a category of thought that has no counterpart at all in Heaven or Earth. Already in that strangely influential

hodge-podge, the salad of Cartesianism, the doctrine stands out very emphatically that the only force is the force of impact, which clearly belongs to the category of Reaction; and ever since Newton's *Principia* began to affect the general thought of Europe through the sympathetic spirit of Voltaire, there has been a disposition to deny any kind of action except purely mechanical action. The Corpuscular Philosophy of Boyle — although the pious Boyle did not himself recognize its character — was bound to come to that in the last resort; and the idea constantly gained strength throughout the eighteenth century and the nineteenth until the doctrine of the Conservation of Energy, generalized rather loosely by philosophers, led to the theory of psycho-physical parallelism, against which there has, only of recent years, been any very sensible and widespread revolt. Psycho-physical parallelism is merely the doctrine that mechanical action explains all the real facts, except that these facts have an internal aspect which is a little obscure and a little shadowy.

64. To my way of regarding philosophy, all this movement was perfectly good scientific procedure. For the simpler hypothesis which excluded the influence of ideas upon matter had to be tried and persevered in until it was thoroughly exploded. But I believe that now at last, at any time for the last thirty years, it has been apparent, to every man who sufficiently considered the subject, that there is a mode of influence upon external facts which cannot be resolved into mere mechanical action, so that henceforward it will be a grave error of scientific philosophy to overlook the universal presence in the phenomenon of this third category. Indeed, from the moment that the Idea of Evolution took possession of the minds of men the pure Corpuscular Philosophy together with nominalism had had their doom pronounced. I grew up in Cambridge, [Massachusetts] and was about 21 when the *Origin of Species* appeared. There was then living here a thinker who left no remains from which one could now gather what an educative influence his was upon the minds of all of us who enjoyed his intimacy, Mr. Chauncey Wright.* He had at first been a Hamiltonian but had early passed over into the warmest advocacy of the nominalism of John Stuart Mill; and

* But see Wright's *Philosophical Discussions*, edited by C. E. Norton (1877).

being a mathematician at a time when dynamics was regarded as the loftiest branch of mathematics, he was also inclined to regard nature from a strictly mechanical point of view. But his interests were wide and he was also a student of Gray.* I was away surveying in the wilds of Louisiana when Darwin's great work appeared, and though I learned by letters of the immense sensation it had created, I did not return until early in the following summer when I found Wright all enthusiasm for Darwin, whose doctrines appeared to him as a sort of supplement to those of Mill. I remember well that I then made a remark to him which although he did not assent to it, evidently impressed him enough to perplex him. The remark was that these ideas of development had more vitality by far than any of his other favorite conceptions and that though they might at that moment be in his mind like a little vine clinging to the tree of Associationalism, yet after a time that vine would inevitably kill the tree. He asked me why I said that and I replied that the reason was that Mill's doctrine was nothing but a metaphysical point of view to which Darwin's, which was nourished by positive observation, must be deadly. Ten or fifteen years later, when Agnosticism was all the go, I prognosticated a short life for it, as philosophies run, for a similar reason. What the true definition of Pragmatism may be, I find it very hard to say; but in my nature it is a sort of instinctive attraction for living facts.

65. All nature abounds in proofs of other influences than merely mechanical action, even in the physical world. They crowd in upon us at the rate of several every minute. And my observation of men has led me to this little generalization. Speaking only of men who really think for themselves and not of mere reporters, I have not found that it is the men whose lives are mostly passed within the four walls of a physical laboratory who are most inclined to be satisfied with a purely mechanical metaphysics. On the contrary, the more clearly they understand how physical forces work the more incredible it seems to them that such action should explain what happens out of doors. A larger proportion of materialists and agnostics is to be found among the thinking physiologists and other naturalists, and the largest proportion of all among those who

* Asa Gray, the famous Harvard botanist.

derive their ideas of physical science from reading popular books. These last, the Spencers, the Youmanses, and the like, seem to be possessed with the idea that science has got the universe pretty well ciphered down to a fine point; while the Faradays and Newtons seem to themselves like children who have picked up a few pretty pebbles upon the ocean beach. But most of us seem to find it difficult to recognize the greatness and wonder of things familiar to us. As the prophet is not without honor save [in his own country] so it is also with phenomena. Point out to the ordinary man evidence, however conclusive, of other influence than physical action in things he sees every day, and he will say: "Well, I don't see as that frog has got any points about him that's any different from any other frog." For that reason we welcome instances perhaps of less real cogency but which have the merit of being rare and strange. Such, for example, are the right-handed and left-handed screw-structures of the molecules of those bodies which are said to be "optically active." Of every such substance there are two varieties, or as the chemists call them, two modifications, one of which twists a ray of light that passes through it to the right, and the other, by an exactly equal amount, to the left. All the ordinary physical properties of the right-handed and left-handed modifications are identical. Only certain faces of their crystals, often very minute, are differently placed. No chemical process can ever transmute the one modification into the other. And their ordinary chemical behaviour is absolutely the same, so that no strictly chemical process can separate them if they are once mixed. Only the chemical action of one optically active substance upon another is different if they both twist the ray the same way from what it is if they twist the ray different ways. There are certain living organisms which feed on one modification and destroy it while leaving the other one untouched. This is presumably due to such organisms containing in their substance, possibly in very minute proportion, some optically active body. Now I maintain that the original segregation of levo-molecules, or molecules with a left-handed twist, from dextro-molecules, or molecules with a right-handed twist, is absolutely incapable of mechanical explanation. Of course you may suppose that in the original nebula at the very formation of the world right-handed quartz was collected into

one place, while left-handed quartz was collected into another place. But to suppose that, is *ipso facto* to suppose that that segregation was a phenomenon without any mechanical explanation. The three laws of motion draw no dynamical distinction between right-handed and left-handed screws, and a mechanical explanation is an explanation founded on the three laws of motion. There, then, is a physical phenomenon absolutely inexplicable by mechanical action. This single instance suffices to overthrow the Corpuscular Philosophy.

LECTURE III*

THE CATEGORIES CONTINUED

§1. DEGENERATE THIRDNESS†

66. Category the First is the Idea of that which is such as it is regardless of anything else. That is to say, it is a *Quality of Feeling*.

Category the Second is the Idea of that which is such as it is as being Second to some First, regardless of anything else, and in particular regardless of any *Law*, although it may conform to a law. That is to say, it is *Reaction* as an element of the Phenomenon.

Category the Third is the Idea of that which is such as it is as being a Third, or Medium, between a Second and its First. That is to say, it is *Representation* as an element of the Phenomenon.

67. A mere complication of Category the Third, involving no idea essentially different, will give the idea of something which is such as it is by virtue of its relations to any multitude, enumerable, denumeral, or abnumerable or even to any super-multitude of correlates; so that this Category suffices of itself to give the conception of True Continuity, than which no conception yet discovered is higher.‡

68. Category the First owing to its Extremely Rudimentary character is not susceptible of any degenerate or weakened modification.

69. Category the Second has a *Degenerate Form*, in which there is Secondness indeed, but a weak or Secondary Secondness that is not in the pair in its own quality, but belongs to it only in a certain respect. Moreover, this degeneracy need not be absolute but may be only approximative. Thus a genus characterized by Reaction will by the determination of its

* There were two draughts of this lecture. It is difficult to determine which is the final one. The following is from version "b."

† Cf. 1.527ff.

‡ Cf. 4.218ff.

essential character split into two species, one a species where the secondness is strong, the other a species where the secondness is weak, and the strong species will subdivide into two that will be similarly related, without any corresponding subdivision of the weak species. For example, Psychological Reaction splits into Willing, where the Secondness is strong, and Sensation, where it is weak; and Willing again subdivides into Active Willing and Inhibitive Willing, to which last dichotomy nothing in Sensation corresponds. But it must be confessed that subdivision, as such, involves something more than the second category.

70. Category the Third exhibits two different ways of Degeneracy, where the irreducible idea of Plurality, as distinguished from Duality, is present indeed but in maimed conditions. The First degree of Degeneracy is found in an Irrational Plurality which, as it exists, in contradistinction [to] the form of its representation, is a mere complication of duality. We have just had an example of this in the idea of Subdivision. In pure Secondness, the reacting correlates are *Singulars*, and as such are *Individuals*, not capable of further division. Consequently, the conception of Subdivision, say by repeated dichotomy, certainly involves a sort of Thirdness, but it is a thirdness that is conceived to consist in a second secondness.

71. The most degenerate Thirdness is where we conceive a mere Quality of Feeling, or Firstness, to represent itself to itself as Representation. Such, for example, would be Pure Self-Consciousness, which might be roughly described as a mere feeling that has a dark instinct of being a germ of thought. This sounds nonsensical, I grant. Yet something can be done toward rendering it comprehensible.

I remember a lady's averring that her father had heard a minister, of what complexion she did not say, open a prayer as follows: "O Thou, All-Sufficient, Self-Sufficient, Insufficient God." Now pure Self-consciousness is Self-sufficient, and if it is also regarded as All-sufficient, it would seem to follow that it must be Insufficient. I ought to apologize for introducing such Buffoonery into serious lectures. I do so because I seriously believe that a bit of fun helps thought and tends to keep it pragmatical.

Imagine that upon the soil of a country, that has a single boundary line thus , and not , or , there lies a map of that same country. This map may distort the different provinces of the country to any extent. But I shall suppose that it represents every part of the country that has a single boundary, by a part of the map that has a single boundary, that every part is represented as bounded by such parts as it really is bounded by, that every point of the country is represented by a single point of the map, and that every point of the map represents a single point in the country. Let us further suppose that this map is infinitely minute in its representation so that there is no speck on any grain of sand in the country that could not be seen represented upon the map if we were to examine it under a sufficiently high magnifying power. Since, then, everything on the soil of the country is shown on the map, and since the map lies on the soil of the country, the map itself will be portrayed in the map, and in this map of the map everything on the soil of the country can be discerned, including the map itself with the map of the map within its boundary. Thus there will be within the map, a map of the map, and within that, a map of the map of the map, and so on *ad infinitum*. These maps being each within the preceding ones of the series, there will be a point contained in all of them, and this will be the map of itself. Each map which directly or indirectly represents the country is itself mapped in the next; *i.e.*, in the next [it] is represented to be a map of the country. In other words each map is *interpreted* as such in the next. We may therefore say that each is a representation of the country *to* the next map; and that point that is in all the maps is in itself the representation of nothing but itself and to nothing but itself. It is therefore the precise analogue of pure self-consciousness. As such it is *self-sufficient*. It is saved from being insufficient, that is as no representation at all, by the circumstance that it is not *all-sufficient*, that is, is not a complete representation but is only a point upon a continuous map.¹ I dare say you may have heard some-

¹ This gives an idea of the second degree of degenerate Thirdness. Those of you who have read Professor Royce's Supplementary Essay [in *The World and the Individual*, vol. 1, p. 505, n. 1] will have remarked that he avoids this result, which does not suit his philosophy, by not allowing his map to be continuous.

thing like this before from Professor Royce, but if so, you will remark an important divergency. The idea itself belongs neither to him nor to me, and was used by me in this connection thirty years ago.*

72. The relatively degenerate forms of the Third category do not fall into a catena, like those of the Second. What we find is this. Taking any class in whose essential idea the predominant element is Thirdness, or Representation, the self-development of that essential idea — which development, let me say, is not to be compassed by any amount of mere “hard thinking,” but only by an elaborate process founded upon experience and reason combined — results in a *trichotomy* giving rise to three sub-classes, or genera, involving respectively a relatively genuine thirdness, a relatively reactional thirdness or thirdness of the lesser degree of degeneracy, and a relatively qualitative thirdness or thirdness of the last degeneracy. This last may subdivide, and its species may even be governed by the three categories, but it will not subdivide, in the manner which we are considering, by the essential determinations of its conception. The genus corresponding to the lesser degree of degeneracy, the reactionally degenerate genus, will subdivide after the manner of the Second category, forming a catena; while the genus of relatively genuine Thirdness will subdivide by Trichotomy just like that from which it resulted. Only as the division proceeds, the subdivisions become harder and harder to discern.

73. The representamen, for example, divides by trichotomy into the general sign or *symbol*, the *index*, and the *icon*.† An *icon* is a representamen which fulfills the function of a representamen by virtue of a character which it possesses in itself, and would possess just the same though its object did not exist. Thus, the statue of a centaur is not, it is true, a representamen if there be no such thing as a centaur. Still, if it represents a centaur, it is by virtue of its shape; and this shape it will have, just as much, whether there be a centaur or not. An *index* is a representamen which fulfills the function of a representamen by virtue of a character which it could not have

But to exclude continuity is to exclude what is best and most living in Hegel — from the alternative “a” version.

* See vol. 7.

† Cf. vol 2, bk. II, ch. 2 and ch. 3.

if its object did not exist, but which it will continue to have just the same whether it be interpreted as a representamen or not. For instance, an old-fashioned hygrometer is an *index*. For it is so contrived as to have a physical reaction with dryness and moisture in the air, so that the little man will come out if it is wet, and this would happen just the same if the use of the instrument should be entirely forgotten, so that it ceased actually to convey any information. A *symbol* is a representamen which fulfills its function regardless of any similarity or analogy with its object and equally regardless of any *factual* connection therewith, but solely and simply because it will be interpreted to be a representamen. Such for example is any general word, sentence, or book.

Of these three genera of representamens, the *Icon* is the Qualitatively degenerate, the *Index* the Reactionally degenerate, while the *Symbol* is the relatively genuine genus.

74. Now the *Icon* may undoubtedly be divided according to the categories; but the mere completeness of the notion of the icon does not imperatively call for any such division. For a pure icon does not draw any distinction between itself and its object. It represents whatever it may represent, and whatever it is like, it in so far is. It is an affair of suchness only.

75. It is quite otherwise with the *Index*. Here is a reactional sign, which is such by virtue of a real connection with its object. Then the question arises is this dual character in the *Index*, so that it has two elements, by virtue of the one serving as a substitute for the particular object it does, while the other is an involved icon that represents the representamen itself regarded as a quality of the object — or is there really no such dual character in the index, so that it merely denotes whatever object it happens to be really connected with just as the icon represents whatever object it happens really to resemble? Of the former, the relatively genuine form of *Index*, the hygrometer, is an example. Its connection with the weather is dualistic, so that by an involved icon, it actually conveys information. On the other hand any mere land-mark by which a particular thing may be recognized because it is as a matter of fact associated with that thing, a proper name without signification, a pointing finger, is a degenerate index. Horatio Greenough,

who designed Bunker Hill Monument, tells us in his book* that he meant it to say simply "Here!" It just stands on that ground and plainly is not movable. So if we are looking for the battle-field, it will tell us whither to direct our steps.

76. The *Symbol*, or relatively genuine form of Representamen, divides by Trichotomy into the Term, the Proposition, and the Argument. The Term corresponds to the Icon and to the degenerate Index. It does excite an icon in the imagination. The proposition conveys definite information like the genuine index, by having two parts of which the function of the one is to indicate the object meant, while that of the other is to represent the representamen by exciting an icon of its quality. The argument is a representamen which does not leave the interpretant to be determined as it may by the person to whom the symbol is addressed, but separately represents what is the interpreting representation that it is intended to determine. This interpreting representation is, of course, the conclusion. It would be interesting to push these illustrations further; but I can linger nowhere. As soon as a subject begins to be interesting I am obliged to pass on to another.

§2. THE SEVEN SYSTEMS OF METAPHYSICS

77. The three categories furnish an artificial classification of all possible systems of metaphysics which is certainly not without its utility. The scheme is shown in this figure (p. 53). It depends upon what ones of the three categories each system admits as important metaphysico-cosmical elements.¹

78. One very naturally and properly endeavors to give an

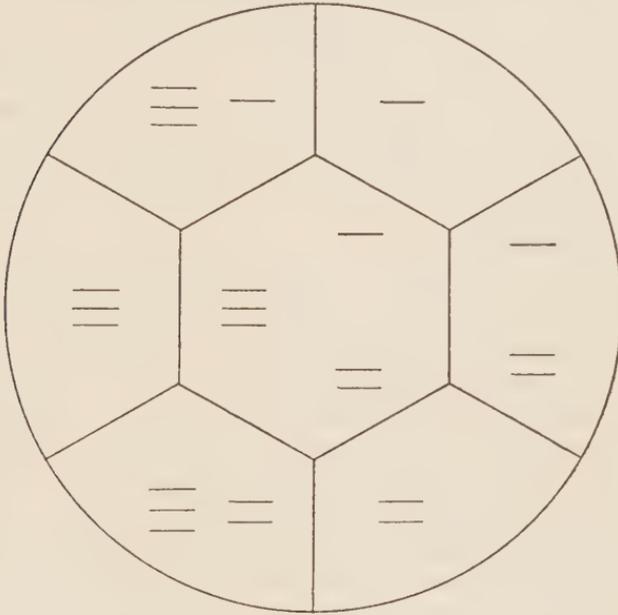
* See "Aesthetics in Washington," in *A Memorial of Horatio Greenough*, by Henry T. Tuckerman, p. 82 (1853).

¹ Grant me that the three categories of Firstness, Secondness, and Thirdness, or Quality, Reaction, and Representation, have in truth the enormous importance for thought that I attribute to them, and it would seem that no division of theories of metaphysics could surpass in importance a division based upon the consideration of what ones of the three categories each of different metaphysical systems have fully admitted as real constituents of nature.

It is, at any rate, a hypothesis easy to try; and the exact logic of hypothesis allots great weight to that consideration. There will be then these seven possible classes:

account of the universe with the fewest and simplest possible categories.

Praedicamenta non sunt multiplicanda praeter necessitatem.



79. We ought therefore to admire and extol the efforts of Condillac and the Associationalists to explain everything by

- i. Nihilism, so-called, and idealistic sensualism.
- ii. The doctrine of [Wincenty] Lutoslawski and his unpronounceable master [Mickiewicz].
- iii. Hegelianism of all shades.
- ii iii. Cartesianism of all kinds, Leibnizianism, Spinozism, and the metaphysics of the physicists of today.
 - i iii. Berkeleyanism.
 - i ii. Ordinary Nominalism.
- i ii iii. The metaphysics that recognizes all the categories. It ought to be subdivided, but I shall not stop to consider its subdivisions. It embraces Kantism, Reid's Philosophy, and the Platonic philosophy of which Aristotelianism is a special development.

A great variety of thinkers call themselves Aristotelians, even the Hegelians, on the strength of special agreements. No modern philosophy, or very little, has any real right to the title. I should call myself an Aristotelian of the scholastic wing, approaching Scotism, but going much further in the direction of scholastic realism.— From the beginning of "Lecture IV."

means of qualities of feeling [i]. If, however, this turns out to be a failure, the next most admirable hypothesis is that of the corpuscularians, Helmholtz and the like, who would like to explain everything by means of mechanical force, which they do not distinguish from individual reaction [ii]. That again failing, the doctrine of Hegel is to be commended who regards Category the Third as the only true one [iii]. For in the Hegelian system the other two are only introduced in order to be *aufgehoben*. All the categories of Hegel's list, from Pure Being up, appear to me very manifestly to involve Thirdness, although he does not appear to recognize it, so immersed is he in this category.

80. All three of these simplest systems having worked themselves out into absurdity, it is natural next in accordance with the maxim of Parsimony to try explanations of the Universe based on the recognition of two only of the Categories.

81. The more moderate nominalists who nevertheless apply the epithet *mere* to thought and to representamens may be said to admit Categories First and Second and to deny the third [i ii]. The Berkeleyans, for whom there are but two kinds of entities, souls, or centres of determinable thought, and ideas in the souls, these ideas being regarded as pure statical entities, little or nothing else than Qualities of Feeling, seem to admit Categories First and Third and to deny Secondness, which they wish to replace by Divine Creative Influence, which certainly has all the flavor of Thirdness [i iii]. So far as one can make out any intelligible aim in that singular hodge-podge, the Cartesian metaphysics, it seems to have been to admit Categories Second and Third as fundamental and to deny the First [ii iii]. Otherwise, I do not know to whom we can attribute this opinion which certainly does not seem to be less acceptable and attractive than several others. But there are other philosophies which seem to do full justice to Categories Second and Third and to minimize the first, and among these perhaps Spinoza and Kant are to be included.

§3. THE IRREDUCIBILITY OF THE CATEGORIES*

82. We must begin by asking whether the three categories can be admitted as simple and irreducible conceptions; and

* 82-87 are from the "a" version; 88-93 follow 81 after an unpublished section which is a duplication of most of 82-87, 2.283f. and 3.423f.

afterward go on to ask whether they cannot all be supposed to be real constituents of the universe. For when I say that certain metaphysical schools do not admit them, I do not mean to say that they do not admit them as mere conceptions — a point to which they do not generally pay much attention, so that their opinions about this are not very marked — but that they do not admit them as real constituents of the universe.

I do not know that I could add anything material to what I said in my last lecture to show that Category the First must be admitted as an irreducible constituent of the phenomenon.

83. There would be no question that Category the Second is an irreducible conception were it not for the deplorable condition of the science of logic. This is illustrated by the fact that so flippant and wildly theorizing work as Prantl's *Geschichte der Logik* should be accepted, as it generally is, even among learned men, as a marvel of patient research. It is true that one or two chapters of it are relatively well done. The account of Aristotle's logic, though not good upon any high standard of completeness or of thorough comprehension, is nevertheless the best account of its subject that we have. But Prantl, to begin with, does not himself understand logic, meaning by logic the science of which those works treated, of which he gives or he professes to give an account; and yet with the shallowest ideas, he is so puffed up with his own views that he disdains to take the trouble to penetrate their meaning. The crude expressions of contempt in which he continually indulges toward great thinkers ought to put readers on their guard against him. In the next place he belongs to that too well-known class of German critics who get bitten with theories deduced from general conceptions, and who fall in love with these theories because they are their own offspring and treat them as absolute certainties although the complete refutation of them is near at hand. You will understand, of course, that I do not say these things without having read all the chief contributions to the questions on both sides and without having subjected them to careful study and criticism. Prantl's opinions about the Megarian philosophers, about what he calls the Byzantine logic, about the Latin medieval logic, about the *Parva Logicalia*, are wild theories, utterly untenable, and in several cases easily refuted by an easy examination of the

MSS. Moreover, it is not a history of logic but mostly of the most trivial parts of logic. But I shall be asked whether I do not think his reading marvellously extensive. No, I do not. He had the Munich library at his hand. He had only to look into the books, and for the most part he has done little more than merely to look into them. He really often has no idea of what the real substance of the books is; and nothing is more common than to find in his notes passages copied out of one book which are nothing but textual copies of celebrated passages in much older works. I do not deny that the book is useful, because the rest of us haven't access to such a library; but I do not consider it a work of respectable erudition. There is no need of mincing words because he himself not only refers most disrespectfully to such solid students of medieval writings as Charles Thurot, Hauréau and others, but frequently descends to what in English we should call the language of Billingsgate in characterising ancient opinions which he may or may not be aware are identical with those held today by analysts of logical forms whose studies are so much more exact than his that they are not to be named in the same day.

84. Nevertheless, bad as Prantl's history is, it is the best we have, and any person who reads it critically, as every book ought to be read, will easily be able to see that the ancient students of logic, Democritus, Plato, Aristotle, Epicurus, Philoponus, even Chrysippus, were thinkers of the highest order, and that St. Augustine, Abelard, Aquinas, Duns Scotus, Ockham, Paulus Venetus, even Laurentius Valla, were logicians of the most painstaking and subtle types. But when the revival of learning came, the finest minds had their attention turned in quite another direction, and modern mathematics and modern physics drew away still more. The result of all this has been that during the centuries that have elapsed since the appearance of the *De Revolutionibus* [1543] — and remember, if you please, that the work of Copernicus was the fruit of the scientific nourishment that he had imbibed in Italy in his youth — throughout these ages, the chairs of Logic in the Universities have been turned over to a class of men, of whom we should be speaking far too euphemistically if we were to say that they have in no wise represented the Intellectual Level of their age. No, no; let us speak the plain truth — modern

logicians as a class have been distinctly puerile minds, the kind of minds that never mature, and yet never have the *élan* and originality of youth. First cast your eyes over the pages of a dozen average treatises, dismissing all preconceived estimates of their authors, and see if that is not the impression you derive from them. Why, in the majority of them, the greatest contribution to reasoning that has been generally applied during these centuries—the Calculus of Probabilities—is almost entirely ignored. If it were only the common run of logics that were affected by this state of things, it would not much matter; for if only one per cent of works on the subject were what they should be, we should still be in possession of a splendid and extensive literature. But unfortunately the general standard has been so terribly lowered that even the treatises written by men of real ability have been but half thought out things. Arnauld, for example, was a thinker of considerable force, and yet *L'Art de penser*, or the *Port Royal Logic*, is a shameful exhibit of what the two and a half centuries of man's greatest achievements could consider as a good account of how to think. You may retort that the past three centuries seem to have got on nicely without the aid of logic. Yes, I reply, they have, because there is one thing even more vital to science than intelligent methods; and that is, the sincere desire to find out the truth, whatever it may be; and *that* those centuries have been blessed with. But according to such estimate—not exactly mere guess-work, although rough enough, no doubt—as I have been able to form, if logic during those centuries had been studied with half the *zeal* and *genius* that has been bestowed upon mathematics, the twentieth century might have opened with the special sciences generally—particularly such vitally important sciences as molecular physics, chemistry, physiology, psychology, linguistics, and ancient historical criticism—in a decidedly more advanced condition than there is much promise that they will have reached at the end of 1950. I shouldn't say that human lives were the most precious things in the world; but after all they have their value; and only think how many lives might thus have been saved. We can mention individuals who might probably have done more work; say Abel, Steiner, Gaulois, Sadi Carnot. Think of the labor of a generation of Germany being allowed

to flow off into Hegelianism! Think of the extravagant admiration that half a generation of English — decidedly the best average reasoners of any modern people, bestowed on that silly thing, Hamilton's *New Analytic*. Look through Vaihinger's commentary to see what an army of students have been entrapped by Kant's view of the relation between his Analytic and Synthetic Judgments — a view that a study of the logic of relatives would at once have exploded.*

85. Had logic not been sunk since the time of Copernicus into a condition of semi-idiocy, the Logic of Relatives would by this time have been pursued for three centuries by hundreds of students, among whom there would have been no small number who in this direction or in that would have surpassed in ability any of the poor handful of students who have been at work upon it for the last generation or so. And let me tell you that this study would have completely revolutionized men's most general notions about logic — the very ideas that are today current in the market-place and on the boulevards. One of the early results of such wide study of the logic of relatives must have been to cause the idea of *reaction* to be solidly fixed in the minds of all men as an irreducible category of *Thought*† — whatever place might have been accorded to it in metaphysics as a cosmical category. This I venture to say, notwithstanding that the lamented Schröder did not seem to see it so. Schröder followed Sigwart in his most fundamental ideas of logic. Now I entertain a high respect for Sigwart — the kind of respect that I feel for Rollin as a historian, for Buffon as a zoölogist, for Priestley as a chemist, for Biot as a physicist — a class of men whom οἱ πολλοί always place too high, and scientific specialists too low. He is one of the most critical and least inexact of the inexact logicians. Sigwart, like almost all the stronger logicians of today, present company excepted, makes the fundamental mistake of confounding the logical question with the psychological question.‡ The psychological question is what processes the mind goes through. But the logical question is whether the conclusion that will be reached, by applying this or that maxim, will or will not accord

* See 3.641, 4.51f, 4.85.

† See 3.63, 3.421f, 3.468ff.

‡ *Logik*, §3, 1; see also 2.19–20, 2.151ff.

with the *fact*. It may be that the mind is so constituted that that which our intellectual instinct approves will be true to the extent to which that instinct approves of it. If so, that is an interesting fact about the human mind; but it has no relevancy for logic whatsoever. Sigwart says that the question of what is good logic and what bad must in the last resort come down to a question of how we feel; it is a matter of *Gefühl*, that is, a Quality of Feeling. And this he undertakes to demonstrate. For he says if any other criterion be employed, the correctness of this criterion has to be established by reasoning, and in this reasoning antecedent to the establishment of any rational criterion we must rely upon *Gefühl*; so that *Gefühl* is that to which any other criterion must ultimately be referred. Good! This is good intelligent work, such as advances philosophy — a good, square, explicit fallacy that can be squarely met and definitively refuted. It is the more valuable because it is a form of argument of very wide applicability. It is precisely analogous to the reasoning by which the hedonist in ethics, the subjectivist in esthetics, the idealist in metaphysics, attacks the category of reaction. You perceive the analogy between their arguments. The hedonist says that the question of what is good morals and what bad must ultimately come down to a question of pleasure. For, he says, suppose we desire anything but our own pleasure. Then whatever it may be that we desire, we take satisfaction in; and if we did not take satisfaction in it we should not desire it. But this satisfaction is that very Quality of Feeling that we call pleasure; and thus the only thing we ever can desire is pleasure, and all deliberate action must be performed for the sake of our own pleasure.

Every idealist, too, begins with an analogous argument, though he very likely may not remain consistently on the ground it leads to, so far as it leads anywhere. He says: When I perceive anything I am conscious; and when I am conscious of anything, I am immediately conscious and aught else I may be conscious of, I am conscious of through that immediate consciousness. Consequently whatever I learn from perception is merely that I have a feeling together with whatever I infer from that immediate consciousness.

86. The answer to all such arguments is that no desire can

possibly desire its own satisfaction, no judgment can judge itself to be true, and no reasoning can conclude that it is itself sound. For all these propositions stand on the same footing and must stand or fall together. If any judgment judges itself to be true, all judgments — or at least all assertory judgments — do so likewise; for there is no ground of discrimination between assertory judgments in this respect. Either therefore the judgment, J, and the judgment “I say that J is true” are the same for all judgments or for none. But if they are identical, their denials are identical. But their denials are respectively “J is not true” and “I do not say that J is true,” which are very different. Consequently no judgment judges itself to be true. All that J does is to furnish a premiss which is complete evidence warranting my assertion in another judgment that J is true. It is important to draw this distinction. The judgment J may, for example, be that “Sirius is white.” That is a judgment about Sirius. To *myself* who perceive myself making this judgment, or to another who hears me assert it and admits my veracity, the evidence is complete that I believe Sirius to be white. But the two propositions “Sirius is white” “I judge that Sirius is white” are two distinct propositions.

There are precisely analogous distinctions in the other cases. I may desire that my sick child should recover, and afterwards reflecting upon the intensity of that desire, I probably shall be unable to refrain from desiring that that desire should be gratified. But I cannot desire that a desire of mine should be gratified unless I already have such a desire; and I have no such desire as long as I am yet in the act of forming the desire, so that the desire is not yet complete. I dare say that some people’s psychical disposition is such that they have no sooner formed a strong desire than their thoughts take a subjective turn and they forthwith begin to think what satisfaction it would give them if that desire were gratified, and such people find it difficult to conceive that there are other people whose thoughts follow a train of objective suggestions and who think very little about themselves and their gratifications. That is just one of those respects in which different people may be expected to differ widely. But in no case is the desire absolutely the same as the desire of the satisfaction of that desire.

87. To return, then, to Sigwart’s argument, I not only

deny what he asserts that when I make an inference I can only do so because of a certain *feeling* of logical satisfaction that is connected with doing so, but I maintain that I *never can* draw an inference because of such a feeling. On the contrary, I never know the inference will afford me any such satisfaction except by a subsequent reflexion after I have already drawn it. It may be that on recognizing the satisfaction the inference gives me I shall consider that as an additional reason for believing in it. But this is *another* inference which in its turn will afford a new gratification if I stop to reflect about it.

In point of fact it is a serious error of reasoning to regard the sense of logicity as anything more than a tolerably strong argument in favor of the soundness of an inference. For although no doubt the sense of logicity carries men right in the main, yet it very frequently deceives them.

But Sigwart's argument is plainly either wholly fallacious or else what it proves is that which he himself distinctly maintains that it proves, namely, that the soundness of an argument *consists* in nothing but the *Gefühl* of logicity. Yet this is a downright absurd position for a logician to take; since, if it were true, there could be no such thing as sincere reasoning that was illogical, and logic, as the criticism of arguments and discrimination of the good from the bad, would have no existence at all; and my sincere argument that Sigwart is wholly in the wrong would be a decision from which there would be no appeal.

If the Holy Father by virtue of his infallibility were to command the faithful to believe that everything that any protestant had ever said was *ipso facto* necessarily true, it could hardly strain one's assent more.

88. It is certainly hard to believe, until one is forced to the belief, that a conception, so obtrusively complex as Thirdness is, should be an irreducible unanalyzable conception. What, one naturally exclaims, does this man think to convince us that a conception is complex and simple, at the same time! I might answer this by drawing a distinction. It is complex in the sense that different features may be discriminated in it, but the peculiar idea of *complexity* that it contains, although it has complexity as its object, is an unanalyzable idea. Of what is the conception of *complexity* built up? Produce it by

construction without using any idea which involves it if you can.

89. The best way of satisfying oneself whether Thirdness is elementary or not — at least, it would be the best way for me, who had in the first place a natural aptitude for logical analysis which has been in constant training all my life long (and I rather think it would be the best way for anybody provided he ruminates over his analysis, returns to it again and again, and criticizes it severely and sincerely, until he reaches a complete insight into the analysis) — the best way, I say, is to take the idea of representation, say the idea of the fact that the object, A, is represented in the representation, B, so as to determine the interpretation, C: to take this idea and endeavor to state what it consists in without introducing the idea of Thirdness at all if possible, or, if you find that impossible, to see what is the minimum or most degenerate form of Thirdness which will answer the purpose.

Then, having exercised yourself on that problem, take another idea in which, according to my views, Thirdness takes a more degenerate form. Try your hand at a logical analysis of the Fact that A gives B to C.

Then pass to a case in which Thirdness takes a still more degenerate form, as for example the idea of "A and B." What is at once A and B involves the idea of three variables. Putting it mathematically, it is $Z = XY$, which is the equation of the simpler of the two hyperboloids, the two-sheeted one, as it is called.

Whoever wishes to train his logical powers will find those problems furnish capital exercise; and whoever wishes to get a just conception of the universe will find that the solutions of those problems have a more intimate connection with that conception than he could suspect in advance.

90. I have thus far been intent on repelling attacks upon the categories which should consist in maintaining that the idea of Reaction can be reduced to that of Quality of Feeling, and the idea of Representation to those of Reaction and Quality of Feeling taken together. But meantime may not the enemy have stolen upon my rear, and shall I not suddenly find myself exposed to an attack which shall run as follows:

We fully admit that you have proved, until we begin to doubt it, that Secondness is not involved in Firstness nor

Thirdness in Secondness and Firstness. But you have entirely failed to prove that Firstness, Secondness, and Thirdness are independent ideas for the obvious reason that it is as plain as the nose on your face that the idea of a triplet involves the idea of pairs, and the idea of a pair the idea of units. Consequently, Thirdness is the one and sole category. This is substantially the idea of Hegel; and unquestionably it contains a truth.

Not only does Thirdness suppose and involve the ideas of Secondness and Firstness, but never will it be possible to find any Secondness or Firstness in the phenomenon that is not accompanied by Thirdness.

91. If the Hegelians confined themselves to that position they would find a hearty friend in my doctrine.

But they do not. Hegel is possessed with the idea that the Absolute is One. Three absolutes he would regard as a ludicrous contradiction *in adjecto*. Consequently, he wishes to make out that the three categories have not their several independent and irrefutable standings in thought. *Firstness* and *Secondness* must somehow be *aufgehoben*. But it is not true. They are in no way refuted nor refutable. Thirdness it is true involves Secondness and Firstness, in a sense. That is to say, if you have the idea of Thirdness you must have had the ideas of Secondness and Firstness to build upon. But what is required for the idea of a genuine Thirdness is an independent solid Secondness and not a Secondness that is a mere corollary of an unfounded and inconceivable Thirdness; and a similar remark may be made in reference to Firstness.

92. Let the Universe be an evolution of Pure Reason if you will. Yet if, while you are walking in the street reflecting upon how everything is the pure distillate of Reason, a man carrying a heavy pole suddenly pokes you in the small of the back, you may think there is something in the Universe that Pure Reason fails to account for; and when you look at the color *red* and ask yourself how Pure Reason could make *red* to have that utterly inexpressible and irrational positive quality it has, you will be perhaps disposed to think that Quality and Reaction have their independent standing in the Universe.

LECTURE IV*

THE REALITY OF THIRDNES

§1. SCHOLASTIC REALISM

93. I proceed to argue that *Thirddness* is operative in Nature. Suppose we attack the question experimentally. Here is a stone. Now I place that stone where there will be no obstacle between it and the floor, and I will predict with confidence that as soon as I let go my hold upon the stone it will fall to the floor. I will prove that I can make a correct prediction by actual trial if you like. But I see by your faces that you all think it will be a very silly experiment. Why so? Because you all know very well that I can predict what will happen, and that the fact will verify my prediction.

94. But *how can* I know what is going to happen? You certainly do not think that it is by clairvoyance, as if the future event by its existential reactivity could affect me directly, as in an *experience* of it, as an event scarcely past might affect me. You know very well that there is nothing of the sort in this case. Still, it remains true that I *do know* that that stone will drop, as a *fact*, as soon as I let go my hold. If I *truly know* anything, that which I know must be *real*. It would be quite absurd to say that I could be enabled to know how events are going to be determined over which I can exercise no more control than I shall be able to exercise over this stone after it shall have left my hand, that I can so peer in the future merely on the strength of any acquaintance with any pure fiction.

95. I know that this stone will fall if it is let go, because experience has convinced me that objects of this kind always do fall; and if anyone present has any doubt on the subject, I should be happy to try the experiment, and I will bet him a hundred to one on the result.

96. But the general proposition that all solid bodies fall in the absence of any upward forces or pressure, this formula

* In the manuscript, what is here published follows shortly after the note to 77 in Lecture III.

I say, is of the nature of a representation. Our nominalistic friends would be the last to dispute that. They will go so far as to say that it is a *mere* representation — the word *mere* meaning that to be represented and really to be are two very different things; and that this formula has no being except a being represented. It certainly is of the nature of a representation. That is undeniable, I grant. And it is equally undeniable that that which is of the nature of a representation is not *ipso facto* real. In that respect there is a great contrast between an object of reaction and an object of representation. Whatever reacts is *ipso facto* real. But an object of representation is not *ipso facto* real. If I were to predict that on my letting go of the stone it would fly up in the air, that would be mere fiction; and the proof that it was so would be obtained by simply trying the experiment. That is clear. On the other hand, and by the same token, the fact that I *know* that this stone will fall to the floor when I let it go, as you all must confess, if you are not blinded by theory, that I *do* know — and you none of you care to take up my bet, I notice — is the proof that the formula, or uniformity, as furnishing a safe basis for prediction, is, or if you like it better, *corresponds to*, a reality.

97. Possibly at this point somebody may raise an objection and say: You admit, that is one thing really to be and another to be represented; and you further admit that it is of the nature of the law of nature to be represented. Then it follows that it has not the mode of being of a reality. My answer to this would be that it rests upon an ambiguity. When I say that the general proposition as to what will happen, whenever a certain condition may be fulfilled, is of the nature of a representation, I mean that it refers to experiences *in futuro*, which I do not know are all of them experienced and never can know have been all experienced. But when I say that really to be is different from being represented, I mean that what really is, ultimately consists in what shall be forced upon us in experience, that there is an element of brute compulsion in fact and that fact is not a mere question of reasonableness. Thus, if I say, "I shall wind up my watch every day as long as I live," I never can have a positive experience which *certainly* covers all that is here promised, because I never shall

know for certain that my last day has come. But what the real fact will be does not depend upon what I represent, but upon what the experiential reactions shall be. My assertion that I shall wind up my watch every day of my life may turn out to accord with facts, even though I be the most irregular of persons, by my dying before nightfall.

If we call that being true by chance, here is a case of a *general proposition* being entirely true in all its generality by chance.

98. Every general proposition is limited to a finite number of occasions in which it might conceivably be falsified, supposing that it is an assertion confined to what human beings may experience; and consequently it is conceivable that, although it should be true without exception, it should still only be by chance that it turns out true.

99. But if I see a man who is very regular in his habits and am led to offer to wager that that man will not miss winding his watch for the next month, you have your choice between two alternative hypotheses only:

1. You may suppose that some *principle* or *cause* is *really* operative to *make* him wind his watch daily, which *active principle* may have more or less strength; or

2. You may suppose that it is mere chance that his actions have hitherto been regular; and in that case, that regularity in the past affords you not the slightest reason for expecting its continuance in the future, any more than, if he had thrown sixes three times running, *that* event would render it either more or less likely that his next throw would show sixes.

100. It is the same with the operations of nature. With overwhelming uniformity, in our past experience, direct and indirect, stones left free to fall have fallen. Thereupon two hypotheses only are open to us. Either

1. the uniformity with which those stones have fallen has been due to mere chance and affords no ground whatever, not the slightest for any expectation that the next stone that shall be let go will fall; or

2. the uniformity with which stones have fallen has been due to some *active general principle*, in which case it would be a strange coincidence that it should cease to act at the moment my prediction was based upon it.

That position, gentlemen, will sustain criticism. It is irrefragable.

101. Of course, every sane man will adopt the latter hypothesis. If he could doubt it in the case of the stone — which he can't — and I may as well drop the stone once for all — I told you so! — if anybody doubts this still, a thousand other such inductive predictions are getting verified every day, and he will have to suppose every one of them to be merely fortuitous in order reasonably to escape the conclusion that **general principles are really operative in nature**. That is the doctrine of scholastic realism.

§2. THIRDNES AND GENERALITY*

102. You may, perhaps, ask me how I connect generality with Thirtness. Various different replies, each fully satisfactory, may be made to that inquiry. The old definition of a general is *Generale est quod natum aptum est dici de multis*.† This recognizes that the general is essentially *predicative* and therefore of the nature of a representamen. And by following out that path of suggestion we should obtain a good reply to the inquiry.

103. In another respect, however, the definition represents a very degenerate sort of generality. None of the scholastic logics fails to explain that *sōl* is a general term; because although there happens to be but one sun yet the term *sōl aptum natum est dici de multis*. But that is most inadequately expressed. If *sōl* is apt to be predicated of *many*, it is apt to be predicated of any multitude however great, and since there is no maximum multitude,‡ those objects, of which it is fit to be predicated, form an aggregate that exceeds all multitude. Take any two possible objects that might be called *suns* and, however much alike they may be, any multitude whatsoever of intermediate *suns* are alternatively possible, and therefore as before these intermediate possible *suns* transcend all multitude. In short, the idea of a general involves the idea of possible variations which no multitude of existent things could exhaust

* Cf. 151f.

† Cf. 2.367.

‡ See 3.547f.

but would leave between any two not merely *many* possibilities, but possibilities absolutely beyond all multitude.

104. Now Thirdness is nothing but the character of an object which embodies Betweenness or Mediation in its simplest and most rudimentary form; and I use it as the name of that element of the phenomenon which is predominant wherever Mediation is predominant, and which reaches its fullness in Representation.

105. Thirdness, as I use the term, is only a synonym for Representation, to which I prefer the less colored term because its suggestions are not so narrow and special as those of the word Representation. Now it is proper to say that a general principle that is operative in the real world is of the essential nature of a Representation and of a Symbol because its *modus operandi* is the same as that by which *words* produce physical effects. Nobody can deny that words do produce such effects. Take, for example, that sentence of Patrick Henry which, at the time of our Revolution, was repeated by every man to his neighbor:

“Three millions of people, armed in the holy cause of Liberty, and in such a country as we possess, are invincible against any force that the enemy can bring against us.”

Those words present this character of the general law of nature. They might have produced effects indefinitely transcending any that circumstances allowed them to produce. It might, for example, have happened that some American schoolboy, sailing as a passenger in the Pacific Ocean, should have idly written down those words on a slip of paper. The paper might have been tossed overboard and might have been picked up by some Jagala on a beach of the island of Luzon; and if he had had them translated to him, they might easily have passed from mouth to mouth there as they did in this country, and with similar effect.

106. Words then do produce physical effects. It is madness to deny it. The very denial of it involves a belief in it; and nobody can consistently fail to acknowledge it until he sinks to a complete mental paresis.

But *how* do they produce their effect? They certainly do not, in their character as symbols, *directly* react upon matter. Such action as they have is merely logical. It is not even

psychological. It is merely that one symbol would justify another. However, suppose that first difficulty to have been surmounted, and that they do act upon actual thoughts. That thoughts act on the physical world and *conversely*, is one of the most familiar of facts. Those who deny it are persons with whom theories are stronger than facts. But how thoughts act on things it is impossible for us in the present state of our knowledge, so much as to make any very promising guess; although, as I will show you presently,* a guess can be made which suffices to show that the problem is not beyond all hope of ultimate solution.

107. All this is equally true of the manner in which the laws of nature influence matter. A law is in itself nothing but a general formula or symbol. An existing thing is simply a blind reacting thing, to which not merely all generality, but even all representation, is utterly foreign. The general formula may logically determine another, less broadly general. But it will be of its essential nature general, and its being narrower does not in the least constitute any participation in the reacting character of the thing. Here we have that great problem of the *principle of individuation* which the scholastic doctors after a century of the closest possible analysis were obliged to confess was quite incomprehensible to them. Analogy suggests that the laws of nature are ideas or resolutions in the mind of some vast consciousness, who, whether supreme or subordinate, is a Deity relatively to us. I do not approve of mixing up Religion and Philosophy; but as a purely philosophical hypothesis, that has the advantage of being supported by analogy. Yet I cannot clearly see that beyond that support to the imagination it is of any particular scientific service. . . .

§3. NORMATIVE JUDGMENTS

108. Reasoning cannot possibly be divorced from *logic*; because, whenever a man reasons, he thinks that he is drawing a conclusion such as would be justified in every analogous case. He therefore cannot really *infer* without having a notion of a class of possible inferences, all of which are logically *good*. That distinction of *good* and *bad* he always has in mind when he infers. Logic proper is the *critic* of arguments, the pro-

* See 119.

nouncing them to be good or bad. There are, as I am prepared to maintain, operations of the mind which are logically exactly analogous to inferences excepting only that they are unconscious and therefore uncontrollable and therefore not subject to criticism. But that makes all the difference in the world; for *inference* is essentially deliberate, and self-controlled. Any operation which cannot be controlled, any conclusion which is not abandoned, not merely as soon as *criticism* has pronounced against it, but in the very act of pronouncing that decree, is not of the nature of rational inference — is not reasoning. Reasoning as deliberate is essentially critical, and it is idle to criticize as good or bad that which cannot be controlled. Reasoning essentially involves *self-control*; so that the *logica utens** is a particular species of morality. Logical goodness and badness, which we shall find is simply the distinction of *Truth* and *Falsity* in general, amounts, in the last analysis, to nothing but a particular application of the more general distinction of Moral Goodness and Badness, or Righteousness and Wickedness.†

109. To criticize as logically sound or unsound an operation of thought that cannot be controlled is not less ridiculous than it would be to pronounce the growth of your hair to be morally good or bad. The ridiculousness in both cases consists in the fact that such a critical judgment may be *pretended* but cannot really be performed in clear thought, for on analysis it will be found absurd.

110. I am quite aware that this position is open to two serious objections, which I have not time to discuss, but which I have carefully considered and refuted. The first is that this is making logic a question of psychology.‡ But this I deny. Logic does rest on certain facts of experience among which are facts about men, but not upon any theory about the human mind or any theory to explain facts. The other objection is that if the distinction [between] Good and Bad Logic is a special case [of the distinction between] Good and Bad Morals, by the same token the distinction of Good and Bad Morals is a special case of the distinction [between] esthetic

* See 2.186f.

† Cf. 34ff, 440.

‡ See 2.39ff.

Goodness and Badness. Now to admit this is not only to admit hedonism, which no man in his senses, and not blinded by theory or something worse, can admit, but also, having to do with the essentially Dualistic distinction of Good and Bad — which is manifestly an affair of Category the Second — it seeks the origin of this distinction in Esthetic Feeling, which belongs to Category the First.

111. This last objection deceived me for many years. The reply to it involves a very important point which I shall have to postpone to the next lecture. When it first presented itself to me, all I knew of ethics was derived from the study of Jouffroy* under Dr. Walker,† of Kant, and of a wooden treatise by Whewell;‡ and I was led by this objection to a line of thought which brought me to regard ethics as a mere art, or applied science, and not a pure normative science at all. But when, beginning in 1883, I came to read the works of the great moralists, whose great fertility of thought I found in wonderful contrast to the sterility of the logicians — I was forced to recognize the dependence of Logic upon Ethics; and then took refuge in the idea that there was no science of esthetics, that, because *de gustibus non est disputandum*, therefore there is no esthetic truth and falsity or generally valid goodness and badness. But I did not remain of this opinion long. I soon came to see that this whole objection rests upon a fundamental misconception. To say that morality, in the last resort, comes to an esthetic judgment is *not* hedonism — but is directly opposed to hedonism. In the next place, every pronouncement between Good and Bad certainly comes under Category the Second; and for that reason such pronouncement comes out in the voice of conscience with an absoluteness of duality which we do not find even in logic; and although I am still a perfect ignoramus in esthetics, I venture to think that the esthetic state of mind is purest when perfectly naïve without any critical pronouncement, and that the esthetic critic finds his judgments upon the result of throwing himself back into such a pure naïve state — and the best critic is the man who has trained himself to do this the most perfectly.

* *Introduction to Ethics* by T. S. Jouffroy, trans. by William H. Channing.

† Dr. James Walker, president of Harvard University, and professor of moral and intellectual philosophy.

‡ Probably *The Elements of Morality, including Polity*.

112. It is a great mistake to suppose that the phenomena of pleasure and pain are mainly phenomena of feeling.* Examine *pain*, which would seem to be a good deal more positive than *pleasure*. I am unable to recognize with confidence any quality of feeling common to all *pains*; and if I cannot I am sure it cannot be an easy thing for anybody. For I have gone through a systematic course of training in recognizing my feelings. I have worked with intensity for so many hours a day every day for long years to train myself to this; and it is a training which I would recommend to all of you. The artist has such a training; but most of his effort goes to reproducing in one form or another what he sees or hears, which is in every art a very complicated trade; while I have striven simply to see what it is that I see. That this limitation of the task is a great advantage is proved to me by finding that the great majority of artists are extremely narrow. Their esthetic appreciations are narrow; and this comes from their only having the power of recognizing the qualities of their percepts in certain directions.

But the majority of those who opine that pain is a quality of feeling are not even artists; and even among those who are artists there are extremely few who are *artists in pain*. But the truth is that there are certain states of mind, especially among states of mind in which Feeling has a large share, which we have an impulse to get rid of. That is the obvious phenomenon; and the ordinary theory is that this impulse is excited by a quality of feeling common to all these states — a theory which is supported by the fact that this impulse is particularly energetic in regard to states in which Feeling is the predominant element. Now whether this be true or false, it is a *theory*. It is not the fact that any such common quality in all pains is readily to be recognized.

113. At any rate, while the whole phenomenon of pain and the whole phenomenon of pleasure are phenomena that arise within the universe of states of mind and attain no great prominence except when they concern states of mind in which Feeling is predominant, yet these phenomena themselves do not mainly consist in any common Feeling-quality of Pleasure and

* Cf. 1.333.

any common Feeling-quality of Pain, even if there are such Qualities of Feeling; but they mainly consist [in a] Pain [which lies] in a Struggle to give a state of mind its *quietus*, and [in a] Pleasure in a peculiar mode of consciousness allied to the consciousness of *making a generalization*, in which not Feeling, but rather Cognition is the principal constituent. This may be hard to make out as regards the lower pleasures, but they do not concern the argument we are considering. It is esthetic enjoyment which concerns us; and ignorant as I am of Art, I have a fair share of capacity for esthetic enjoyment; and it seems to me that while in esthetic enjoyment we attend to the totality of Feeling — and especially to the total resultant Quality of Feeling presented in the work of art we are contemplating — yet it is a sort of intellectual sympathy, a sense that here is a Feeling that one can comprehend, a reasonable Feeling. I do not succeed in saying exactly *what* it is, but it is a consciousness belonging to the category of Representation, though representing something in the Category of Quality of Feeling.

In that view of the matter, the objection to the doctrine that the distinction Moral approval and disapproval is ultimately only a species of the distinction Esthetic approval and disapproval seems to be answered.

114. It appears, then, that *Logica utens* consisting in self-control, the distinction of logical goodness and badness must begin where control of the processes of cognition begins; and any object that antecedes the distinction, if it has to be named either good or bad, must be named *good*. For since no fault can be found with it, it must be taken at its own valuation.

§4. PERCEPTUAL JUDGMENTS*

115. Where then in the process of cognition does the possibility of controlling it begin? Certainly not before the *percept* is formed.

Even after the percept is formed there is an operation which seems to me to be quite uncontrollable. It is that of judging what it is that the person perceives. A judgment is an act of formation of a mental proposition combined with an adoption

* Cf. 151ff, 568, 4.539f.

of it or act of assent to it. A percept on the other hand is an image or moving picture or other exhibition. The perceptual judgment, that is, the first judgment of a person as to what is before his senses, bears no more resemblance to the percept than the figure I am going to draw is like a man.

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M A N

I do not see that it is possible to exercise any control over that operation or to subject it to criticism. If we can criticize it at all, as far as I can see, that criticism would be limited to performing it again and seeing whether, with closer attention, we get the same result. But when we so perform it again, paying now closer attention, the percept is presumably not such as it was before. I do not see what other means we have of knowing whether it is the same as it was before or not, except by comparing the former perceptual judgment and the later one. I should utterly distrust any other method of ascertaining what the character of the percept was. Consequently, until I am better advised, I shall consider the *perceptual judgment* to be utterly beyond control. Should I be wrong in this, the *Percept*, at all events, would seem to be so.

116. It follows, then, that our perceptual judgments are the first premisses of all our reasonings and that they cannot be called in question. All our other judgments are so many theories whose only justification is that they have been and will be borne out by perceptual judgments. But the perceptual judgments declare one thing to be blue, another yellow — one sound to be that of A, another that of U, another that of I. These are the Qualities of Feeling which the physicists say are mere illusions because there is no room for them in their theories. If the facts won't agree with the Theory, so much the worse for them. They are *bad facts*. This sounds to me childish, I confess. It is like an infant that beats an inanimate object that hurts it. Indeed this is true of all fault-finding with others than oneself, and those for whose conduct one is responsible. Reprobation is a silly [business].

117. But peradventure I shall be asked whether I do not admit that there is any such thing as an illusion or hallucina-

tion. Oh, yes; among artists I have known more than one case of downright hallucinatory imaginations at the beck and call of these *ποιηταί*. Of course, the man knows that such obedient spectres are not real experiences, because experience is that which forces itself upon him, will-he nill-he.

Hallucinations proper — obsessional hallucinations — will *not* down at one's bidding, and people who are subject to them are accustomed to sound the people who are with them in order to ascertain whether the object before them has a being independent of their disease or not. There are also social hallucinations.

In such a case, a photographic camera or other instrument might be of service.

118. Of course, everybody admits and must admit that these apparitions are entities — *entia*; the question is whether these *entia* belong to the class of realities or not, that is, whether they are such as they are independently of any collection of singular representations that they are so, or whether their mode of being depends upon abnormal conditions. But as for the entire universe of Qualities which the physicist would pronounce Illusory, there is not the smallest shade of just suspicion resting upon their normality. On the contrary, there is considerable evidence that colors, for example, and sounds have the same character for all mankind.

Well, I will skip this. Suffice it to say that there is no reason for suspecting the veracity of the senses, and the presumption is that the physics of the future will find out that they are more real than the present state of scientific theory admits of their being represented as being.*

119. Therefore, if you ask me what part Qualities can play in the economy of the universe, I shall reply that the universe is a vast representamen, a great symbol of God's purpose, working out its conclusions in living realities. Now every symbol must have, organically attached to it, its Indices of Reactions and its Icons of Qualities; and such part as these reactions and these qualities play in an argument that, they of course, play in the universe — that Universe being precisely an argument. In the little bit that you or I can make out of

* §9 of ch. 2, bk. III, vol. 1 follows here in the ms., but apparently was not read.

this huge demonstration, our perceptual judgments are the premisses *for us* and these perceptual judgments have icons as their predicates, in which *icons* Qualities are immediately presented. But what is first for us is not first in nature. The premisses of Nature's own process are all the independent uncaused elements of facts that go to make up the variety of nature which the necessitarian supposes to have been all in existence from the foundation of the world, but which the Tychist supposes are continually receiving new accretions.* These premisses of nature, however, though they are not the *perceptual facts* that are premisses to us, nevertheless must resemble them in being premisses. We can only imagine what they are by comparing them with the premisses for us. As premisses they must involve Qualities.

Now as to their function in the economy of the Universe. The Universe as an argument is necessarily a great work of art, a great poem — for every fine argument is a poem and a symphony — just as every true poem is a sound argument. But let us compare it rather with a painting — with an impressionist seashore piece — then every Quality in a Premiss is one of the elementary colored particles of the Painting; they are all meant to go together to make up the intended Quality that belongs to the whole as whole. That total effect is beyond our ken; but we can appreciate in some measure the resultant Quality of parts of the whole — which Qualities result from the combinations of elementary Qualities that belong to the premisses.

But I shall endeavor to make this clearer in the next lecture.

* Cf. vol. 6, bk. I, A.

LECTURE V*

THE THREE KINDS OF GOODNESS

§1. THE DIVISIONS OF PHILOSOPHY†

120. . . . I have already explained‡ that by Philosophy I mean that department of Positive Science, or Science of Fact, which does not busy itself with gathering facts, but merely with learning what can be learned from that experience which presses in upon every one of us daily and hourly. It does not gather new facts, because it does not need them, and also because new general facts cannot be firmly established without the assumption of a metaphysical doctrine; and this, in turn, requires the coöperation of every department of philosophy; so that such new facts, however striking they may be, afford weaker support to philosophy by far than that *common experience* which nobody doubts or can doubt, and which nobody ever even *pretended* to doubt except as a consequence of belief in that experience so entire and perfect that it failed to be conscious of itself; just as an American who has never been abroad fails to perceive the characteristics of Americans; just as a writer is unaware of the peculiarities of his own style; just as none of us can see himself as others see him.

Now I am going to make a series of assertions which will sound wild; for I cannot stop to argue them, although I cannot omit them if I am to set the supports of pragmatism in their true light.

121. Philosophy has three grand divisions. The first is Phenomenology, which simply contemplates the Universal Phenomenon and discerns its ubiquitous elements, Firstness, Secondness, and Thirdness, together perhaps with other series of categories. The second grand division is Normative Science, which investigates the universal and necessary laws of the relation of Phenomena to *Ends*, that is, perhaps, to Truth, Right,

* The third and final draught; cf. vol. 1, bk. IV.

† Cf. vol. 1, bk. II, ch. 2, §5.

‡ See 61, and 1.126ff.

and Beauty. The third grand division is Metaphysics, which endeavors to comprehend the Reality of Phenomena. Now Reality is an affair of Thirdness as Thirdness, that is, in its mediation between Secondness and Firstness. Most, if not all of you, are, I doubt not, Nominalists; and I beg you will not take offence at a truth which is just as plain and undeniable to me as is the truth that children do not understand human life. To be a nominalist consists in the undeveloped state in one's mind of the apprehension of Thirdness as Thirdness. The remedy for it consists in allowing ideas of human life to play a greater part in one's philosophy. Metaphysics is the science of Reality. Reality consists in regularity. Real regularity is active law. Active law is efficient reasonableness, or in other words is truly reasonable reasonableness. Reasonable reasonableness is Thirdness as Thirdness.

So then the division of Philosophy into these three grand departments, whose distinctness can be established without stopping to consider the contents of Phenomenology (that is, without asking what the true categories may be), turns out to be a division according to Firstness, Secondness, and Thirdness, and is thus one of the very numerous phenomena I have met with which confirm this list of categories.

122. Phenomenology treats of the universal Qualities of Phenomena in their immediate phenomenal character, in themselves as phenomena. It, thus, treats of Phenomena in their Firstness.

123. Normative Science treats of the laws of the relation of phenomena to ends; that is, it treats of Phenomena in their Secondness.

124. Metaphysics, as I have just remarked, treats of Phenomena in their Thirdness.

125. If, then, Normative Science does not seem to be sufficiently described by saying that it treats of phenomena in their secondness, this is an indication that our conception of Normative Science is too narrow; and I had come to the conclusion that this is true of even the best modes of conceiving Normative Science which have achieved any renown, many years before I recognized the proper division of philosophy.

I wish I could talk for an hour to you concerning the true conception of normative science. But I shall only be able to

make a few negative assertions which, even if they were proved, would not go far toward developing that conception. Normative Science is not a skill, nor is it an investigation conducted with a view to the production of skill. Coriolis wrote a book on the Analytic Mechanics of the Game of Billiards.* If that book does not help people in the least degree to play billiards, that is nothing against it. The book is only intended to be pure theory. In like manner, if Normative Science does not in the least tend to the development of skill, its value as Normative Science remains the same. It is purely theoretical. Of course there *are* practical sciences of reasoning and investigation, of the conduct of life, and of the production of works of art. They correspond to the Normative Sciences, and may be probably expected to receive aid from them. But they are not integrant parts of these sciences; and the reason that they are not so, thank you, is no mere formalism, but is this, that it will be in general quite different men — two knots of men not apt to consort the one with the other — who will conduct the two kinds of inquiry. Nor again is Normative Science a *special* science, that is, one of those sciences that discover new phenomena. It is not even aided in any appreciable degree by any such science, and let me say that it is no more by psychology than by any other special science. If we were to place six lots each of seven coffee beans in one pan of an equal-armed balance, and forty-two coffee beans in the other pan, and were to find on trial that the two loads nearly balanced one another, this observation might be regarded as adding in some excessively slight measure to the certainty of the proposition that six times seven make forty-two; because it is conceivable that this proposition should be a mistake due to some peculiar insanity affecting the whole human race, and the experiment may possibly evade the effects of that insanity, supposing that we are affected with it. In like manner, and in just *about the same degree*, the fact that men for the most part show a natural disposition to approve nearly the same arguments that logic approves, nearly the same acts that ethics approves, and nearly the same works of art that esthetics approves, may be regarded as tending to support the conclusions of logic, ethics, and esthetics. But such support is perfectly insignificant; and

* *Théorie mathématique des effets du jeu de billard*, G. G. Coriolis, Paris (1835).

when it comes to a particular case, to urge that anything is sound and good logically, morally, or esthetically, for no better reason than that men have a natural tendency to think so, I care not how strong and imperious that tendency may be, is as pernicious a fallacy as ever was. Of course it is quite a different thing for a man to acknowledge that he cannot perceive that he doubts what he does not appreciably doubt.

126. In one of the ways I have indicated, especially the last, Normative Science is by the majority of writers of the present day ranked too low in the scale of the sciences. On the other hand, some students of exact logic rank *that* normative science, at least, *too high*, by virtually treating it as on a par with pure mathematics.* There are three excellent reasons any one of which ought to rescue them from the error of this opinion. In the first place, the hypotheses from which the deductions of normative science proceed are *intended to conform* to positive truth of fact and those deductions derive their interest from that circumstance almost exclusively; while the hypotheses of pure mathematics are purely ideal in intention, and their interest is purely intellectual. But in the second place, the procedure of the normative sciences is *not purely deductive*, as that of mathematics is, nor even principally so. Their peculiar analyses of familiar phenomena, analyses which ought to be guided by the facts of phenomenology in a manner in which mathematics is not at all guided, separate Normative Science from mathematics quite radically. In the third place, there is a most intimate and essential element of Normative Science which is still *more* proper to it, and that is its *peculiar appreciations*, to which nothing at all in the phenomena, in themselves, corresponds. These appreciations relate to the conformity of phenomena *to ends* which are not immanent within those phenomena.

127. There are sundry other widely spread misconceptions of the nature of Normative Science. One of these is that the chief, if not the only, problem of Normative Science is to say what is *good* and what *bad*, logically, ethically, and esthetically; or what degree of goodness a given description of phenomenon attains. Were this the case, normative science would be, in a certain sense, *mathematical*, since it would deal entirely with

* See 1.247f, 4.239ff.

a question of *quantity*. But I am strongly inclined to think that this view will not sustain critical examination. Logic classifies arguments, and in doing so recognizes different *kinds* of truth. In ethics, too, *qualities* of good are admitted by the great majority of moralists. As for esthetics, in that field qualitative differences appear to be so prominent that, abstracted from them, it is impossible to say that there is any appearance which is not esthetically good. Vulgarity and pretension, themselves, may appear quite delicious in their perfection, if we can once conquer our squeamishness about them, a squeamishness which results from a contemplation of them as possible qualities of our own handiwork — but that is a *moral* and not an *esthetic* way of considering them. I hardly need remind you that goodness, whether esthetic, moral, or logical, may either be *negative* — consisting in freedom from fault — or *quantitative* — consisting in the degree to which it attains. But in an inquiry, such as we are now engaged upon, negative goodness is the important thing.

128. A subtle and almost ineradicable narrowness in the conception of Normative Science runs through almost all modern philosophy in making it relate exclusively to the human mind. The beautiful is conceived to be relative to human taste, right and wrong concern human conduct alone, logic deals with human reasoning. Now in the truest sense these sciences certainly are indeed sciences of mind. Only, modern philosophy has never been able quite to shake off the Cartesian idea of the mind, as something that “resides”— such is the term* — in the pineal gland. Everybody laughs at this nowadays, and yet everybody continues to think of mind in this same general way, as something within this person or that, belonging to him and correlative to the real world. A whole course of lectures would be required to expose this error. I can only hint that if you reflect upon it, without being dominated by preconceived ideas, you will soon begin to perceive that it is a very narrow view of mind. I should think it must appear so to anybody who was sufficiently soaked in the *Critic of the Pure Reason*.

* See *Oeuvres de Descartes*, t. III, lettre 183, A. et P. Tannery, Paris (1897–1910).

§2. ETHICAL AND ESTHETICAL GOODNESS*

129. I cannot linger more upon the general conception of Normative Science. I must come down to the particular Normative Sciences. These are now commonly said to be logic, ethics, and esthetics. Formerly only logic and ethics were reckoned as such. A few logicians refuse to recognize any other normative science than their own. My own opinions of ethics and esthetics are far less matured than my logical opinions. It is only since 1883 that I have numbered ethics among my special studies; and until about four years ago, I was not prepared to affirm that ethics was a normative science. As for esthetics, although the first year of my study of philosophy was devoted to this branch exclusively, yet I have since then so completely neglected it that I do not feel entitled to have any confident opinions about it. I am inclined to think that there is such a Normative Science; but I feel by no means sure even of that.

Supposing, however, that normative science divides into esthetics, ethics, and logic, then it is easily perceived, from my standpoint, that this division is governed by the three categories. For Normative Science in general being the science of the laws of conformity of things to ends, esthetics considers those things whose ends are to embody qualities of feeling, ethics those things whose ends lie in action, and logic those things whose end is to represent something.

130. Just at this point we begin to get upon the trail of the secret of pragmatism, after a long and apparently aimless beating about the bush. Let us glance at the relations of these three sciences to one another. Whatever opinion be entertained in regard to the scope of logic, it will be generally agreed that the heart of it lies in the classification and critic of arguments. Now it is peculiar to the nature of argument that no argument can exist without being referred to some special class of arguments. The act of inference consists in the thought that the inferred conclusion is true because *in any analogous case* an analogous conclusion *would be* true. Thus, logic is coeval with reasoning. Whoever reasons *ipso facto* virtually holds a logical doctrine, his *logica utens*.† This classi-

* Cf. 1.573ff, 2.196f.

† See 2.186f.

fication is not a mere qualification of the argument. It essentially involves *an approval* of it — a *qualitative approval*. Now such self-approval supposes *self-control*. Not that we regard our approval as *itself* a voluntary act, but that we hold the act of inference, which we approve, to be voluntary. That is, if we did not approve, we should not infer. There are mental operations which are as completely beyond our control as the growth of our hair. To approve or disapprove of *them* would be idle. But when we institute an experiment to test a theory, or when we imagine an extra line to be inserted in a geometrical diagram in order to determine a question in geometry, these are *voluntary acts* which our logic, whether it be of the natural or the scientific sort, *approves*. Now, *the approval of a voluntary act* is a *moral approval*. *Ethics is the study of what ends of action we are deliberately prepared to adopt*. That is right action which is in conformity to ends which we are prepared deliberately to adopt. That is all there *can be* in the notion of righteousness, as it seems to me. The righteous man is the man who controls his passions, and makes them conform to such ends as he is prepared deliberately to adopt as *ultimate*. If it were in the nature of a man to be perfectly satisfied to make his personal comfort his ultimate aim, no more blame would attach to him for doing so than attaches to a hog for behaving in the same way. A logical reasoner is a reasoner who exercises great self-control in his intellectual operations; and therefore the logically good is simply a particular species of the morally good. Ethics — the genuine normative science of ethics, as contradistinguished from the branch of anthropology which in our day often passes under the name of ethics — this genuine ethics is the normative science *par excellence*, because an *end* — the essential object of normative science — is germane to a voluntary act in a primary way in which it is germane to nothing else. For that reason I have some lingering doubt as to there being any true normative science of the beautiful. On the other hand, an ultimate end of action *deliberately* adopted — that is to say, *reasonably* adopted — must be a state of things that *reasonably recommends itself in itself* aside from any ulterior consideration. It must be an *admirable ideal*, having the only kind of goodness that such an ideal *can* have; namely, esthetic

goodness. From this point of view the morally good appears as a particular species of the esthetically good.

131. If this line of thought be sound, the morally good will be the esthetically good specially determined by a peculiar superadded element; and the logically good will be the morally good specially determined by a special superadded element. Now it will be admitted to be, at least, very likely that in order to correct or to vindicate the maxim of pragmatism, we must find out precisely what the logically good consists in; and it would appear from what has been said that, in order to analyze the nature of the logically good, we must first gain clear apprehensions of the nature of the esthetically good and especially that of the morally good.

132. So, then, incompetent as I am to it, I find the task imposed upon me of defining the esthetically good — a work which so many philosophical artists have made as many attempts at performing. In the light of the doctrine of categories I should say that an object, to be esthetically good, must have a multitude of parts so related to one another as to impart a positive simple immediate quality to their totality; and whatever does this is, in so far, esthetically good, no matter what the particular quality of the total may be. If that quality be such as to nauseate us, to scare us, or otherwise to disturb us to the point of throwing us out of the mood of esthetic enjoyment, out of the mood of simply contemplating the embodiment of the quality — just, for example, as the Alps affected the people of old times, when the state of civilization was such that an impression of great power was inseparably associated with lively apprehension and terror — then the object remains none the less esthetically good, although people in our condition are incapacitated from a calm esthetic contemplation of it.

This suggestion must go for what it may be worth, which I dare say may be very little. If it be correct, it will follow that there is no such thing as positive esthetic badness; and since by goodness we chiefly in this discussion mean merely the absence of badness, or faultlessness, there will be no such thing as esthetic goodness. All there will be will be various esthetic qualities; that is, simple qualities of totalities not capable of full embodiment in the parts, which qualities may be

more decided and strong in one case than in another. But the very reduction of the intensity may be an esthetic quality; nay, it *will* be so; and I am seriously inclined to doubt there being any distinction of pure esthetic betterness and worse-ness. My notion would be that there are innumerable varieties of esthetic quality, but no purely esthetic grade of excellence.

133. But the instant that an esthetic ideal is proposed as an ultimate end of action, at that instant a categorical imperative pronounces for or against it. Kant, as you know, proposes to allow that categorical imperative to stand unchallenged — an eternal pronouncement. His position is in extreme disfavor now, and not without reason. Yet I cannot think very highly of the logic of the ordinary attempts at refuting it. The whole question is whether or not this categorical imperative be beyond control. If this voice of conscience is unsupported by ulterior reasons, is it not simply an insistent irrational howl, the hooting of an owl which we may disregard if we can? *Why should* we pay any more attention to it than we would to the barking of a cur? If we *cannot* disregard conscience, all homilies and moral maxims are perfectly idle. But if it can be disregarded, it is, in one sense, not beyond control. It leaves us free to control ourselves. So then, it appears to me that any aim whatever which can be consistently pursued becomes, as soon as it is unfalteringly adopted, beyond all possible criticism, except the quite impertinent criticism of outsiders. An aim which *cannot* be adopted and consistently pursued is a bad aim. It cannot properly be called an ultimate aim at all. The only moral evil is not to have an ultimate aim.

134. Accordingly the problem of ethics is to ascertain what end is possible. It might be thoughtlessly supposed that *special science* could aid in this ascertainment. But that would rest on a misconception of the nature of an absolute aim, which is what *would be* pursued under all possible circumstances — that is, even though the contingent facts ascertained by special sciences were entirely different from what they are. Nor, on the other hand, must the definition of such aim be reduced to a mere formalism.

135. The importance of the matter for pragmatism is obvi-

ous. For if the meaning of a symbol consists in *how* it might cause us to act, it is plain that this "how" cannot refer to the description of mechanical motions that it might cause, but must intend to refer to a description of the action as having this or that *aim*. In order to understand pragmatism, therefore, well enough to subject it to intelligent criticism, it is incumbent upon us to inquire what an ultimate aim, capable of being pursued in an indefinitely prolonged course of action, can be.

136. The deduction of this is somewhat intricate, on account of the number of points which have to be taken into account; and of course I cannot go into details. In order that the aim should be immutable under all circumstances, without which it will not be an ultimate aim, it is requisite that it should accord with a free development of the agent's own esthetic quality. At the same time it is requisite that it should not ultimately tend to be disturbed by the reactions upon the agent of that outward world which is supposed in the very idea of action. It is plain that these two conditions can be fulfilled at once only if it happens that the esthetic quality toward which the agent's free development tends and that of the ultimate action of experience upon him are parts of one esthetic total. Whether or not this is really so, is a metaphysical question which it does not fall within the scope of Normative Science to answer. If it is *not* so, the aim is essentially *unattainable*. But just as in playing a hand of whist, when only three tricks remain to be played, the rule is to assume that the cards are so distributed that the odd trick can be made, so the rule of ethics will be to adhere to the only possible absolute aim, and to hope that it will prove attainable. Meantime, it is comforting to know that all experience is favorable to that assumption.

§3. LOGICAL GOODNESS

137. The ground is now cleared for the analysis of logical goodness, or the goodness of representation. There is a special variety of esthetic goodness that may belong to a representamen, namely, *expressiveness*. There is also a special moral goodness of representations, namely, *veracity*. But besides

this there is a peculiar mode of goodness which is logical. What this consists in we have to inquire.

138. The mode of being of a representamen is such that it is capable of repetition. Take, for example, any proverb. "Evil communications corrupt good manners." Every time this is written or spoken in English, Greek, or any other language, and every time it is thought of it is one and the same representamen. It is the same with a diagram or picture. It is the same with a physical sign or symptom. If two weather-cocks are different signs, it is only in so far as they refer to different parts of the air. A representamen which should have a unique embodiment, incapable of repetition, would not be a representamen, but a part of the very fact represented. This repetitory character of the representamen involves as a consequence that it is essential to a representamen that it should contribute to the determination of another representamen distinct from itself. For in what sense would it be true that a representamen was repeated if it were not capable of determining some different representamen? "Evil communications corrupt good manners" and *φθείρουσιν ἥθη χρήσθ' ὀμιλῖαι κακαί* are one and the same representamen. They are so, however, only so far as they are represented as being so; and it is one thing to say that "Evil communications corrupt good manners" and quite a different thing to say that "Evil communications corrupt good manners" and *φθείρουσιν ἥθη χρήσθ' ὀμιλῖαι κακαί* are two expressions of the same proverb. Thus every representamen must be capable of contributing to the determination of a representamen different from itself. Every conclusion from premisses is an instance in point; and what would be a representamen that was not capable of contributing to any ulterior conclusion? I call a representamen which is determined by another representamen, an *interpretant* of the latter. Every representamen is related or is capable of being related to a reacting thing, its object, and every representamen embodies, in some sense, some quality, which may be called its *signification*, what in the case of a common name J. S. Mill calls its *connotation*, a particularly objectionable expression.*

139. A representamen [as symbol] is either a *rhema*, a

* See 2.317n, 2.393.

proposition, or an *argument*. An *argument* is a representamen which separately shows what interpretant it is intended to determine. A *proposition* is a representamen which is not an argument, but which separately indicates what object it is intended to represent. A *rhema* is a simple representation without such separate parts.

140. Esthetic goodness, or *expressiveness*, may be possessed, and in some degree must be possessed, by any kind of representamen — rhema, proposition, or argument.

141. Moral goodness, or veracity, may be possessed by a proposition or by an argument, but cannot be possessed by a rhema. A mental judgment or inference must possess some degree of veracity.

142. As to logical goodness, or *truth*, the statements in the books are faulty; and it is highly important for our inquiry that they should be corrected. The books distinguish between *logical truth*, which some of them rightly confine to arguments that do not promise more than they perform, and *material truth* which belongs to propositions, being that which veracity aims to be; and this is conceived to be a higher grade of truth than mere logical truth. I would correct this conception as follows. In the first place, all our knowledge rests upon perceptual judgments. These are necessarily veracious in greater or less degree according to the effort made, but there is no meaning in saying that they have any other truth than veracity, since a perceptual judgment can never be repeated. At most we can say of a perceptual judgment that its relation to other perceptual judgments is such as to permit a simple theory of the facts. Thus I may judge that I see a clean white surface. But a moment later I may question whether the surface really was clean, and may look again more sharply. If this second more veracious judgment still asserts that I see a clean surface, the theory of the facts will be simpler than if, at my second look, I discern that the surface is soiled. Still, even in this last case, I have no right to say that my first *percept* was that of a soiled surface. I absolutely have no testimony concerning it, except my perceptual judgment, and although that was careless and had no high degree of veracity, still I have to accept the only evidence in my possession. Now consider any other judgment I may make. That is a con-

clusion of inferences ultimately based on perceptual judgments, and since these are indisputable, all the truth which my judgment can have must consist in the logical correctness of those inferences. Or I may argue the matter in another way. To say that a proposition is false is not veracious unless the speaker has found out that it is false. Confining ourselves, therefore, to veracious propositions, to say that a proposition is false and that it has been *found* to be false are equivalent, in the sense of being necessarily either both true or both false. Consequently, to say that a proposition is *perhaps* false is the same as to say that it will *perhaps* be found out to be false. Hence to deny one of these is to deny the other. To say that a proposition is certainly true means simply that it never can be found out to be false, or in other words, that it is derived by logically correct arguments from veracious perceptual judgments. Consequently, the only difference between material truth and the logical correctness of argumentation is that the *latter* refers to a single line of argument and the *former* to all the arguments which could have a given proposition or its denial as their conclusion.

Let me say to you that this reasoning needs to be scrutinized with the severest and minutest logical criticism, because pragmatism largely depends upon it.

143. It appears, then, that logical goodness is simply the excellence of argument — its negative, and more fundamental, goodness being its soundness and weight, its really having the force that it pretends to have and that force being great, while its quantitative goodness consists in the degree in which it advances our knowledge. In what then does the soundness of argument consist?

144. In order to answer that question it is necessary to recognize three radically different kinds of arguments which I signalized in 1867* and which had been recognized by the logicians of the eighteenth century, although [those] logicians quite pardonably failed to recognize the inferential character of one of them. Indeed, I suppose that the three were given by Aristotle in the *Prior Analytics*, although the unfortunate illegibility of a single word in his MS. and its replacement by a wrong word by his first editor, the stupid [Apellicon],

* Vol. 2, bk. III, ch. 2, Part III.

has completely altered the sense of the chapter on Abduction.* At any rate, even if my conjecture is wrong, and the text must stand as it is, still Aristotle, in that chapter on Abduction, was even in that case evidently groping for that mode of inference which I call by the otherwise quite useless name of Abduction — a word which is only employed in logic to translate the [*ἀπαγωγή*] of that chapter.

145. These three kinds of reasoning are Abduction, Induction, and Deduction. Deduction is the only necessary reasoning. It is the reasoning of mathematics. It starts from a hypothesis, the truth or falsity of which has nothing to do with the reasoning; and of course its conclusions are equally ideal. The ordinary use of the doctrine of chances is necessary reasoning, although it is reasoning concerning probabilities. Induction is the experimental testing of a theory. The justification of it is that, although the conclusion at any stage of the investigation may be more or less erroneous, yet the further application of the same method must correct the error. The only thing that induction accomplishes is to determine the value of a quantity. It sets out with a theory and it measures the degree of concordance of that theory with fact. It never can originate any idea whatever. No more can deduction. All the ideas of science come to it by the way of Abduction. Abduction consists in studying facts and devising a theory to explain them. Its only justification is that if we are ever to understand things at all, it must be in that way.

146. Concerning the relations of these three modes of inference to the categories and concerning certain other details, my opinions, I confess, have wavered. These points are of such a nature that only the closest students of what I have written would remark the discrepancies. Such a student might infer that I have been given to expressing myself without due consideration; but in fact I have never, in any philosophical writing — barring anonymous contributions to newspapers — made any statement which was not based on at least half a dozen attempts, in writing, to subject the whole question to a very far more minute and critical examination than could be attempted in print, these attempts being made quite independently of one another, at intervals of many months, but

* Chapter 25, bk. II.

subsequently compared together with the most careful criticism, and being themselves based upon at least two briefs of the state of the question, covering its whole literature, as far as known to me, and carrying the criticism in the strictest logical form to its extreme beginnings, without leaving any loopholes that I was able to discern with my utmost pains, these two briefs being made at an interval of a year or more and as independently as possible, although they were subsequently minutely compared, amended, and reduced to one. My waverings, therefore, have never been due to haste. They may argue stupidity. But I can at least claim that they prove one quality in my favor. That is that so far from my being wedded to opinions as being my own, I have shown rather a decided distrust of any opinion of which I have been an advocate. This perhaps ought to give a slight additional weight to those opinions in which I have never wavered — although I need not say that the notion of any weight of authority being attached to opinions in philosophy or in science is utterly illogical and unscientific. Among these opinions which I have constantly maintained is this, that while Abductive and Inductive reasoning are utterly irreducible, either to the other or to Deduction, or Deduction to either of them, yet the only *rationale* of these methods is essentially Deductive or Necessary. If then we can state wherein the validity of Deductive reasoning lies, we shall have defined the foundation of logical goodness of whatever kind.

147. Now all necessary reasoning, whether it be good or bad, is of the nature of mathematical reasoning. The philosophers are fond of boasting of the pure conceptual character of their reasoning. The more conceptual it is, the nearer it approaches to verbiage. I am not speaking from surmise. My analyses of reasoning surpass in thoroughness all that has ever been done in print, whether in words or in symbols — all that DeMorgan, Dedekind, Schröder, Peano, Russell, and others have ever done — to such a degree as to remind one of the difference between a pencil sketch of a scene and a photograph of it. To say that I analyze the passage from the premisses to the conclusion of a syllogism in Barbara into seven or eight distinct inferential steps gives but a very inadequate

idea of the thoroughness of my analysis.* Let any responsible person pledge himself to go through the matter and dig it out, point by point, and he shall receive the manuscript.

148. It is on the basis of such analysis that I declare that all necessary reasoning, be it the merest verbiage of the theologians, so far as there is any semblance of necessity in it, is mathematical reasoning. Now mathematical reasoning is diagrammatic. This is as true of algebra as of geometry. But in order to discern the features of diagrammatic reasoning, it is requisite to begin with examples that are not too simple. In simple cases, the essential features are so nearly obliterated that they can only be discerned when one knows what to look for. But beginning with suitable examples and thence proceeding to others, one finds that the diagram itself, in its individuality, is not what the reasoning is concerned with. I will take an example which recommends itself only by its consideration requiring but a moment. A line abuts upon an ordinary point of another line forming two angles. The sum of these angles is proved by Legendre to be equal to the sum of two right angles by erecting a perpendicular to the second line in the plane of the two and through the point of abuttal. This perpendicular must lie in the one angle or the other. The pupil is supposed to *see* that. He sees it only in a special case, but he is supposed to perceive that it will be so in any case. The more careful logician may demonstrate that it must fall in one angle or the other; but this demonstration will only consist in substituting a different diagram in place of Legendre's figure. But in any case, either in the new diagram or else, and more usually, in passing from one diagram to the other, the interpreter of the argumentation will be supposed to *see* something, which will present this little difficulty for the theory of vision, that it is of a *general nature*.

149. Mr. Mill's disciples will say that this proves that geometrical reasoning is inductive. I do not wish to speak disparagingly of Mill's treatment† of the *Pons Asinorum* because it penetrates further into the logic of the subject than anybody had penetrated before. Only it does not quite touch bottom. As for such general perceptions being inductive, I

* See 4.571.

† See his *Logic*, bk. II, ch. 4, §4.

might treat the question from a technical standpoint and show that the essential characters of induction are wanting. But besides the interminable length, such a way of dealing with the matter would hardly meet the point. It is better to remark that the "uniformity of nature" is not in question, and that there is no way of applying that principle to supporting the mathematical reasoning that will not enable me to give a precisely analogous instance in every essential particular, except that it will be a fallacy that no good mathematician could overlook. If you admit the principle that logic stops where self-control stops, you will find yourself obliged to admit that a *perceptual fact*, a logical origin, may involve generality. This can be shown for ordinary generality. But if you have already convinced yourself that continuity is generality, it will be somewhat easier to show that a perceptual fact may involve continuity than that it can involve non-relative generality.

150. If you object that there can be no immediate consciousness of generality, I grant that. If you add that one can have no direct experience of the general, I grant that as well. Generality, Thirdness, pours in upon us in our very perceptual judgments, and all reasoning, so far as it depends on necessary reasoning, that is to say, mathematical reasoning, turns upon the perception of generality and continuity at every step.

LECTURE VI

THREE TYPES OF REASONING

§1. PERCEPTUAL JUDGMENTS AND GENERALITY

151. I was remarking at the end of my last lecture that perceptual judgments involve generality. What is the general? The Aristotelian definition is good enough. It is *quod aptum natum est praedicari de pluribus*;^{*} λέγω δὲ καθόλου μὲν ὁ ἐπὶ πλειόνων πεφυκε κατηγορεῖσθαι. *De Interp.* 7. When logic was studied in a scientific spirit of exactitude it was recognized on all hands that all ordinary judgments contain a predicate and that this predicate is general. There seemed to be some exceptions, of which the only noticeable ones were expository judgments, such as "Tully is Cicero." But the Logic of Relations has now reduced logic to order, and it is seen that a proposition may have any number of subjects but can have but one predicate which is invariably general. Such a proposition as "Tully is Cicero" predicates the general relation of identity of Tully and Cicero.† Consequently, it is now clear that if there be any perceptual judgment, or proposition directly expressive of and resulting from the quality of a present percept, or sense-image, that judgment must involve generality in its predicate.

152. That which is not general is singular; and the singular is that which reacts. The being of a singular may consist in the being of other singulars which are its parts. Thus heaven and earth is a singular; and its being consists in the being of heaven and the being of earth, each of which reacts and is therefore a singular forming a part of heaven and earth. If I had denied that every perceptual judgment refers, as to its subject, to a singular, and that singular actually reacting upon the mind in forming the judgment, actually reacting too upon

* Cf. 2.367f.

† Cf. 2.440.

the mind in interpreting the judgment, I should have uttered an absurdity. For every proposition whatsoever refers as to its subject to a singular actually reacting upon the utterer of it and actually reacting upon the interpreter of it. All propositions relate to the same ever-reacting singular; namely, to the totality of all real objects. It is true that when the Arabian romancer tells us that there was a lady named Scherherazade, he does not mean to be understood as speaking of the world of outward realities, and there is a great deal of fiction in what he is talking about. For the *fiction* is that whose characters depend upon what characters somebody attributes to it; and the story is, of course, the mere creation of the poet's thought. Nevertheless, once he has imagined Scherherazade and made her young, beautiful, and endowed with a gift of spinning stories, it becomes a real fact that so he has imagined her, which fact he cannot destroy by pretending or thinking that he imagined her to be otherwise. What he wishes us to understand is what he might have expressed in plain prose by saying, "I have imagined a lady, Scherherazade by name, young, beautiful and a tireless teller of tales, and I am going on to imagine what tales she told." This would have been a plain expression of professed fact relating to the sum total of realities.

153. As I said before, propositions usually have more subjects than one; and almost every proposition, if not quite every one, has one or more other singular subjects, to which some propositions do not relate. These are the special parts of the Universe of all Truth* to which the given proposition especially refers. It is a characteristic of perceptual judgments that each of them relates to some singular to which no other proposition relates directly, but, if it relates to it at all, does so by relating to that perceptual judgment. When we express a proposition in words, we leave most of its singular subjects unexpressed; for the circumstances of the enunciation sufficiently show what subject is intended and words, owing to their usual generality, are not well adapted to designating singulars. The pronoun, which may be defined as a part of speech intended to fulfill the function of an index, is never intelligible taken by itself apart from the circumstances of its utterance;

*See 448n, 4.539.

and the noun, which may be defined as a part of speech put in place of a pronoun, is always liable to be equivocal.*

154. A subject need not be singular. If it is not so, then when the proposition is expressed in the canonical form used by logicians, this subject will present one or other of two imperfections:†

On the one hand, it may be *indesignative*, so that the proposition means that a singular of the universe might replace this subject while the truth was preserved, while failing to designate what singular that is: as when we say, “*Some* calf has five legs.”

Or on the other hand, the subject may be *hypothetical*, that is may allow any singular to be substituted for it that fulfills certain conditions, without guaranteeing that there is any singular which fulfills these conditions; as when we say, “Any salamander could live in fire,” or “Any man who should be stronger than Samson could do all that Samson did.”

A subject which has neither of these two imperfections is a *singular* subject referring to an existing singular collection in its entirety.

155. If a proposition has two or more subjects of which one is *indesignative* and the other *hypothetical*, then it makes a difference in what order the replacement by singulars is asserted to be possible. It is, for example, one thing to assert that “Any Catholic there may be adores some woman or other” and quite another thing to assert that “There is some woman whom any Catholic adores.” If the first general subject is *indesignate*, the proposition is called *particular*. If the first general subject is *hypothetical*, the proposition is called *universal*.‡

A *particular* proposition asserts the existence of something of a given description. A *universal* proposition merely asserts the non-existence of anything of a given description.

156. Had I, therefore, asserted that a perceptual judgment could be a universal proposition, I should have fallen into rank absurdity. For reaction is existence and the perceptual judgment is the cognitive product of a reaction.

But as from the *particular* proposition that “there is some

* Cf. 2. 287n.

† Cf. 2.324, 2.357.

‡ Cf. 3.532, where a bar is to be inserted over the second l.

women whom any Catholic you can find will adore" we can with certainty infer the universal proposition that "any Catholic you can find will adore some woman or other,"* so if a perceptual judgment involves any general elements, as it certainly does, the presumption is that a universal proposition can be necessarily deduced from it.

157. In saying that perceptual judgments involve general elements I certainly never intended to be understood as enunciating any proposition in psychology. For my principles absolutely debar me from making the least use of psychology in logic. I am confined entirely to the unquestionable facts of everyday experience, together with what can be deduced from them. All that I can mean by a perceptual judgment is a judgment absolutely forced upon my acceptance, and that by a process which I am utterly unable to control and consequently am unable to criticize. Nor can I pretend to absolute certainty about any matter of fact. If with the closest scrutiny I am able to give, a judgment appears to have the characters I have described, I must reckon it among perceptual judgments until I am better advised. Now consider the judgment that one event *C appears to be* subsequent to another event *A*. Certainly, I may have inferred this; because I may have remarked that *C* was subsequent to a third event *B* which was itself subsequent to *A*. But then these premisses are judgments of the same description. It does not seem possible that I can have performed an infinite series of acts of criticism each of which must require a distinct effort. The case is quite different from that of Achilles and the tortoise because Achilles does not require to make an infinite series of distinct efforts. It therefore appears that I must have made some judgment that one event *appeared to be* subsequent to another without that judgment having been inferred from any premiss [i.e.] without any *controlled* and *criticized* action of reasoning. If this be so, it is a perceptual judgment in the only sense that the logician can recognize. But from that proposition that one event, *Z*, is subsequent to another event, *J*, I can at once deduce by necessary reasoning a universal proposition. Namely, the definition of the relation of apparent subsequence is well known, or sufficiently so for our purpose. *Z* will appear to be subsequent to

* See 3.532, where the above is interpreted as an instance of subalternation.

Y if and only if Z appears to stand in a peculiar relation, R, to Y such that nothing can stand in the relation R to itself, and if, furthermore, whatever event, X, there may be to which Y stands in the relation R, to that same X, Z also stands in the relation R.* This being implied in the meaning of subsequence, concerning which there is no room for doubt, it easily follows that whatever is subsequent to C is subsequent to anything, A, to which C is subsequent — which is a universal proposition.

Thus my assertion at the end of the last lecture appears to be most amply justified. Thirdness pours in upon us through every avenue of sense.

§2. THE PLAN AND STEPS OF REASONING

158. We may now profitably ask ourselves what logical goodness is. We have seen that any kind of goodness consists in the adaptation of its subject to its *end*. One might set this down as a truism. Verily, it is scarcely more, although circumstances may have prevented it being clearly apprehended.

If you call this utilitarianism, I shall not be ashamed of the title. For I do not know what other system of philosophy has wrought so much good in the world as that same utilitarianism. Bentham may be a shallow logician; but such truths as he saw, he saw most nobly. As for the vulgar utilitarian, his fault does not lie in his pressing too much the question of what would be the good of this or that. On the contrary his fault is that he never presses the question half far enough, or rather he never really raises the question at all. He simply rests in his present desires as if desire were beyond all dialectic. He wants, perhaps, to go to heaven. But he forgets to ask what would be the good of his going to heaven. He would be happy, there, he thinks. But that is a mere word. It is no real answer to the question.

159. Our question is, What is the use of thinking? We have already remarked that it is the argument alone which is the primary and direct subject of logical goodness and badness. We have therefore to ask what the end of argumentation is, what it ultimately leads to.

160. The Germans, whose tendency is to look at every-

* Cf. 3.562B.

thing subjectively and to exaggerate the element of Firstness, maintain that the object is simply to satisfy one's logical feeling and that the goodness of reasoning consists in that esthetic satisfaction alone.* This might do if we were gods and not subject to the force of experience.

Or if the force of experience were mere blind compulsion, and we were utter foreigners in the world, then again we might as well think to please ourselves; because we then never could make our thoughts conform to that mere Secondness.

But the saving truth is that there is a Thirdness in experience, an element of Reasonableness to which we can train our own reason to conform more and more. If this were not the case, there could be no such thing as logical goodness or badness; and therefore we need not wait until it is proved that there is a reason operative in experience to which our own can approximate.† We should at once hope that it is so, since in that hope lies the only possibility of any knowledge.

161. Reasoning is of three types, Deduction, Induction, and Abduction.‡ In deduction, or necessary reasoning, we set out from a hypothetical state of things which we define in certain abstracted respects. Among the characters to which we pay no attention in this mode of argument is whether or not the hypothesis of our premisses conforms more or less to the state of things in the outward world. We consider this hypothetical state of things and are led to conclude that, however it may be with the universe in other respects, wherever and whenever the hypothesis may be realized, something else not explicitly supposed in that hypothesis will be true invariably. Our inference is valid if and only if there really is such a relation between the state of things supposed in the premisses and the state of things stated in the conclusion. Whether this really be so or not is a question of reality, and has nothing at all to do with how we may be inclined to think. If a given person is unable to see the connection, the argument is none the less valid, provided that relation of real facts really subsists. If the entire human race were unable to see the connection, the argument would be none the less sound, although it would not be

* See 2.152ff.

† Cf. 2.654f.

‡ Cf. 2.100ff; 2.266ff; 2.619ff.

humanly clear. Let us see precisely how we assure ourselves of the reality of the connection. Here, as everywhere throughout logic, the study of relatives has been of the greatest service. The simple syllogisms, which are alone considered by the old inexact logicians, are such very rudimentary forms that it is practically impossible to discern in them the essential features of deductive inference until our attention has been called to these features in higher forms of deduction.

162. All necessary reasoning without exception is diagrammatic.* That is, we construct an icon of our hypothetical state of things and proceed to observe it. This observation leads us to suspect that something is true, which we may or may not be able to formulate with precision, and we proceed to inquire whether it is true or not. For this purpose it is necessary to form a plan of investigation and this is the most difficult part of the whole operation. We not only have to select the features of the diagram which it will be pertinent to pay attention to, but it is also of great importance to return again and again to certain features. Otherwise, although our conclusions may be correct, they will not be the particular conclusions at which we are aiming. But the greatest point of art consists in the introduction of suitable *abstractions*. By this I mean such a transformation of our diagrams that characters of one diagram may appear in another as things. A familiar example is where in analysis we treat operations as themselves the subject of operations. Let me say that it would make a grand life-study to give an account of this operation of planning a mathematical demonstration.† Sundry sporadic maxims are afloat among mathematicians, and several meritorious books have been written upon the subject, but nothing broad and masterly. With the modern reformed mathematics and with my own and other logical results as a basis, such a theory of the plan of demonstration is no longer a superhuman task.

163. Having thus determined the plan of the reasoning, we proceed to the reasoning itself, and this I have ascertained can be reduced to three kinds of steps.‡ The first consists in copulating separate propositions into one compound proposi-

* See vol. 4, bk. II, for a detailed study of diagrams.

† See 3.363f; 3.559, 4.233.

‡ See 579, 2.442ff, 4.505f, 4.565f.

tion. The second consists in omitting something from a proposition without possibility of introducing error. The third consists in inserting something into a proposition without introducing error.

164. You can see precisely what these elementary steps of inference are in Baldwin's *Dictionary* under Symbolic Logic.* As a specimen of what they are like you may take this:

A is a bay horse,
Therefore, A is a horse.

If one asks oneself how one knows that this is certain, one is likely to reply that one imagines a bay horse and on contemplating the image one sees that it is a horse. But that only applies to the single image. How large a horse did this image represent? Would it be the same with a horse of very different size? How old was the horse represented to be; was his tail docked? Would it be so if he had the blind-staggers, and if so are you sure it would be so whatever of the numerous diseases of the horse afflicted him? We are perfectly certain that none of these circumstances could affect the question in the least. It is easy enough to formulate reasons by the dozen; but the difficulty is that they are one and all far less evident than the original inference. I do not see that the logician can do better than to say that he *perceives* that when a copulative proposition is given, such as "A is a horse and A has a bay color" any member of the copulation may be omitted without changing the proposition from true to false. In a psychological sense I am willing to take the word of the psychologist if he says that such a general truth cannot be *perceived*. But what better can we do in logic?

165. Somebody may answer that the copulative proposition contains the conjunction "and" or something equivalent, and that the very *meaning* of this "and" is that the entire copulation is true if and only if each of the members is singly true; so that it is involved in the very *meaning* of the copulative proposition that any member may be dropped.

To this I assent with all my heart. But after all, what does it amount to? It is another way of saying that what we call the *meaning* of a proposition embraces every obvious necessary

* See vol. 4, bk. II, ch. 2.

deduction from it. Considered as the beginning of an analysis of what the meaning of the word "meaning" is, it is a valuable remark. But I ask how it helps us to understand our passing from an accepted judgment A to another judgment C of which we not only feel equally confident but in point of fact *are* equally sure, barring a possible blunder which could be corrected as soon as attention was called to it, barring another equivalent blunder?

To this the advocate of the explanation by the conception of "meaning" may reply: that is *meant* which is intended or purposed; that a judgment is a voluntary act, and our intention is not to employ the form of the judgment A, except to the interpretation of images to which judgments, corresponding in form to C, can be applied.

166. Perhaps it may reconcile the psychologist to the admission of perceptual judgments involving generality to be told that they are perceptual judgments concerning our own purposes. I certainly think that the certainty of pure mathematics and of all necessary reasoning is due to the circumstance that it relates to objects which are the creations of our own minds, and that mathematical knowledge is to be classed along with knowledge of our own purposes. When we meet with a surprising result in pure mathematics, as we so often do, because a loose reasoning had led us to suppose it impossible, this is essentially the same sort of phenomenon as when in pursuing a purpose we are led to do something that we are quite surprised to find ourselves doing, as being contrary, or apparently contrary, to some weaker purpose.

But if it is supposed that any such considerations afford any logical justification of primary logical principles I must say that, on the contrary, at the very best they *beg the question* by assuming premisses far less certain than the conclusion to be established.

§3. INDUCTIVE REASONING*

167. A generation and a half of evolutionary fashions in philosophy has not sufficed entirely to extinguish the fire of admiration for John Stuart Mill — that very strong but Philistine philosopher whose inconsistencies fitted him so well to be

* Cf. vol. 2, bk. III, B.

the leader of a popular school — and consequently there will still be those who propose to explain the general principles of formal logic, which are now fully shown to be mathematical principles, by means of induction. Anybody who holds to that view today may be assumed to have a very loose notion of induction; so that all he really means is that the general principles in question are derived from images of the imagination by a process which is, roughly speaking, analogous to induction. Understanding him in that way, I heartily agree with him. But he must not expect me in 1903 to have anything more than a historical admiration for conceptions of induction which shed a brilliant light upon the subject in 1843. Induction is so manifestly inadequate to account for the certainty of these principles that it would be a waste of time to discuss such a theory.

168. However, it is now time for me to pass to the consideration of Inductive Reasoning. When I say that by inductive reasoning I mean a course of experimental investigation, I do not understand experiment in the narrow sense of an operation by which one varies the conditions of a phenomenon almost as one pleases. We often hear students of sciences, which are not in this narrow sense experimental, lamenting that in their departments they are debarred from this aid. No doubt there is much justice in this lament; and yet those persons are by no means debarred from pursuing the same logical method precisely, although not with the same freedom and facility. An experiment, says Stöckhardt, in his excellent *School of Chemistry*, is a question put to nature.* Like any interrogatory, it is based on a supposition. If that supposition be correct, a certain sensible result is to be expected under certain circumstances which can be created, or at any rate are to be met with. The question is, Will this be the result? If Nature replies "No!" the experimenter has gained an important piece of knowledge. If Nature says "Yes," the experimenter's ideas remain just as they were, only somewhat more deeply engrained. If Nature says "Yes" to the first twenty questions, although they were so devised as to render that answer as surprising as possible, the experimenter will be confident that he

* See *Die Schule der Chemie*, Julius A. Stöckhardt, Part I, §6.

is on the right track, since 2 to the 20th power exceeds a million.

169. Laplace was of the opinion that the affirmative experiments impart a definite probability to the theory; and that doctrine is taught in most books on probability to this day, although it leads to the most ridiculous results, and is inherently self-contradictory. It rests on a very confused notion of what probability is. Probability applies to the question whether a specified kind of event will occur when certain pre-determined conditions are fulfilled; and it is the ratio of the number of times in the long run in which that specified result would follow upon the fulfillment of those conditions to the total number of times in which those conditions were fulfilled in the course of experience. It essentially refers to a course of experience, or at least of real events; because mere possibilities are not capable of being counted. You can, for example, ask what the probability is that a given kind of object will be red, provided you define red sufficiently. It is simply the ratio of the number of objects of that kind that are red to the total number of objects of that kind. But to ask in the abstract what the probability is that a shade of color will be red is nonsense, because shades of color are not individuals capable of being counted. You can ask what the probability is that the next chemical element to be discovered will have an atomic weight exceeding a hundred. But you cannot ask what the probability is that the law of universal attraction should be that of the inverse square until you can attach some meaning to statistics of the characters of possible universes. When Leibniz said that this world is the best that was possible, he may have had some glimmer of meaning, but when Quételet* says that if a phenomenon has been observed on m occasions, the probability that it will occur on the $(m+1)^{th}$ occasion is $\frac{m+1}{m+2}$, he is talking downright nonsense. Mr. F. Y. Edgeworth

asserts that of all theories that are started one half are correct. That is not nonsense, but it is ridiculously false. For of theories that have enough to recommend them to be seriously discussed, there are more than two on the average to each general phenomenon to be explained. Poincaré, on the other

* See *Lettres sur la théorie des probabilités*, 3^{me} lettre.

hand, seems to think that all theories are wrong, and that it is only a question of how wrong they are.

170. Induction consists in starting from a theory, deducing from it predictions of phenomena, and observing those phenomena in order to see *how nearly* they agree with the theory. The justification for believing that an experiential theory which has been subjected to a number of experimental tests will be in the near future sustained about as well by further such tests as it has hitherto been, is that by steadily pursuing that method we must in the long run find out how the matter really stands. The reason that we must do so is that our theory, if it be admissible even as a theory, simply consists in supposing that such experiments will in the long run have results of a certain character. But I must not be understood as meaning that experience can be exhausted, or that any approach to exhaustion can be made. What I mean is that if there be a series of objects, say crosses and circles, this series having a beginning but no end, then whatever may be the arrangement or want of arrangement of these crosses and circles in the entire endless series must be discoverable to an indefinite degree of approximation by examining a sufficient finite number of successive ones beginning at the beginning of the series. This is a theorem capable of strict demonstration. The principle of the demonstration is that whatever has no end can have no mode of being other than that of a law, and therefore whatever general character it may have must be describable, but the only way of describing an endless series is by stating explicitly or implicitly the law of the succession of one term upon another. But every such term has a finite ordinal place from the beginning and therefore, if it presents any regularity for all finite successions from the beginning, it presents the same regularity throughout. Thus the validity of induction depends upon the necessary relation between the general and the singular. It is precisely this which is the support of Pragmatism.

§4. INSTINCT AND ABDUCTION*

171. Concerning the validity of Abductive inference, there is little to be said, although that little is pertinent to the problem we have in hand.

* Cf. 1.118, 2.623ff, 2.753f.

Abduction is the process of forming an explanatory hypothesis. It is the only logical operation which introduces any new idea; for induction does nothing but determine a value, and deduction merely evolves the necessary consequences of a pure hypothesis.

Deduction proves that something *must* be; Induction shows that something *actually is* operative; Abduction merely suggests that something *may be*.

Its only justification is that from its suggestion deduction can draw a prediction which can be tested by induction, and that, if we are ever to learn anything or to understand phenomena at all, it must be by abduction that this is to be brought about.

No reason whatsoever can be given for it, as far as I can discover; and it needs no reason, since it merely offers suggestions.

172. A man must be downright crazy to deny that science has made many true discoveries. But every single item of scientific theory which stands established today has been due to Abduction.

But how is it that all this truth has ever been lit up by a process in which there is no compulsiveness nor tendency toward compulsiveness? Is it by chance? Consider the multitude of theories that might have been suggested. A physicist comes across some new phenomenon in his laboratory. How does he know but the conjunctions of the planets have something to do with it or that it is not perhaps because the dowager empress of China has at that same time a year ago chanced to pronounce some word of mystical power or some invisible jinnee may be present. Think of what trillions of trillions of hypotheses might be made of which one only is true; and yet after two or three or at the very most a dozen guesses, the physicist hits pretty nearly on the correct hypothesis. By chance he would not have been likely to do so in the whole time that has elapsed since the earth was solidified. You may tell me that astrological and magical hypotheses were resorted to at first and that it is only by degrees that we have learned certain general laws of nature in consequence of which the physicist seeks for the explanation of his phenomenon within the four walls of his laboratory. But when you look at the matter more narrowly, the matter is not to be accounted for

in any considerable measure in that way. Take a broad view of the matter. Man has not been engaged upon scientific problems for over twenty thousand years or so. But put it at ten times that if you like. But that is not a hundred thousandth part of the time that he might have been expected to have been searching for his first scientific theory.

You may produce this or that excellent psychological account of the matter. But let me tell you that all the psychology in the world will leave the logical problem just where it was. I might occupy hours in developing that point. I must pass it by.

You may say that evolution accounts for the thing. I don't doubt it is evolution. But as for explaining evolution by chance, there has not been time enough.

173. However man may have acquired his faculty of divining the ways of Nature, it has certainly not been by a self-controlled and critical logic. Even now he cannot give any exact reason for his best guesses. It appears to me that the clearest statement we can make of the logical situation — the freest from all questionable admixture — is to say that man has a certain Insight, not strong enough to be oftener right than wrong, but strong enough not to be overwhelmingly more often wrong than right, into the Thirdnesses, the general elements, of Nature. An Insight, I call it, because it is to be referred to the same general class of operations to which Perceptive Judgments belong. This Faculty is at the same time of the general nature of Instinct, resembling the instincts of the animals in its so far surpassing the general powers of our reason and for its directing us as if we were in possession of facts that are entirely beyond the reach of our senses. It resembles instinct too in its small liability to error; for though it goes wrong oftener than right, yet the relative frequency with which it is right is on the whole the most wonderful thing in our constitution.

174. One little remark and I will drop this topic. If you ask an investigator why he does not try this or that wild theory, he will say, "It does not seem *reasonable*." It is curious that we seldom use this word where the strict logic of our procedure is clearly seen. We do [not] say that a mathematical error is not reasonable. We call that opinion reasonable whose only support is instinct. . . .

* See 6.307ff.

§5. THE MEANING OF AN ARGUMENT

175. We have already seen* some reason to hold that the idea of *meaning* is such as to involve some reference to a *purpose*. But Meaning is attributed to representamens alone, and the only kind of representamen which has a definite professed purpose is an "argument." The professed purpose of an argument is to determine an acceptance of its conclusion, and it quite accords with general usage to call the conclusion of an argument its meaning. But I may remark that the word meaning has not hitherto been recognized as a technical term of logic, and in proposing it as such (which I have a right to do since I have a new conception to express, that of the conclusion of an argument as its intended interpretant) I should have a recognized right slightly to warp the acceptance of the word "meaning," so as to fit it for the expression of a scientific conception. It seems natural to use the word *meaning* to denote the intended interpretant of a symbol.

176. I may presume that you are all familiar with Kant's reiterated insistence that necessary reasoning does nothing but explicate the *meaning* of its premisses.† Now Kant's conception of the nature of necessary reasoning is clearly shown by the logic of relations to be utterly mistaken, and his distinction between analytic and synthetic judgments, which he otherwise and better terms *explicative* (*erläuternde*) and *ampliative* (*erweiternde*) judgments, which is based on that conception, is so utterly confused that it is difficult or impossible to do anything with it. But, nevertheless, I think we shall do very well to accept Kant's dictum that necessary reasoning is merely explicatory of the meaning of the terms of the premisses, only reversing the use to be made of it. Namely instead of adopting the conception of meaning from the Wolffian logicians, as he does, and making use of this dictum to express what necessary reasoning can do, about which he was utterly mistaken, we shall do well to understand necessary reasoning as mathematics and the logic of relations compels us to understand it, and to use the dictum, that necessary reasoning only explicates the meanings of the terms of the premisses, to fix our

* See 166.

† See e.g., *Kritik der Reinen Vernunft*, A7, B10, 11.

ideas as to what we shall understand by the *meaning* of a term.

177. Kant and the logicians with whose writings he was alone acquainted — he was far from being a thorough student of logic, notwithstanding his great natural power as a logician — consistently neglected the logic of relations; and the consequence was that the only account they were in condition to give of the meaning of a term, its “signification” as they called it, was that it was composed of all the terms which could be essentially predicated of that term. Consequently, either the analysis of the signification must be capable of [being] pushed on further and further, without limit—an opinion which Kant* expresses in a well-known passage but which he did not develop, or, what was more usual, one ultimately reached certain absolutely simple conceptions such as Being, Quality, Relation, Agency, Freedom, etc., which were regarded as absolutely incapable of definition and of being in the highest degree luminous and clear. It is marvellous what a following this opinion, that those excessively abstracted conceptions were in themselves in the highest degree simple and facile, obtained, notwithstanding its repugnancy to good sense. One of the many important services which the logic of relations has rendered has been that of showing that these so-called simple conceptions, notwithstanding their being unaffected by the particular kind of combination recognized in non-relative logic, are nevertheless capable of analysis in consequence of their implying various modes of relationship. For example, no conceptions are simpler than those of Firstness, Secondness, and Thirdness; but this has not prevented my defining them, and that in a most effective manner, since all the assertions I have made concerning them have been deduced from those definitions.

178. Another effect of the neglect of the logic of relations was that Kant imagined that all necessary reasoning was of the type of a syllogism in *Barbara*. Nothing could be more ridiculously in conflict with well-known facts.† For had that been the case, any person with a good logical head would be able instantly to see whether a given conclusion followed from given premisses or not; and moreover the number of conclusions from a small number of premisses would be very moder-

* *Ibid*, A 656, B 684.

† Cf. 4.427.

ate. Now it is true that when Kant wrote, Legendre and Gauss had not shown what a countless multitude of theorems are deducible from the very few premisses of arithmetic. I suppose we must excuse him, therefore, for not knowing this. But it is difficult to understand what the state of mind on this point could have been of logicians who were at the same time mathematicians, such as Euler, Lambert, and Ploucquet. Euler invented the logical diagrams which go under his name; for the claims that have been made in favor of predecessors may be set down as baseless;* and Lambert used an equivalent system.† Now I need not say that both of these men were mathematicians of great power. One is simply astounded that they should seem to say that all the reasonings of mathematics could be represented in any such ways. One may suppose that Euler never paid much attention to logic. But Lambert wrote a large book in two volumes on the subject, and a pretty superficial affair it is. One has a difficulty in realizing that the author of it was the same man who came so near to the discovery of the non-Euclidean geometry. The logic of relatives is now able to exhibit in strict logical form the reasoning of mathematics. You will find an example of it — although too simple a one to put all the features into prominence — in that chapter‡ of Schröder's logic in which he remodels the reasoning of Dedekind in his brochure *Was sind und was sollen die Zahlen*; and if it be objected that this analysis was chiefly the work of Dedekind who did not employ the machinery of the logic of relations, I reply that Dedekind's whole book is nothing but an elaboration of a paper published by me several years previously in the *American Journal of Mathematics*§ which paper was the direct result of my logical studies. These analyses show that although most of the steps of the reasoning have considerable resemblance to Barbara, yet the difference of effect is very great indeed.

179. On the whole, then, if by the *meaning* of a term, proposition, or argument, we understand the entire general intended interpretant, then the meaning of an argument is

* See 4.353.

† See his *Neues Organon*, Bd. I., S. 111ff.

‡ *Vorlesungen über die Algebra der Logik (Exakte Logik)*, Bd. III, 12.

§ See vol. 3, No. VII.

explicit. It is its conclusion; while the meaning of a proposition or term is all that that proposition or term could contribute to the conclusion of a demonstrative argument. But while this analysis will be found useful, it is by no means sufficient to cut off all nonsense or to enable us to judge of the maxim of pragmatism. What we need is an account of the *ultimate* meaning of a term. To this problem we have to address ourselves.

LECTURE VII*

PRAGMATISM AND ABDUCTION

§1. THE THREE COTARY PROPOSITIONS

180. At the end of my last lecture I had just enunciated three propositions which seem to me to give to pragmatism its peculiar character. In order to be able to refer to them briefly this evening, I will call them, for the nonce, my cotary propositions. *Cos, cotis*, is a whetstone. They appear to me to put the edge on the maxim of pragmatism.

181. These *cotary* propositions are as follows:

(1) *Nihil est in intellectu quod non prius fuerit in sensu*. I take this in a sense somewhat different from that which Aristotle intended.† By *intellectus*, I understand the meaning of any representation in any kind of cognition, virtual, symbolic, or whatever it may be. Berkeley‡ and nominalists of his stripe deny that we have any idea at all of a triangle in general, which is neither equilateral, isosceles, nor scalene. But he cannot deny that there are propositions about triangles in general, which propositions are either true or false; and as long as that is the case, whether we have an *idea* of a triangle in some psychological sense or not, I do not, as a logician, care. We have an *intellectus*, a meaning, of which the triangle in general is an element. As for the other term, *in sensu*, that I take in the sense of *in a perceptual judgment*, the starting point or first premiss of all critical and controlled thinking. I will state presently what I conceive to be the evidence of the truth of this first cotary proposition. But I prefer to begin by recalling to you what all three of them are.

(2) The second is that perceptual judgments contain general elements, so that universal propositions are deducible from them in the manner in which the logic of relations shows that particular propositions usually, not to say invariably, allow universal propositions to be necessarily inferred from them.

* Peirce was scheduled to deliver six lectures; he seems, however, to have given all seven.

† See *de Anima*, bk. III, ch. 8.

‡ See *The Principles of Human Knowledge*, §13.

This I sufficiently argued in my last lecture. This evening I shall take the truth of it for granted.

(3) The third cotary proposition is that abductive inference shades into perceptual judgment without any sharp line of demarcation between them; or, in other words, our first premisses, the perceptual judgments, are to be regarded as an extreme case of abductive inferences, from which they differ in being absolutely beyond criticism. The abductive suggestion comes to us like a flash. It is an act of *insight*, although of extremely fallible insight. It is true that the different elements of the hypothesis were in our minds before; but it is the idea of putting together what we had never before dreamed of putting together which flashes the new suggestion before our contemplation.

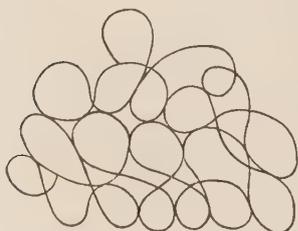
On its side, the perceptive judgment is the result of a process, although of a process not sufficiently conscious to be controlled, or, to state it more truly, not controllable and therefore not fully conscious. If we were to subject this subconscious process to logical analysis, we should find that it terminated in what that analysis would represent as an abductive inference, resting on the result of a similar process which a similar logical analysis would represent to be terminated by a similar abductive inference, and so on *ad infinitum*. This analysis would be precisely analogous to that which the sophism of Achilles and the Tortoise applies to the chase of the Tortoise by Achilles, and it would fail to represent the real process for the same reason. Namely, just as Achilles does not have to make the series of distinct endeavors which he is represented as making, so this process of forming the perceptual judgment, because it is subconscious and so not amenable to logical criticism, does not have to make separate acts of inference, but performs its act in one continuous process.

§2. ABDUCTION AND PERCEPTUAL JUDGMENTS

182. I have already put in my brief in favor of my second cotary proposition, and in what I am about to say I shall treat that as already sufficiently proved. In arguing it I avoided all resort to anything like special phenomena, upon which I do not think that philosophy ought to rest, at all. Still, there is no harm in using special observations merely in an abductive way to throw a light upon doctrines otherwise established, and to

aid the mind in grasping them; and there are some phenomena which, I think, do aid us to see what is meant by asserting that perceptual judgments contain general elements, and which will also naturally lead up to a consideration of the third cosal proposition.

183. I will show you a figure which I remember my father [Benjamin Peirce] drawing in one of his lectures. I do not remember what it was supposed to show; but I cannot imagine what else it could have been but my cotary proposition No. 2. If so, in maintaining that proposition I am substantially treading in his footprints, though he would doubtless have put the proposition into a shape very different from mine. Here is the figure (though I cannot draw it as skillfully as he did). It consists of a serpentine line. But when it is completely drawn, it appears to be a stone wall.



The point is that there are two ways of conceiving the matter. Both, I beg you to remark, are *general ways of classing the line*, general classes under which the line is subsumed. But the very decided preference of our perception for one mode of classing the percept shows that this classification is contained in the perceptual judgment. So it is

with that well-known unshaded outline figure of a pair of steps seen in perspective. We seem at first to be looking at the steps from above; but some unconscious part of the mind seems to tire of putting that construction upon it and suddenly we seem to see the steps from below, and so the perceptive judgment, and the percept itself, seems to keep shifting from one general aspect to the other and back again.

In all such visual illusions of which two or three dozen are well known, the most striking thing is that a certain theory of interpretation of the figure has all the appearance of being given in perception. The first time it is shown to us, it seems as completely beyond the control of rational criticism as any percept is; but after many repetitions of the now familiar experiment, the illusion wears off, becoming first less decided, and ultimately ceasing completely. This shows that these phe-

nomena are true connecting links between abductions and perceptions.

184. If the percept or perceptual judgment were of a nature entirely unrelated to abduction, one would expect that the percept would be entirely free from any characters that are proper to *interpretations*, while it can hardly fail to have such characters if it be merely a continuous series of what, discretely and consciously performed, would be abductions. We have here then almost a crucial test of my third cotary proposition. Now, then, how is the fact? The fact is that it is not necessary to go beyond ordinary observations of common life to find a variety of widely different ways in which perception is interpretative.

185. The whole series of hypnotic phenomena, of which so many fall within the realm of ordinary everyday observation — such as our waking up at the hour we wish to wake much nearer than our waking selves could guess it — involve the fact that we perceive what we are adjusted for interpreting, though it be far less perceptible than any express effort could enable us to perceive; while that, to the interpretation of which our adjustments are not fitted, we fail to perceive although it exceed in intensity what we should perceive with the utmost ease, if we cared at all for its interpretation. It is a marvel to me that the clock in my study strikes every half hour in the most audible manner, and yet I never hear it. I should not know at all whether the striking part were going, unless it is out of order and strikes the wrong hour. If it does that, I am pretty sure to hear it. Another familiar fact is that we perceive, or seem to perceive, objects differently from how they really are, accommodating them to their manifest intention. Proof-readers get high salaries because ordinary people miss seeing misprints, their eyes correcting them. We can repeat the *sense* of a conversation, but we are often quite mistaken as to what words were uttered. Some politicians think it a clever thing to convey an idea which they carefully abstain from stating in words. The result is that a reporter is ready to swear quite sincerely that a politician said something to him which the politician was most careful not to say.

I should tire you if I dwelt further on anything so familiar, especially to every psychological student, as the interpreta-

tiveness of the perceptive judgment. It is plainly nothing but the extremest case of Abductive Judgments.

186. If this third cotary proposition be admitted, the second, that the perceptual judgment contains general elements, must be admitted; and as for the first, that all general elements are given in perception, that loses most of its significance. For if a general element were given otherwise than in the perceptual judgment, it could only first appear in an abductive suggestion, and that is now seen to amount substantially to the same thing. I not only opine, however, that every general element of every hypothesis, however wild or sophisticated it may be, [is] given somewhere in perception, but I will venture so far as to assert that every general *form* of putting concepts together is, in its elements, given in perception. In order to decide whether this be so or not, it is necessary to form a clear notion of the precise difference between abductive judgment and the perceptual judgment which is its limiting case. The only symptom by which the two can be distinguished is that we cannot form the least conception of what it would be to deny the perceptual judgment. If I judge a perceptual image to be red, I can conceive of another man's not having that same percept. I can also conceive of his having this percept but never having thought whether it was red or not. I can conceive that while colors are among his sensations, he shall never have had his attention directed to them. Or I can conceive that, instead of redness, a somewhat different conception should arise in his mind; that he should, for example, judge that this percept has a warmth of color. I can imagine that the redness of my percept is excessively faint and dim so that one can hardly make sure whether it is red or not. But that any man should have a percept similar to mine and should ask himself the question whether this percept be *red*, which would imply that he had already judged *some* percept to be red, and that he should, upon careful attention to this percept, pronounce it to be decidedly and clearly *not* red, when I judge it to be prominently red, *that* I cannot comprehend at all. An abductive suggestion, however, is something whose truth *can* be questioned or even denied.

187. We thus come to the *test of inconceivability* as the only means of distinguishing between an abduction and a per-

ceptual judgment. Now I fully assent to all that Stuart Mill so forcibly said in his *Examination of Hamilton* as to the utter untrustworthiness of the test of inconceivability.* That which is inconceivable to us today, may prove tomorrow to be conceivable and even probable; so that we never can be absolutely sure that a judgment is perceptual and not abductive; and this may seem to constitute a difficulty in the way of satisfying ourselves that the first cotary proposition is true.

I should easily show you that this difficulty, however formidable theoretically, amounts practically to little or nothing for a person skilled in shaping such inquiries. But this is unnecessary, since the objection founded upon it has no logical force whatever.

188. No doubt, in regard to the first cotary proposition, [that proposition] follows as a necessary consequence of the possibility that what are really abductions have been mistaken for perceptions. For the question is whether that which really is an abductive result can contain elements foreign to its premisses. It must be remembered that abduction, although it is very little hampered by logical rules, nevertheless is logical inference, asserting its conclusion only problematically or conjecturally, it is true, but nevertheless having a perfectly definite logical form.

189. Long before I first classed abduction as an inference it was recognized by logicians that the operation of adopting an explanatory hypothesis — which is just what abduction is — was subject to certain conditions. Namely, the hypothesis cannot be admitted, even as a hypothesis, unless it be supposed that it would account for the facts or some of them. The form of inference, therefore, is this:

The surprising fact, C, is observed;

But if A were true, C would be a matter of course,

Hence, there is reason to suspect that A is true.

Thus, A cannot be abductively inferred, or if you prefer the expression, cannot be abductively conjectured until its entire content is already present in the premiss, "If A were true, C would be a matter of course."

190. Whether this be a correct account of the matter or not, the mere suggestion of it as a possibility shows that the

* Ch. XXI.

bare fact that abductions may be mistaken for perceptions does not necessarily affect the force of an argument to show [that] quite new conceptions cannot be obtained from abduction.

191. But when the account just given of abduction is proposed as a proof that all conceptions must be given substantially in perception, three objections will be started. Namely, in the first place, it may be said that even if this be the normative form of abduction, the form to which abduction *ought* to conform, yet it may be that new conceptions arise in a manner which puts the rules of logic at defiance. In the second place, waiving this objection, it may be said that the argument would prove too much; for if it were valid, it would follow that no hypothesis could be so fantastic as not to have presented itself entire in experience. In the third place, it may be said that granting that the abductive conclusion, "A is true" rests upon the premiss, "If A is true, C is true," still it would be contrary to common knowledge to assert that the antecedents of all conditional judgments are given in perception, and thus it remains almost certain that some conceptions have a different origin.

192. In answer to the first of these objections, it is to be remarked that it is only in deduction that there is no difference between a *valid* argument and a *strong* one. An argument is valid if it possesses the sort of strength that it professes and tends toward the establishment of the conclusion in the way in which it pretends to do this. But the question of its strength does not concern the comparison of the due effect of the argument with its pretensions, but simply upon how great its due effect is. An argument is none the less logical for being weak, provided it does not pretend to a strength that it does not possess. It is, I suppose, in view of this that the best modern logicians outside the English school never say a word about fallacies. They assume that there is no such thing as an argument illogical in itself. An argument is fallacious only so far as it is mistakenly, though not illogically, inferred to have professed what it did not perform. Perhaps it may be said that if all our reasonings conform to the laws of logic, this is, at any rate, nothing but a proposition in psychology which my principles ought to forbid my recognizing. But I do not offer it as a principle of psychology only. For a principle of psychology

is a contingent truth, while this, as I contend, is a necessary truth. Namely, if a fallacy involves nothing in its conclusion which was not in its premisses, that is nothing that was not in any previous knowledge that aided in suggesting it, then the forms of logic will invariably and necessarily enable us logically to account for it as due to a mistake arising from the use of a logical but weak argumentation.* In most cases it is due to an abduction. The conclusion of an abduction is problematic or conjectural, but is not necessarily at the weakest grade of surmise, and what we call assertoric judgments are, accurately, problematic judgments of a high grade of hopefulness. There is therefore no difficulty in maintaining that fallacies are merely due to mistakes which are logically valid, though weak argumentations. If, however, a fallacy contains something in the conclusion which was not in the premisses at all, that is, was in no previous knowledge or none that influenced the result, then again a mistake, due as before to weak inference, has been committed; only in this case the mistake consists in taking that to be an inference which, in respect to this new element, is not an inference, at all. That part of the conclusion which inserts the wholly new element can be separated from the rest with which it has no logical connection nor appearance of logical connection. The first emergence of this new element into consciousness must be regarded as a perceptive judgment. We are irresistibly led to judge that we are conscious of it. But the connection of this perception with other elements must be an ordinary logical inference, subject to error like all inference.

193. As for the second objection that, according to my account of abduction, every hypothesis, however fantastic, must have presented itself entire in perception, I have only to say that this could only arise in a mind entirely unpractised in the logic of relations, and apparently quite oblivious of any other mode of inference than abduction. Deduction accomplishes first the simple colligation of different perceptive judgments into a copulative whole, and then, with or without the aid of other modes of inference, is quite capable of transforming this copulative proposition so as to bring certain of its parts into more intimate connection.

194. But the third objection is the really serious one. In it

* Cf. 280ff.

lies the whole nodus of the question; and its full refutation would be quite a treatise. If the antecedent is not given in a perceptive judgment, then it must first emerge in the conclusion of an inference. At this point we are obliged to draw the distinction between the matter and the logical form. With the aid of the logic of relations it would be easy to show that the entire logical matter of a conclusion must in any mode of inference be contained, piecemeal, in the premisses. Ultimately therefore it must come from the uncontrolled part of the mind, because a series of controlled acts must have a first. But as to the logical *form*, it would be, at any rate, extremely difficult to dispose of it in the same way. An induction, for example, concludes a ratio of frequency; but there is nothing about any such ratio in the single instances on which it is based. Where do the conceptions of deductive necessity, of inductive probability, of abductive expectability come from? Where does the conception of inference itself come from? That is the only difficulty. But self-control is the character which distinguishes reasonings from the processes by which perceptual judgments are formed, and self-control of any kind is purely *inhibitory*. It originates nothing. Therefore it cannot be in the act of adoption of an inference, in the pronouncing of it to be reasonable, that the formal conceptions in question can first emerge. It must be in the first perceiving that so one might conceivably reason. And what is the nature of that? I see that I have instinctively described the phenomenon as a "perceiving." I do not wish to argue from words; but a word may furnish a valuable suggestion. What can our first acquaintance with an inference, when it is not yet adopted, be but a perception of the world of ideas? In the first suggestion of it, the inference must be thought of as an inference, because when it is adopted there is always the thought that so one might reason in a whole class of cases. But the mere act of inhibition cannot introduce this conception. The inference must, then, be thought of as an inference in the first suggestion of it. Now when an inference is thought of *as* an inference, the conception of inference becomes a part of the *matter* of thought. Therefore, the same argument which we used in regard to matter in general applies to the conception of inference. But I am prepared to show in detail, and indeed virtually have shown, that all the forms of

logic can be reduced to combinations of the conception of inference, the conception of otherness, and the conception of a character.* These are obviously simply forms of Thirdness, Secondness, and Firstness of which the last two are unquestionably given in perception. Consequently the whole logical form of thought is so given in its elements.

§3. PRAGMATISM — THE LOGIC OF ABDUCTION

195. It appears to me, then, that my three cotary propositions are satisfactorily grounded. Nevertheless, since others may not regard them as so certain as I myself do, I propose in the first instance to disregard them, and to show that, even if they are put aside as doubtful, a maxim practically little differing in most of its applications from that of pragmatism ought to be acknowledged and followed; and after this has been done, I will show how the recognition of the cotary propositions will affect the matter. . . .

196. If you carefully consider the question of pragmatism you will see that it is nothing else than the question of the logic of abduction. That is, pragmatism proposes a certain maxim which, if sound, must render needless any further rule as to the admissibility of hypotheses to rank as hypotheses, that is to say, as explanations of phenomena held as hopeful suggestions; and, furthermore, this is *all* that the maxim of pragmatism really pretends to do, at least so far as it is confined to logic, and is not understood as a proposition in psychology. For the maxim of pragmatism is that a conception can have no logical effect or import differing from that of a second conception except so far as, taken in connection with other conceptions and intentions, it might conceivably modify our practical conduct differently from that second conception. Now it is indisputable that no rule of abduction would be admitted by *any* philosopher which should prohibit on any formalistic grounds any inquiry as to how we ought in consistency to shape our practical conduct. Therefore, a maxim which looks only to possibly practical considerations will not need any supplement in order to exclude any hypotheses as inadmissible. What

* See 3.63.

hypotheses it admits all philosophers would agree ought to be admitted. On the other hand, if it be true that nothing but such considerations has any logical effect or import whatever, it is plain that the maxim of pragmatism cannot cut off any kind of hypothesis which ought to be admitted. Thus, the maxim of pragmatism, if true, fully *covers* the entire logic of abduction. It remains to inquire whether this maxim may not have some *further* logical effect. If so, it must in some way affect inductive or deductive inference. But that pragmatism cannot interfere with induction is evident; because induction simply teaches us what we have to expect as a result of experimentation, and it is plain that any such expectation *may* conceivably concern practical conduct. In a certain sense it *must* affect *deduction*. Anything which gives a rule to abduction and so puts a limit upon admissible hypotheses will cut down *the premisses* of deduction, and thereby will render a *reductio ad absurdum* and other equivalent forms of deduction possible which would not otherwise have been possible. But here three remarks may be made. First, to affect the *premisses* of deduction is not to affect the logic of deduction. For in the process of deduction itself, no conception is introduced to which pragmatism could be supposed to object, except the acts of abstraction. Concerning that I have only time to say that pragmatism ought not to object to it. Secondly, no effect of pragmatism which *is consequent upon its effect on abduction* can go to show that pragmatism is anything more than a doctrine concerning the logic of abduction. Thirdly, if pragmatism is the doctrine that every conception is a conception of conceivable practical effects, it makes conception reach far beyond the practical. It allows any flight of imagination, provided this imagination ultimately alights upon a possible practical effect; and thus many hypotheses may seem at first glance to be excluded by the pragmatistical maxim that are not really so excluded.

197. Admitting, then, that the question of Pragmatism is the question of Abduction, let us consider it under that form. What is good abduction? What should an explanatory hypothesis be to be worthy to rank as a hypothesis? Of course, it must explain the facts. But what other conditions ought it to fulfill to be good? The question of the goodness of any-

thing is whether that thing fulfills its end. What, then, is the end of an explanatory hypothesis? Its end is, through subjection to the test of experiment, to lead to the avoidance of all surprise and to the establishment of a habit of positive expectation that shall not be disappointed. Any hypothesis, therefore, may be admissible, in the absence of any special reasons to the contrary, provided it be capable of experimental verification, and only insofar as it is capable of such verification. This is approximately the doctrine of pragmatism. But just here a broad question opens out before us. What are we to understand by experimental verification? The answer to that involves the whole logic of induction.

198. Let me point out to you the different opinions which we actually find men holding today — perhaps not consistently, but thinking that they hold them — upon this subject. In the first place, we find men who maintain that no hypothesis ought to be admitted, even as a hypothesis, any further than its truth or its falsity is *capable* of being directly perceived. This, as well as I can make out, is what was in the mind of Auguste Comte,† who is generally assumed to have first formulated this maxim. Of course, this maxim of abduction supposes that, as people say, we “are to believe only what we actually see”; and there are well-known writers, and writers of no little intellectual force, who maintain that it is unscientific to make predictions — unscientific, therefore, to expect anything. One ought to restrict one’s opinions to what one actually perceives. I need hardly say that that position cannot be consistently maintained. It refutes itself, for it is *itself* an opinion relating to more than is actually in the field of momentary perception.

199. In the second place, there are those who hold that a theory which has sustained a number of experimental tests may be expected to sustain a number of other similar tests, and to have a general approximate truth, the justification of this being that this kind of inference must prove correct in the long run, as I explained in a previous lecture.* But these logicians refuse to admit that we can ever have a right to conclude definitely that a hypothesis is *exactly* true, that is that it should be able to sustain experimental tests in endless series;

* See 170.

† See *Cours de philosophie positive*, 28^{me} leçon.

for, they urge, no hypothesis can be subjected to an endless series of tests. They are willing we should say that a theory is true, because, all our ideas being more or less vague and approximate, what we mean by saying that a theory is true can only be that it is very near true. But they will not allow us to say that anything put forth as an anticipation of experience should assert exactitude, because exactitude in experience would imply experiences in endless series, which is impossible.

200. In the third place, the great body of scientific men hold that it is too much to say that induction must be restricted to that for which there can be *positive* experimental evidence. They urge that the rationale of induction as it is understood by logicians of the second group, themselves, entitles us to hold a theory, provided it be such that if it involve any falsity, experiment must some day detect that falsity. We, therefore, have a right, they will say, to infer that something *never* will happen, provided it be of such a nature that it could not occur without being detected.

201. I wish to avoid in the present lecture *arguing* any such points, because the substance of all sound argumentation about pragmatism has, as I conceive it, been already given in previous lectures, and there is no end to the forms in which it might be stated. I must, however, except from this statement the logical principles which I intend to state in tomorrow evening's lecture on multitude and continuity;* and for the sake of making the relation clear between this third position and the fourth and fifth, I must anticipate a little what I shall further explain tomorrow.

202. What ought persons, who hold this third position, to say to the Achilles sophism? Or rather . . . what would they be obliged to say to Achilles overtaking the tortoise (Achilles and the tortoise being geometrical points) supposing that our only knowledge was derived inductively from observations of the relative positions of Achilles and the tortoise at those stages of the progress that the sophism supposes, and supposing that Achilles really moves twice as fast as the tortoise? They ought

* There is a record of the fifth of the Lowell Lectures, "The Doctrine of Multitude, Infinity and Continuity," being delivered on December 7, 1903. It does not seem possible, due to the discrepancy of dates, that this is the lecture meant, but no other has been uncovered. See, however, vol. 4, bk. I, No. VI.

to say that *if* it could not happen that Achilles in one of those stages of his progress should at length reach a certain finite distance behind the tortoise which he would be unable to halve, *without our learning that fact*, then we should have a right to conclude that he could halve *every* distance and consequently that he could make his distance behind the tortoise less than *all* fractions having a power of two for the denominator. Therefore unless these logicians were to suppose a distance less than any measurable distance, which would be contrary to their principles, they would be obliged to say that Achilles could reduce his distance behind the tortoise to *zero*.

203. The reason why it would be contrary to their principles to admit any distance less than a measurable distance, is that their way of supporting induction implies that they differ from the logicians of the second class, in that these third class logicians admit that we can infer a proposition implying an infinite multitude and therefore implying the reality of the infinite multitude itself, while their mode of justifying induction would exclude every infinite multitude except the lowest grade, that of the multitude of all integer numbers. Because with reference to a greater multitude than that, it would not be true that what did not occur in a finite ordinal place in a series could not occur anywhere within the infinite series — which is the only reason they admit for the inductive conclusion.

But now let us look at something else that those logicians would be obliged to admit. Namely, suppose any regular polygon to have all its vertices joined by straight radii to its centre. Then if there were any particular finite number of sides for a regular polygon with radii so drawn, which had the singular property that it should be impossible to bisect all the angles by new radii equal to the others and by connecting the extremities of each new radius to those of the two adjacent old radii to make a new polygon of double the number of angles — if, I say, there were any *finite number* of sides for which this could not be done — it may be admitted that we should be able to find it out. The question I am asking supposes arbitrarily that they admit that. Therefore these logicians of the third class would have to admit that all such polygons could so have their sides doubled and that consequently there would be a

polygon of an infinite multitude of sides which could be, on their principles, nothing else than the circle. But it is easily proved that the perimeter of that polygon, that is, the circumference of the circle, would be incommensurable, so that an incommensurable measure is real, and thence it easily follows that all such lengths are real or possible. But these exceed in multitude the only multitude those logicians admit. Without any geometry, the same result could be reached, supposing only that we have an indefinitely bisectible quantity.

204. We are thus led to a fourth opinion very common among mathematicians, who generally hold that any one irrational real quantity (say of length, for example) whether algebraical or transcendental in its general expression, is just as possible and admissible as any rational quantity, but who generally reason that if the distance between two points is less than any assignable quantity, that is, less than any finite quantity, then it is nothing at all. If that be the case, it is possible for us to conceive, with mathematical precision, a state of things in favor of whose actual reality there would seem to be no possible sound argument, however weak. For example, we can conceive that the diagonal of a square is incommensurable with its side. That is to say, if you first name any length commensurable with the side, the diagonal will differ from that by a finite quantity (and a commensurable quantity), yet however accurately we may measure the diagonal of an apparent square, there will always be a limit to our accuracy and the measure will always be commensurable. So we never could have any reason to think it otherwise. Moreover, if there be, as they seem to hold, no other points on a line than such as are at distances assignable to an indefinite approximation, it will follow that if a line has an extremity, that extreme point may be conceived to be taken away so as to leave the line without any extremity, while leaving all the other points just as they were. In that case, all the points stand discrete and separate; and the line might be torn apart at any number of places without disturbing the relations of the points to one another. Each point has, on that view, its own independent existence, and there can be no merging of one into another. There is no continuity of points in the sense in which continuity implies generality.

205. In the fifth place it may be held that we can be justified in inferring true generality, true continuity. But I do not see in what way we ever can be justified in doing so unless we admit the cotary propositions, and in particular that such continuity is given in perception; that is, that whatever the underlying psychological process may be, we seem to perceive a genuine flow of time, such that instants melt into one another without separate individuality.

It would not be necessary for me to deny a psychological theory which should make this to be illusory, in such [a] sense as [one might say] that anything beyond all logical criticism is illusory, but I confess I should strongly suspect that such a psychological theory involved a logical inconsistency; and at best it could do nothing at all toward solving the logical question.

§4. THE TWO FUNCTIONS OF PRAGMATISM

206. There are two functions which we may properly require that Pragmatism should perform; or if not pragmatism, whatever the true doctrine of the Logic of Abduction may be, ought to do these two services.

Namely, it ought, in the first place, to give us an expeditious riddance of all ideas essentially unclear. In the second place, it ought to lend support, and help to render distinct, ideas essentially clear, but more or less difficult of apprehension; and in particular, it ought to take a satisfactory attitude toward the element of thirdness.

207. Of these two offices of Pragmatism, there is at the present day not so crying a need of the first as there was a quarter of a century ago when I enunciated the maxim. The state of logical thought is very much improved. Thirty years ago* when, in consequence of my study of the logic of relations, I told philosophers that all conceptions ought to be defined, with the sole exception of the familiar concrete conceptions of everyday life, my opinion was considered in every school to be utterly incomprehensible. The doctrine then was, as it remains in nineteen out of every score of logical treatises that are appearing in these days, that there is no way of defining a term

* See 400ff.

except by enumerating all its universal predicates, each of which is more abstracted and general than the term defined. So unless this process can go on endlessly, which was a doctrine little followed, the explication of a concept must stop at such ideas as Pure Being, Agency, Substance and the like, which were held to be ideas so perfectly simple that no explanation whatever could be given of them. This grotesque doctrine was shattered by the logic of relations, which showed that the simplest conceptions, such as Quality, Relation, Self-consciousness could be defined and that such definitions would be of the greatest service in dealing with them.* By this time, although few really study the logic of relations, one seldom meets with a philosopher who continues to think the most general relations are particularly simple in any except a technical sense; and of course, the only alternative is to regard as the simplest the practically applied notions of familiar life. We should hardly find today a man of Kirchhoff's rank in science saying that we know exactly what energy *does* but what energy *is* we do not know in the least.† For the answer would be that energy being a term in a dynamical equation, if we know how to apply that equation, we thereby know what energy is, although we may suspect that there is some more fundamental law underlying the laws of motion.

208. In the present situation of philosophy, it is far more important that thirdness should be adequately dealt with by our logical maxim of abduction. The urgent pertinence of the question of thirdness, at this moment of the breakup of agnostic calm, when we see that the chief difference between philosophers is in regard to the extent to which they allow elements of thirdness a place in their theories, is too plain to be insisted upon.

209. I shall take it for granted that as far as *thought* goes, I have sufficiently shown that thirdness is an element not reducible to secondness and firstness. But even if so much be granted, three attitudes may be taken:

(1) That thirdness, though an element of the mental phenomenon, ought not to be admitted into a theory of the real, because it is not experimentally verifiable;

* See e.g., 3.217ff.

† See Kirchhoff's *Vorlesungen ü. math. Physik*, Bd. I, Vorrede. Leipzig (1874-6).

(2) That thirdness is experimentally verifiable, that is, is inferable by induction, [abduction?] although it cannot be directly perceived;

(3) That it is directly perceived, from which the other cotary propositions can hardly be separated.

210. The man who takes the first position ought to admit no general law as really operative. Above all, therefore, he ought not to admit the law of laws, the law of the uniformity of nature. He ought to abstain from all prediction, however qualified by a confession of fallibility. But that position can practically not be maintained.

211. The man who takes the second position will hold thirdness to be an addition which the operation of abduction introduces over and above what its premisses in any way contain, and further that this element, though not perceived in experiment, is justified *by* experiment. Then his conception of reality must be such as completely to sunder the real from perception; and the puzzle for him will be why perception should be allowed such authority in regard to what is real.

I do not think that man can consistently hold that there is room in time for an event between any two events separate in time. But even if he could, he would (if he could grasp the reasons) be forced to acknowledge that the contents of time consists of separate, independent, unchanging states, and nothing else. There would not be even a determinate order of sequence among these states. He might insist that one order of sequence was more readily grasped by us; but nothing more. Every man is fully satisfied that there is such a thing as truth, or he would not ask any question. *That* truth consists in a conformity to something *independent of his thinking it to be so*, or of any man's opinion on that subject. But for the man who holds this second opinion, the only reality, there could be, would be conformity to the ultimate result of inquiry. But there would not be any course of inquiry possible except in the sense that it would be easier for him to interpret the phenomenon; and ultimately he would be forced to say that there was no reality at all except that he now at this instant finds a certain way of thinking easier than any other. But that violates the very idea of reality and of truth.

212. The man who takes the third position and accepts

the cotary propositions will hold, with firmest of grasps, to the recognition that logical criticism is limited to what we can control. In the future we may be able to control more but we must consider what we can now control. Some elements we can control in some limited measure. But the content of the perceptual judgment cannot be sensibly controlled now, nor is there any rational hope that it ever can be. Concerning that quite uncontrolled part of the mind, logical maxims have as little to do as with the growth of hair and nails. We may be dimly able to see that, in part, it depends on the accidents of the moment, in part on what is personal or racial, in part is common to all nicely adjusted organisms whose equilibrium has narrow ranges of stability, in part on whatever is composed of vast collections of independently variable elements, in part on whatever reacts, and in part on whatever has any mode of being. But the sum of it all is that our logically controlled thoughts compose a small part of the mind, the mere blossom of a vast complexus, which we may call the instinctive mind, in which this man will not say that he has *faith*, because that implies the conceivability of distrust, but upon which he builds as the very fact to which it is the whole business of his logic to be true.

That he will have no difficulty with Thirdness is clear enough, because he will hold that the conformity of action to general intentions is as much given in perception as is the element of action itself, which cannot really be mentally torn away from such general purposiveness. There can be no doubt that he will allow hypotheses fully all the range they ought to be allowed. The only question will be whether he succeeds in excluding from hypotheses everything unclear and nonsensical. It will be asked whether he will not have a shocking leaning toward anthropomorphic conceptions. I fear I must confess that he will be inclined to see an anthropomorphic, or even a zoöomorphic, if not a physiomorphic element in all our conceptions. But against unclear and nonsensical hypotheses, [of] whatever ægis [he will be protected]. Pragmatism will be more essentially significant for him than for any other logician, for the reason that it is in action that logical energy returns to the uncontrolled and uncriticizable parts of the mind. His maxim will be this:

The elements of every concept enter into logical thought at the gate of perception and make their exit at the gate of purposive action; and whatever cannot show its passports at both those two gates is to be arrested as unauthorized by reason.

The digestion of such thoughts is slow, ladies and gentlemen; but when you come in the future to reflect upon all that I have said, I am confident you will find the seven hours, you have spent in listening to these ideas, have not been altogether wasted.

Book II
PUBLISHED PAPERS

I

QUESTIONS CONCERNING CERTAIN FACULTIES
CLAIMED FOR MAN^{P*}

QUESTION 1. *Whether by the simple contemplation of a cognition, independently of any previous knowledge and without reasoning from signs, we are enabled rightly to judge whether that cognition has been determined by a previous cognition or whether it refers immediately to its object.*

213. Throughout this paper, the term *intuition* will be taken as signifying a cognition not determined by a previous cognition of the same object, and therefore so determined by something out of the consciousness.¹ Let me request the reader to note this. *Intuition* here will be nearly the same as "premiss not itself a conclusion"; the only difference being that premisses and conclusions are judgments, whereas an intuition may, as far as its definition states, be any kind of cognition whatever. But just as a conclusion (good or bad) is determined in the mind of the reasoner by its premiss, so cognitions not judgments may be determined by previous

* *Journal of Speculative Philosophy*, vol. 2, pp. 103-114 (1868); intended as Essay IV of the "Search for a Method," 1893.

¹ The word *intuitus* first occurs as a technical term in St. Anselm's *Monologium*. [*Monologium*, LXVI; Cf. Prantl, III, S. 332, 746n.] He wished to distinguish between our knowledge of God and our knowledge of finite things (and in the next world, of God, also); and thinking of the saying of St. Paul, *Videmus nunc per speculum in ænigmate: tunc autem facie ad faciem*, [LXX], he called the former *speculation* and the latter *intuition*. This use of "speculation" did not take root, because that word already had another exact and widely different meaning. In the middle ages, the term "intuitive cognition" had two principal senses; 1st, as opposed to abstractive cognition, it meant the knowledge of the present as present, and this is its meaning in Anselm; but 2d, as no intuitive cognition was allowed to be determined by a previous cognition, it came to be used as the opposite of discursive cognition (see Scotus, *In sentent.*, lib. 2, dist. 3, qu. 9), and this is nearly the sense in which I employ it. This is also nearly the sense in which Kant uses it, the former distinction being expressed by his *sensuous* and *non-sensuous*. (See *Werke*, herausg. Rosenkranz, Thl. 2, S. 713, 31, 41, 100, u. s. w.) An enumeration of six meanings of intuition may be found in Hamilton's *Reid*, p. 759.

cognitions; and a cognition not so determined, and therefore determined directly by the transcendental object, is to be termed an *intuition*.

214. Now, it is plainly one thing to have an intuition and another to know intuitively that it is an intuition, and the question is whether these two things, distinguishable in thought, are, in fact, invariably connected, so that we can always intuitively distinguish between an intuition and a cognition determined by another. Every cognition, as something present, is, of course, an intuition of itself. But the determination of a cognition by another cognition or by a transcendental object is not, at least so far as appears obviously at first, a part of the immediate content of that cognition, although it would appear to be an element of the action or passion of the transcendental *ego*, which is not, perhaps, in consciousness immediately; and yet this transcendental action or passion may invariably determine a cognition of itself, so that, in fact, the determination or non-determination of the cognition by another may be a part of the cognition. In this case, I should say that we had an intuitive power of distinguishing an intuition from another cognition.

There is no evidence that we have this faculty, except that we seem to *feel* that we have it. But the weight of that testimony depends entirely on our being supposed to have the power of distinguishing in this feeling whether the feeling be the result of education, old associations, etc., or whether it is an intuitive cognition; or, in other words, it depends on presupposing the very matter testified to. Is this feeling infallible? And is this judgment concerning it infallible, and so on, *ad infinitum*? Supposing that a man really could shut himself up in such a faith, he would be, of course, impervious to the truth, "evidence-proof."

215. But let us compare the theory with the historic facts. The power of intuitively distinguishing intuitions from other cognitions has not prevented men from disputing very warmly as to which cognitions are intuitive. In the middle ages, reason and external authority were regarded as two coördinate sources of knowledge, just as reason and the authority of intuition are now; only the happy device of considering the enunciations of authority to be essentially indemonstrable had

not yet been hit upon. All authorities were not considered as infallible, any more than all reasons; but when Berengarius said that the authoritativeness of any particular authority must rest upon reason, the proposition was scouted as opinionated, impious, and absurd.* Thus, the credibility of authority was regarded by men of that time simply as an ultimate premiss, as a cognition not determined by a previous cognition of the same object, or, in our terms, as an intuition. It is strange that they should have thought so, if, as the theory now under discussion supposes, by merely contemplating the credibility of the authority, as a Fakir does his God, they could have seen that it was not an ultimate premiss! Now, what if our *internal* authority should meet the same fate, in the history of opinions, as that external authority has met? Can that be said to be absolutely certain which many sane, well-informed, and thoughtful men already doubt?¹

* See Prantl, II, 73ff.

¹ The proposition of Berengarius is contained in the following quotation from his *De Sacra Cæna*: "*Maximi plane cordis est, per omnia ad dialecticam confugere, quia confugere ad eam ad rationem est confugere, quo qui non confugit, cum secundum rationem sit factus ad imaginem dei, suum honorem reliquit, nec potest renovari de die in diem ad imaginem dei.*" The most striking characteristic of medieval reasoning, in general, is the perpetual resort to authority. When Fredigisus and others wish to prove that darkness is a thing, although they have evidently derived the opinion from nominalistic-Platonistic meditations, they argue the matter thus: "God called the darkness, night;" then, certainly, it is a thing, for otherwise before it had a name, there would have been nothing, not even a fiction to name. [See Prantl, II, 19f.] Abelard [*Ouvrages*, p. 179] thinks it worth while to cite Boëthius, when he says that space has three dimensions, and when he says that an individual cannot be in two places at once. The author of *De Generibus et Speciebus* [*ibid.*, p. 517], a work of a superior order, in arguing against a Platonic doctrine, says that if whatever is universal is eternal, the *form* and matter of Socrates, being severally universal, are both eternal, and that, therefore, Socrates was not created by God, but only put together, "*quod quantum a vero deviet, palam est.*" The authority is the final court of appeal. The same author, where in one place he doubts a statement of Boëthius [*ibid.*, p. 535f], finds it necessary to assign a special reason why in this case it is not absurd to do so. *Exceptio probat regulam in casibus non exceptis*. Recognized authorities were certainly sometimes disputed in the twelfth century; their mutual contradictions insured that; and the authority of philosophers was regarded as inferior to that of theologians. Still, it would be impossible to find a passage where the authority of Aristotle is directly denied upon any logical question. "*Sunt et multi errores eius,*" says John of Salisbury [*Metalogicon*, Lib. IV, cap. XXVIII], "*qui in scripturis tam ethnicis, quam fidelibus poterunt inveniri; verum in logica*

216. Every lawyer knows how difficult it is for witnesses to distinguish between what they have seen and what they have inferred. This is particularly noticeable in the case of a person who is describing the performances of a spiritual medium or of a professed juggler. The difficulty is so great that the juggler himself is often astonished at the discrepancy between the actual facts and the statement of an intelligent witness who has not understood the trick. A part of the very complicated trick of the Chinese rings consists in taking two solid rings linked together, talking about them as though they were separate — taking it for granted, as it were — then pretending to put them together, and handing them immediately to the spectator that he may see that they are solid. The art of this consists in raising, at first, the strong suspicion that one is broken. I have seen McAlister do this with such success, that a person sitting close to him, with all his faculties straining to detect the illusion, would have been ready to swear that he saw the rings put together, and, perhaps, if the juggler had not professedly practised deception, would have considered a doubt of it as a doubt of his own veracity. This certainly seems to show that it is not always very easy to distinguish between a premiss and a conclusion, that we have no infallible power of doing so, and that in fact our only security in difficult cases is in some signs from which we can infer that a given fact must have been seen or must have been inferred. In trying to give an account of a dream, every accurate person must often have felt that it was a hopeless undertaking to attempt to disentangle waking interpretations and fillings out from the fragmentary images of the dream itself.

217. The mention of dreams suggests another argument. A dream, as far as its own content goes, is exactly like an actual experience. It is mistaken for one. And yet all the world believes that dreams are determined, according to the laws of the association of ideas, etc., by previous cognitions. If it be said that the faculty of intuitively recognizing intuitions is asleep, I reply that this is a mere supposition, without other

parem habuisse non legitur. "Sed nihil adversus Aristotelem," says Abelard, and in another place, "Sed si Aristotelem Peripateticorum principem cuiuspare possumus, quam amplius in hac arte recepimus?" The idea of going without an authority, or of subordinating authority to reason, does not occur to him.

support. Besides, even when we wake up, we do not find that the dream differed from reality, except by certain *marks*, darkness and fragmentariness. Not unfrequently a dream is so vivid that the memory of it is mistaken for the memory of an actual occurrence.

218. A child has, as far as we know, all the perceptive powers of a man. Yet question him a little as to *how* he knows what he does. In many cases, he will tell you that he never learned his mother-tongue; he always knew it, or he knew it as soon as he came to have sense. It appears, then, that *he* does not possess the faculty of distinguishing, by simple contemplation, between an intuition and a cognition determined by others.

219. There can be no doubt that before the publication of Berkeley's book on Vision,* it had generally been believed that the third dimension of space was immediately intuited, although, at present, nearly all admit that it is known by inference. We had been *contemplating* the object since the very creation of man, but this discovery was not made until we began to *reason* about it.

220. Does the reader know of the blind spot on the retina? Take a number of this journal, turn over the cover so as to expose the white paper, lay it sideways upon the table before which you must sit, and put two cents upon it, one near the left-hand edge, and the other to the right. Put your left hand over your left eye, and with the right eye look *steadily* at the left-hand cent. Then, with your right hand, move the right-hand cent (which is now plainly seen) *towards* the left hand. When it comes to a place near the middle of the page it will disappear — you cannot see it without turning your eye. Bring it nearer to the other cent, or carry it further away, and it will reappear; but at that particular spot it cannot be seen. Thus it appears that there is a blind spot nearly in the middle of the retina; and this is confirmed by anatomy. It follows that the space we immediately see (when one eye is closed) is not, as we had imagined, a continuous oval, but is a ring, the filling up of which must be the work of the intellect. What more striking example could be desired of the impossi-

* *An Essay Towards a New Theory of Vision*, 1709.

bility of distinguishing intellectual results from intuitional data, by mere contemplation?

221. A man can distinguish different textures of cloth by feeling; but not immediately, for he requires to move his fingers over the cloth, which shows that he is obliged to compare the sensations of one instant with those of another.

222. The pitch of a tone depends upon the rapidity of the succession of the vibrations which reach the ear. Each of those vibrations produces an impulse upon the ear. Let a single such impulse be made upon the ear, and we know, experimentally, that it is perceived. There is, therefore, good reason to believe that each of the impulses forming a tone is perceived. Nor is there any reason to the contrary. So that this is the only admissible supposition. Therefore, the pitch of a tone depends upon the rapidity with which certain impressions are successively conveyed to the mind. These impressions must exist previously to any tone; hence, the sensation of pitch is determined by previous cognitions. Nevertheless, this would never have been discovered by the mere contemplation of that feeling.

223. A similar argument may be urged in reference to the perception of two dimensions of space. This appears to be an immediate intuition. But if we were to *see* immediately an extended surface, our retinas must be spread out in an extended surface. Instead of that, the retina consists of innumerable needles pointing towards the light, and whose distances from one another are decidedly greater than the *minimum visibile*. Suppose each of those nerve-points conveys the sensation of a little colored surface. Still, what we immediately see must even then be, not a continuous surface, but a collection of spots. Who could discover this by mere intuition? But all the analogies of the nervous system are against the supposition that the excitation of a single nerve can produce an idea as complicated as that of a space, however small. If the excitation of no one of these nerve points can immediately convey the impression of space, the excitation of all cannot do so. For, the excitation of each produces some impression (according to the analogies of the nervous system), hence, the sum of these impressions is a necessary condition of any perception produced by the excitation of all; or, in other terms, a per-

ception produced by the excitation of all is determined by the mental impressions produced by the excitation of every one. This argument is confirmed by the fact that the existence of the perception of space can be fully accounted for by the action of faculties known to exist, without supposing it to be an immediate impression. For this purpose, we must bear in mind the following facts of physio-psychology: 1. The excitation of a nerve does not of itself inform us where the extremity of it is situated. If, by a surgical operation, certain nerves are displaced, our sensations from those nerves do not inform us of the displacement. 2. A single sensation does not inform us how many nerves or nerve-points are excited. 3. We can distinguish between the impressions produced by the excitations of different nerve-points. 4. The differences of impressions produced by different excitations of similar nerve-points are similar. Let a momentary image be made upon the retina. By No. 2, the impression thereby produced will be indistinguishable from what might be produced by the excitation of some conceivable single nerve. It is not conceivable that the momentary excitation of a single nerve should give the sensation of space. Therefore, the momentary excitation of all the nerve-points of the retina cannot, immediately or mediately, produce the sensation of space. The same argument would apply to any unchanging image on the retina. Suppose, however, that the image moves over the retina. Then the peculiar excitation which at one instant affects one nerve-point, at a later instant will affect another. These will convey impressions which are very similar by 4, and yet which are distinguishable by 3. Hence, the conditions for the recognition of a relation between these impressions are present. There being, however, a very great number of nerve-points affected by a very great number of successive excitations, the relations of the resulting impressions will be almost inconceivably complicated. Now, it is a known law of mind, that when phenomena of an extreme complexity are presented, which yet would be reduced to *order* or mediate simplicity by the application of a certain conception, that conception sooner or later arises in application to those phenomena. In the case under consideration, the conception of extension would reduce the phenomena to unity, and, therefore, its genesis is fully accounted for. It remains

only to explain why the previous cognitions which determine it are not more clearly apprehended. For this explanation, I shall refer to a paper upon a new list of categories, Section 5,¹ merely adding that just as we are able to recognize our friends by certain appearances, although we cannot possibly say what those appearances are and are quite unconscious of any process of reasoning, so in any case when the reasoning is easy and natural to us, however complex may be the premisses, they sink into insignificance and oblivion proportionately to the satisfactoriness of the theory based upon them. This theory of space is confirmed by the circumstance that an exactly similar theory is imperatively demanded by the facts in reference to time. That the course of time should be immediately felt is obviously impossible. For, in that case, there must be an element of this feeling at each instant. But in an instant there is no duration and hence no immediate feeling of duration. Hence, no one of these elementary feelings is an immediate feeling of duration; and, hence the sum of all is not. On the other hand, the impressions of any moment are very complicated — containing all the images (or the elements of the images) of sense and memory, which complexity is reducible to mediate simplicity by means of the conception of time.²

¹ *Proceedings of the American Academy*, May 14, 1867. [1.549]

² The above theory of space and time does not conflict with that of Kant so much as it appears to do. They are in fact the solutions of different questions. Kant, it is true, makes space and time intuitions, or rather forms of intuition, but it is not essential to his theory that intuition should mean more than "individual representation." The apprehension of space and time results, according to him, from a mental *process* — the "Synthesis der Apprehension in der Anschauung." (See *Critik d. reinen Vernunft*. Ed. 1781, pp. 98 *et seq.*) My theory is merely an account of this synthesis.

The gist of Kant's Transcendental *Æsthetic* is contained in two principles. First, that universal and necessary propositions are not given in experience. Second, that universal and necessary facts are determined by the conditions of experience in general. By a universal proposition is meant merely, one which asserts something of *all* of a sphere — not necessarily one which all men believe. By a necessary proposition, is meant one which asserts what it does, not merely of the actual condition of things, but of every possible state of things; it is not meant that the proposition is one which we cannot help believing. Experience, in Kant's first principle, cannot be used for a product of the objective understanding, but must be taken for the first impressions of sense with consciousness conjoined and worked up by the imagination into images, together with all which is logically deducible therefrom. In this sense, it may be admitted

224. We have, therefore, a variety of facts, all of which are most readily explained on the supposition that we have no intuitive faculty of distinguishing intuitive from mediate cognitions. Some arbitrary hypothesis may otherwise explain any one of these facts; this is the only theory which brings them to support one another. Moreover, no facts require the supposition of the faculty in question. Whoever has studied the nature of proof will see, then, that there are here very strong reasons for disbelieving the existence of this faculty. These will become still stronger when the consequences of rejecting it have, in this paper and in a following one, been more fully traced out.

QUESTION 2. *Whether we have an intuitive self-consciousness.*

225. Self-consciousness, as the term is here used, is to be distinguished both from consciousness generally, from the

that universal and necessary propositions are not given in experience. But, in that case, neither are any inductive conclusions which might be drawn from experience, given in it. In fact, it is the peculiar function of induction to produce universal and necessary propositions. Kant points out, indeed, that the universality and necessity of scientific inductions are but the analogues of philosophic universality and necessity; and this is true, in so far as it is never allowable to accept a scientific conclusion without a certain indefinite drawback. But this is owing to the insufficiency in the number of the instances; and whenever instances may be had in as large numbers as we please, *ad infinitum*, a truly universal and necessary proposition is inferable. As for Kant's second principle, that the truth of universal and necessary propositions is dependent upon the conditions of the general experience, it is no more nor less than the principle of Induction. I go to a fair and draw from the "grab-bag" twelve packages. Upon opening them, I find that every one contains a red ball. Here is a universal fact. It depends, then, on the condition of the experience. What is the condition of the experience? It is solely that the balls are the contents of packages drawn from that bag, that is, the only thing which determined the experience, was the drawing from the bag. I infer, then, according to the principle of Kant, that what is drawn from the bag will contain a red ball. This is induction. Apply induction not to any limited experience but to all human experience and you have the Kantian philosophy, so far as it is correctly developed.

Kant's successors, however, have not been content with his doctrine. Nor ought they to have been. For, there is this third principle: "Absolutely universal propositions must be analytic." For whatever is absolutely universal is devoid of all content or determination, for all determination is by negation. The problem, therefore, is not how universal propositions can be synthetical, but how universal propositions appearing to be synthetical can be evolved by thought alone from the purely indeterminate.

internal sense, and from pure apperception. Any cognition is a consciousness of the object as represented; by self-consciousness is meant a knowledge of ourselves. Not a mere feeling of subjective conditions of consciousness, but of our personal selves. Pure apperception is the self-assertion of *THE ego*; the self-consciousness here meant is the recognition of my *private* self. I know that *I* (not merely *the I*) exist. The question is, how do I know it; by a special intuitive faculty, or is it determined by previous cognitions?

226. Now, it is not self-evident that we have such an intuitive faculty, for it has just been shown that we have no intuitive power of distinguishing an intuition from a cognition determined by others. Therefore, the existence or non-existence of this power is to be determined upon evidence, and the question is whether self-consciousness can be explained by the action of known faculties under conditions known to exist, or whether it is necessary to suppose an unknown cause for this cognition, and, in the latter case, whether an intuitive faculty of self-consciousness is the most probable cause which can be supposed.

227. It is first to be observed that there is no known self-consciousness to be accounted for in extremely young children. It has already been pointed out by Kant¹ that the late use of the very common word "I" with children indicates an imperfect self-consciousness in them, and that, therefore, so far as it is admissible for us to draw any conclusion in regard to the mental state of those who are still younger, it must be against the existence of any self-consciousness in them.

228. On the other hand, children manifest powers of thought much earlier. Indeed, it is almost impossible to assign a period at which children do not already exhibit decided intellectual activity in directions in which thought is indispensable to their well-being. The complicated trigonometry of vision, and the delicate adjustments of coördinated movement, are plainly mastered very early. There is no reason to question a similar degree of thought in reference to themselves.

229. A very young child may always be observed to watch its own body with great attention. There is every reason why this should be so, for from the child's point of view this body is

¹ *Werke*, vii. (2), 11.

the most important thing in the universe. Only what it touches has any actual and present feeling; only what it faces has any actual color; only what is on its tongue has any actual taste.

230. No one questions that, when a sound is heard by a child, he thinks, not of himself as hearing, but of the bell or other object as sounding. How when he wills to move a table? Does he then think of himself as desiring, or only of the table as fit to be moved? That he has the latter thought, is beyond question; that he has the former, must, until the existence of an intuitive self-consciousness is proved, remain an arbitrary and baseless supposition. There is no good reason for thinking that he is less ignorant of his own peculiar condition than the angry adult who denies that he is in a passion.

231. The child, however, must soon discover by observation that things which are thus fit to be changed are apt actually to undergo this change, after a contact with that peculiarly important body called Willy or Johnny. This consideration makes this body still more important and central, since it establishes a connection between the fitness of a thing to be changed and a tendency in this body to touch it before it is changed.

232. The child learns to understand the language; that is to say, a connection between certain sounds and certain facts becomes established in his mind. He has previously noticed the connection between these sounds and the motions of the lips of bodies somewhat similar to the central one, and has tried the experiment of putting his hand on those lips and has found the sound in that case to be smothered. He thus connects that language with bodies somewhat similar to the central one. By efforts, so unenergetic that they should be called rather instinctive, perhaps, than tentative, he learns to produce those sounds. So he begins to converse.

233. It must be about this time that he begins to find that what these people about him say is the very best evidence of fact. So much so, that testimony is even a stronger mark of fact than *the facts themselves*, or rather than what must now be thought of as the *appearances* themselves. (I may remark, by the way, that this remains so through life; testimony will convince a man that he himself is mad.) A child hears it said that the stove is hot. But it is not, he says; and, indeed, that central

body is not touching it, and only what that touches is hot or cold. But he touches it, and finds the testimony confirmed in a striking way. Thus, he becomes aware of ignorance, and it is necessary to suppose a *self* in which this ignorance can inhere. So testimony gives the first dawning of self-consciousness.

234. But, further, although usually appearances are either only confirmed or merely supplemented by testimony, yet there is a certain remarkable class of appearances which are continually contradicted by testimony. These are those predicates which *we* know to be emotional, but which *he* distinguishes by their connection with the movements of that central person, himself (that the table wants moving, etc.) These judgments are generally denied by others. Moreover, he has reason to think that others, also, have such judgments which are quite denied by all the rest. Thus, he adds to the conception of appearance as the actualization of fact, the conception of it as something *private* and valid only for one body. In short, *error* appears, and it can be explained only by supposing a *self* which is fallible.

235. Ignorance and error are all that distinguish our private selves from the absolute *ego* of pure apperception.

236. Now, the theory which, for the sake of perspicuity, has thus been stated in a specific form, may be summed up as follows: At the age at which we know children to be self-conscious, we know that they have been made aware of ignorance and error; and we know them to possess at that age powers of understanding sufficient to enable them to infer from ignorance and error their own existence. Thus we find that known faculties, acting under conditions known to exist, would rise to self-consciousness. The only essential defect in this account of the matter is, that while we know that children exercise *as much* understanding as is here supposed, we do not know that they exercise it in precisely this way. Still the supposition that they do so is infinitely more supported by facts, than the supposition of a wholly peculiar faculty of the mind.

237. The only argument worth noticing for the existence of an intuitive self-consciousness is this. We are more certain of our own existence than of any other fact; a premiss cannot determine a conclusion to be more certain than it is itself; hence, our own existence cannot have been inferred from any other

fact. The first premiss must be admitted, but the second premiss is founded on an exploded theory of logic. A conclusion cannot be more certain than that some one of the facts which support it is true, but it may easily be more certain than any one of those facts. Let us suppose, for example, that a dozen witnesses testify to an occurrence. Then my belief in that occurrence rests on the belief that each of those men is generally to be believed upon oath. Yet the fact testified to is made more certain than that any one of those men is generally to be believed. In the same way, to the developed mind of man, his own existence is supported by *every other fact*, and is, therefore, incomparably more certain than any one of these facts. But it cannot be said to be more certain than that there is another fact, since there is no doubt perceptible in either case.

It is to be concluded, then, that there is no necessity of supposing an intuitive self-consciousness, since self-consciousness may easily be the result of inference.

QUESTION 3. *Whether we have an intuitive power of distinguishing between the subjective elements of different kinds of cognitions.*

238. Every cognition involves something represented, or that of which we are conscious, and some action or passion of the self whereby it becomes represented. The former shall be termed the objective, the latter the subjective, element of the cognition. The cognition itself is an intuition of its objective element, which may therefore be called, also, the immediate object. The subjective element is not necessarily immediately known, but it is possible that such an intuition of the subjective element of a cognition of its character, whether that of dreaming, imagining, conceiving, believing, etc., should accompany every cognition. The question is whether this is so.

239. It would appear, at first sight, that there is an overwhelming array of evidence in favor of the existence of such a power. The difference between seeing a color and imagining it is immense. There is a vast difference between the most vivid dream and reality. And if we had no intuitive power of distinguishing between what we believe and what we merely conceive, we never, it would seem, could in any way distinguish them; since if we did so by reasoning, the question would arise

whether the argument itself was believed or conceived, and this must be answered before the conclusion could have any force. And thus there would be a *regressus ad infinitum*. Besides, if we do not know that we believe, then, from the nature of the case, we do not believe.

240. But be it noted that we do not intuitively know the existence of this faculty. For it is an intuitive one, and we cannot intuitively know that a cognition is intuitive. The question is, therefore, whether it is necessary to suppose the existence of this faculty, or whether then the facts can be explained without this supposition.

241. In the first place, then, the difference between what is imagined or dreamed and what is actually experienced, is no argument in favor of the existence of such a faculty. For it is not questioned that there are distinctions in what is present to the mind, but the question is, whether independently of any such distinctions in the immediate *objects* of consciousness, we have any immediate power of distinguishing different modes of consciousness. Now, the very fact of the immense difference in the immediate objects of sense and imagination, sufficiently accounts for our distinguishing those faculties; and instead of being an argument in favor of the existence of an intuitive power of distinguishing the subjective elements of consciousness, it is a powerful reply to any such argument, so far as the distinction of sense and imagination is concerned.

242. Passing to the distinction of belief and conception, we meet the statement that the knowledge of belief is essential to its existence. Now, we can unquestionably distinguish a belief from a conception, in most cases, by means of a peculiar feeling of conviction; and it is a mere question of words whether we define belief as that judgment which is accompanied by this feeling, or as that judgment from which a man will act. We may conveniently call the former *sensational*, the latter *active*, belief. That neither of these necessarily involves the other, will surely be admitted without any recital of facts. Taking belief in the sensational sense, the intuitive power of reorganizing it will amount simply to the capacity for the sensation which accompanies the judgment. This sensation, like any other, is an object of consciousness; and therefore the capacity for it implies no intuitive recognition of subjective elements of con-

consciousness. If belief is taken in the active sense, it may be discovered by the observation of external facts and by inference from the sensation of conviction which usually accompanies it.

243. Thus, the arguments in favor of this peculiar power of consciousness disappear, and the presumption is again against such a hypothesis. Moreover, as the immediate objects of any two faculties must be admitted to be different, the facts do not render such a supposition in any degree necessary.

QUESTION 4. *Whether we have any power of introspection, or whether our whole knowledge of the internal world is derived from the observation of external facts.*

244. It is not intended here to assume the reality of the external world. Only, there is a certain set of facts which are ordinarily regarded as external, while others are regarded as internal. The question is whether the latter are known otherwise than by inference from the former. By introspection, I mean a direct perception of the internal world, but not necessarily a perception of it *as* internal. Nor do I mean to limit the signification of the word to intuition, but would extend it to any knowledge of the internal world not derived from external observation.

245. There is one sense in which any perception has an internal object, namely, that every sensation is partly determined by internal conditions. Thus, the sensation of redness is as it is, owing to the constitution of the mind; and in this sense it is a sensation of something internal. Hence, we may derive a knowledge of the mind from a consideration of this sensation, but that knowledge would, in fact, be an inference from redness as a predicate of something external. On the other hand, there are certain other feelings — the emotions, for example — which appear to arise in the first place, not as predicates at all, and to be referable to the mind alone. It would seem, then, that by means of these, a knowledge of the mind may be obtained, which is not inferred from any character of outward things. The question is whether this is really so.

246. Although introspection is not necessarily intuitive, it is not self-evident that we possess this capacity; for we have no intuitive faculty of distinguishing different subjective modes of consciousness. The power, if it exists, must be known

by the circumstance that the facts cannot be explained without it.

247. In reference to the above argument from the emotions, it must be admitted that if a man is angry, his anger implies, in general, no determinate and constant character in its object. But, on the other hand, it can hardly be questioned that there is some relative character in the outward thing which makes him angry, and a little reflection will serve to show that his anger consists in his saying to himself, "this thing is vile, abominable, etc." and that it is rather a mark of returning reason to say, "I am angry." In the same way any emotion is a predication concerning some object, and the chief difference between this and an objective intellectual judgment is that while the latter is relative to human nature or to mind in general, the former is relative to the particular circumstances and disposition of a particular man at a particular time. What is here said of emotions in general, is true in particular of the sense of beauty and of the moral sense. Good and bad are feelings which first arise as predicates, and therefore are either predicates of the not-I, or are determined by previous cognitions (there being no intuitive power of distinguishing subjective elements of consciousness).

248. It remains, then, only to inquire whether it is necessary to suppose a particular power of introspection for the sake of accounting for the sense of willing. Now, volition, as distinguished from desire, is nothing but the power of concentrating the attention, of abstracting. Hence, the knowledge of the power of abstracting may be inferred from abstract objects, just as the knowledge of the power of seeing is inferred from colored objects.

249. It appears, therefore, that there is no reason for supposing a power of introspection; and, consequently, the only way of investigating a psychological question is by inference from external facts.

QUESTION 5. *Whether we can think without signs.*

250. This is a familiar question, but there is, to this day, no better argument in the affirmative than that thought must precede every sign. This assumes the impossibility of an infinite series. But Achilles, as a fact, will overtake the tor-

toise. *How* this happens, is a question not necessary to be answered at present, as long as it certainly does happen.

251. If we seek the light of external facts, the only cases of thought which we can find are of thought in signs. Plainly, no other thought can be evidenced by external facts. But we have seen that only by external facts can thought be known at all. The only thought, then, which can possibly be cognized is thought in signs. But thought which cannot be cognized does not exist. All thought, therefore, must necessarily be in signs.

252. A man says to himself, "Aristotle is a man; *therefore*, he is fallible." Has he not, then, thought what he has not said to himself, that all men are fallible? The answer is, that he has done so, so far as this is said in his *therefore*. According to this, our question does not relate to *fact*, but is a mere asking for distinctness of thought.

253. From the proposition that every thought is a sign, it follows that every thought must address itself to some other, must determine some other, since that is the essence of a sign. This, after all, is but another form of the familiar axiom, that in intuition, *i. e.*, in the immediate present, there is no thought, or, that all which is reflected upon has past. *Hinc loquor inde est*. That, since any thought, there must have been a thought, has its analogue in the fact that, since any past time, there must have been an infinite series of times. To say, therefore, that thought cannot happen in an instant, but requires a time, is but another way of saying that every thought must be interpreted in another, or that all thought is in signs.

QUESTION 6. *Whether a sign can have any meaning, if by its definition it is the sign of something absolutely incognizable.*

254. It would seem that it can, and that universal and hypothetical propositions are instances of it. Thus, the universal proposition, "all ruminants are cloven-hoofed," speaks of a possible infinity of animals, and no matter how many ruminants may have been examined, the possibility must remain that there are others which have not been examined. In the case of a hypothetical proposition, the same thing is still more manifest; for such a proposition speaks not merely of the actual state of things, but of every possible state of things, all

of which are not knowable, inasmuch as only one can so much as exist.

255. On the other hand, all our conceptions are obtained by abstractions and combinations of cognitions first occurring in judgments of experience. Accordingly, there can be no conception of the absolutely incognizable, since nothing of that sort occurs in experience. But the meaning of a term is the conception which it conveys. Hence, a term can have no such meaning.

256. If it be said that the incognizable is a concept compounded of the concept *not* and *cognizable*, it may be replied that *not* is a mere syncategorematic term and not a concept by itself.

257. If I think "white," I will not go so far as Berkeley* and say that I think of a person seeing, but I will say that what I think is of the nature of a cognition, and so of anything else which can be experienced. Consequently, the highest concept which can be reached by abstractions from judgments of experience — and therefore, the highest concept which can be reached at all — is the concept of something of the nature of a cognition. *Not*, then, or *what is other than*, if a concept, is a concept of the cognizable. Hence, not-cognizable, if a concept, is a concept of the form "A, not-A," and is, at least, self-contradictory. Thus, ignorance and error can only be conceived as correlative to a real knowledge and truth, which latter are of the nature of cognitions. Over against any cognition, there is an unknown but knowable reality; but over against all possible cognition, there is only the self-contradictory. In short, *cognizability* (in its widest sense) and *being* are not merely metaphysically the same, but are synonymous terms.

258. To the argument from universal and hypothetical propositions, the reply is, that though their truth cannot be cognized with absolute certainty, it may be probably known by induction.

QUESTION 7. *Whether there is any cognition not determined by a previous cognition.*

259. It would seem that there is or has been; for since we are in possession of cognitions, which are all determined by previous ones, and these by cognitions earlier still, there must

* Cf. *A Treatise Concerning Human Knowledge*, §§1-6.

have been a *first* in this series or else our state of cognition at any time is completely determined, according to logical laws, by our state at any previous time. But there are many facts against the last supposition, and therefore in favor of intuitive cognitions.

260. On the other hand, since it is impossible to know intuitively that a given cognition is not determined by a previous one, the only way in which this can be known is by hypothetical inference from observed facts. But to adduce the cognition by which a given cognition has been determined is to explain the determinations of that cognition. And it is the only way of explaining them. For something entirely out of consciousness which may be supposed to determine it, can, as such, only be known and only adduced in the determinate cognition in question. So, that to suppose that a cognition is determined solely by something absolutely external, is to suppose its determinations incapable of explanation. Now, this is a hypothesis which is warranted under no circumstances, inasmuch as the only possible justification for a hypothesis is that it explains the facts, and to say that they are explained and at the same time to suppose them inexplicable is self-contradictory.

261. If it be objected that the peculiar character of *red* is not determined by any previous cognition, I reply that that character is not a character of red as a cognition; for if there be a man to whom red things look as blue ones do to me and *vice versa*, that man's eyes teach him the same facts that they would if he were like me.

262. Moreover, we know of no power by which an intuition could be known. For, as the cognition is beginning, and therefore in a state of change, at only the first instant would it be intuition. And, therefore, the apprehension of it must take place in no time and be an event occupying no time.¹ Besides, all the cognitive faculties we know of are relative, and consequently their products are relations. But the cognition of a relation is determined by previous cognitions. No cognition not determined by a previous cognition, then, can be known. It does not exist, then, first, because it is absolutely incog-

¹ This argument, however, only covers a part of the question. It does not go to show that there is no cognition undetermined except by another like it.

nizable, and second, because a cognition only exists so far as it is known.

263. The reply to the argument that there must be a first is as follows: In retracing our way from conclusions to premisses, or from determined cognitions to those which determine them, we finally reach, in all cases, a point beyond which the consciousness in the determined cognition is more lively than in the cognition which determines it. We have a less lively consciousness in the cognition which determines our cognition of the third dimension than in the latter cognition itself; a less lively consciousness in the cognition which determines our cognition of a continuous surface (without a blind spot) than in this latter cognition itself; and a less lively consciousness of the impressions which determine the sensation of tone than of that sensation itself. Indeed, when we get near enough to the external this is the universal rule. Now let any horizontal line represent a cognition, and let the length of the line serve to measure (so to speak) the liveliness of consciousness in that cognition. A point, having no length, will, on this principle, represent an object quite out of consciousness. Let one horizontal line below another represent a cognition which determines the cognition represented by that other and which has the same object as the latter. Let the finite distance between two such lines represent that they are two different cognitions. With this aid to thinking, let us see whether "there must be a first." Suppose an inverted triangle ∇ to be gradually dipped into water. At any date or instant, the surface of the water makes a horizontal line across that triangle. This line represents a cognition. At a subsequent date, there is a sectional line so made, higher upon the triangle. This represents another cognition of the same object determined by the former, and having a livelier consciousness. The apex of the triangle represents the object external to the mind which determines both these cognitions. The state of the triangle before it reaches the water, represents a state of cognition which contains nothing which determines these subsequent cognitions. To say, then, that if there be a state of cognition by which all subsequent cognitions of a certain object are not determined, there must subsequently be some cognition of that object not determined by previous cognitions

of the same object, is to say that when that triangle is dipped into the water there must be a sectional line made by the surface of the water lower than which no surface line had been made in that way. But draw the horizontal line where you will, as many horizontal lines as you please can be assigned at finite distances below it and below one another. For any such section is at some distance above the apex, otherwise it is not a line. Let this distance be a . Then there have been similar sections at the distances $\frac{1}{2}a$, $\frac{1}{4}a$, $\frac{1}{8}a$, $\frac{1}{16}a$, above the apex, and so on as far as you please. So that it is not true that there must be a first. Explicate the logical difficulties of this paradox (they are identical with those of the Achilles) in whatever way you may. I am content with the result, as long as your principles are fully applied to the particular case of cognitions determining one another. Deny motion, if it seems proper to do so; only then deny the process of determination of one cognition by another. Say that instants and lines are fictions; only say, also, that states of cognition and judgments are fictions. The point here insisted on is not this or that logical solution of the difficulty, but merely that cognition arises by a *process* of beginning, as any other change comes to pass.

In a subsequent paper, I shall trace the consequences of these principles, in reference to the questions of reality, of individuality, and of the validity of the laws of logic.

II

*SOME CONSEQUENCES OF FOUR INCAPACITIES**

§1. THE SPIRIT OF CARTESIANISM^E

264. Descartes is the father of modern philosophy, and the spirit of Cartesianism — that which principally distinguishes it from the scholasticism which it displaced — may be compendiously stated as follows:

1. It teaches that philosophy must begin with universal doubt; whereas scholasticism had never questioned fundamentals.

2. It teaches that the ultimate test of certainty is to be found in the individual consciousness; whereas scholasticism had rested on the testimony of sages and of the Catholic Church.

3. The multiform argumentation of the middle ages is replaced by a single thread of inference depending often upon inconspicuous premisses.

4. Scholasticism had its mysteries of faith, but undertook to explain all created things. But there are many facts which Cartesianism not only does not explain but renders absolutely inexplicable, unless to say that "God makes them so" is to be regarded as an explanation.

265. In some, or all of these respects, most modern philosophers have been, in effect, Cartesians. Now without wishing to return to scholasticism, it seems to me that modern science and modern logic require us to stand upon a very different platform from this.

1. We cannot begin with complete doubt. We must begin with all the prejudices which we actually have when we enter upon the study of philosophy. These prejudices are not to be dispelled by a maxim, for they are things which it does not occur to us *can* be questioned. Hence this initial skepticism will be a mere self-deception, and not real doubt; and no one

* *Journal of Speculative Philosophy*, vol. 2, pp. 140-157 (1868); intended as Essay V of the "Search for a Method," 1893.

who follows the Cartesian method will ever be satisfied until he has formally recovered all those beliefs which in form he has given up. It is, therefore, as useless a preliminary as going to the North Pole would be in order to get to Constantinople by coming down regularly upon a meridian. A person may, it is true, in the course of his studies, find reason to doubt what he began by believing; but in that case he doubts because he has a positive reason for it, and not on account of the Cartesian maxim. Let us not pretend to doubt in philosophy what we do not doubt in our hearts.

2. The same formalism appears in the Cartesian criterion, which amounts to this: "Whatever I am clearly convinced of, is true." If I were really convinced, I should have done with reasoning and should require no test of certainty. But thus to make single individuals absolute judges of truth is most pernicious. The result is that metaphysicians will all agree that metaphysics has reached a pitch of certainty far beyond that of the physical sciences; — only they can agree upon nothing else. In sciences in which men come to agreement, when a theory has been broached it is considered to be on probation until this agreement is reached. After it is reached, the question of certainty becomes an idle one, because there is no one left who doubts it. We individually cannot reasonably hope to attain the ultimate philosophy which we pursue; we can only seek it, therefore, for the *community* of philosophers. Hence, if disciplined and candid minds carefully examine a theory and refuse to accept it, this ought to create doubts in the mind of the author of the theory himself.

3. Philosophy ought to imitate the successful sciences in its methods, so far as to proceed only from tangible premisses which can be subjected to careful scrutiny, and to trust rather to the multitude and variety of its arguments than to the conclusiveness of any one. Its reasoning should not form a chain which is no stronger than its weakest link, but a cable whose fibers may be ever so slender, provided they are sufficiently numerous and intimately connected.

4. Every unidealistic philosophy supposes some absolutely inexplicable, unanalyzable ultimate; in short, something resulting from mediation itself not susceptible of mediation. Now that anything *is* thus inexplicable can only be known by rea-

soning from signs. But the only justification of an inference from signs is that the conclusion explains the fact. To suppose the fact absolutely inexplicable, is not to explain it, and hence this supposition is never allowable.

In the last number of this journal will be found a piece entitled "Questions concerning certain Faculties claimed for Man," [Paper No. I] which has been written in this spirit of opposition to Cartesianism. That criticism of certain faculties resulted in four denials, which for convenience may here be repeated:

1. We have no power of Introspection, but all knowledge of the internal world is derived by hypothetical reasoning from our knowledge of external facts.

2. We have no power of Intuition, but every cognition is determined logically by previous cognitions.

3. We have no power of thinking without signs.

4. We have no conception of the absolutely incognizable.

These propositions cannot be regarded as certain; and, in order to bring them to a further test, it is now proposed to trace them out to their consequences. We may first consider the first alone; then trace the consequences of the first and second; then see what else will result from assuming the third also; and, finally, add the fourth to our hypothetical premisses.

§2. MENTAL ACTION^B

266. In accepting the first proposition, we must put aside all prejudices derived from a philosophy which bases our knowledge of the external world on our self-consciousness. We can admit no statement concerning what passes within us except as a hypothesis necessary to explain what takes place in what we commonly call the external world. Moreover when we have upon such grounds assumed one faculty or mode of action of the mind, we cannot, of course, adopt any other hypothesis for the purpose of explaining any fact which can be explained by our first supposition, but must carry the latter as far as it will go. In other words, we must, as far as we can do so without additional hypotheses, reduce all kinds of mental action to one general type.

267. The class of modifications of consciousness with which we must commence our inquiry must be one whose

existence is indubitable, and whose laws are best known, and, therefore (since this knowledge comes from the outside), which most closely follows external facts; that is, it must be some kind of cognition. Here we may hypothetically admit the second proposition of the former paper, according to which there is no absolutely first cognition of any object, but cognition arises by a continuous process. We must begin, then, with a *process* of cognition, and with that process whose laws are best understood and most closely follow external facts. This is no other than the process of valid inference, which proceeds from its premiss, A, to its conclusion, B, only if, as a matter of fact, such a proposition as B is always or usually true when such a proposition as A is true. It is a consequence, then, of the first two principles whose results we are to trace out, that we must, as far as we can, without any other supposition than that the mind reasons, reduce all mental action to the formula of valid reasoning.

268. But does the mind in fact go through the syllogistic process? It is certainly very doubtful whether a conclusion — as something existing in the mind independently, like an image — suddenly displaces two premisses existing in the mind in a similar way. But it is a matter of constant experience, that if a man is made to believe in the premisses, in the sense that he will act from them and will say that they are true, under favorable conditions he will also be ready to act from the conclusion and to say that that is true. Something, therefore, takes place within the organism which is equivalent to the syllogistic process.

269. A valid inference is either *complete* or *incomplete*.* An incomplete inference is one whose validity depends upon some matter of fact not contained in the premisses. This implied fact might have been stated as a premiss, and its relation to the conclusion is the same whether it is explicitly posited or not, since it is at least virtually taken for granted; so that every valid incomplete argument is virtually complete. Complete arguments are divided into *simple* and *complex*.† A complex argument is one which from three or more premisses concludes what might have been concluded by successive steps

* Cf. 2.466.

† Cf. 2.470.

in reasonings each of which is simple. Thus, a complex inference comes to the same thing in the end as a succession of simple inferences.

270. A complete, simple, and valid argument, or syllogism, is either *apodictic* or *probable*.* An apodictic or deductive syllogism is one whose validity depends unconditionally upon the relation of the fact inferred to the facts posited in the premisses. A syllogism whose validity should depend not merely upon its premisses, but upon the existence of some other knowledge, would be impossible; for either this other knowledge would be posited, in which case it would be a part of the premisses, or it would be implicitly assumed, in which case the inference would be incomplete. But a syllogism whose validity depends partly upon the *non-existence* of some other knowledge, is a *probable* syllogism.

271. A few examples will render this plain. The two following arguments are apodictic or deductive:

1. No series of days of which the first and last are different days of the week exceeds by one a multiple of seven days; now the first and last days of any leap-year are different days of the week, and therefore no leap-year consists of a number of days one greater than a multiple of seven.

2. Among the vowels there are no double letters; but one of the double letters (w) is compounded of two vowels: hence, a letter compounded of two vowels is not necessarily itself a vowel.

In both these cases, it is plain that as long as the premisses are true, however other facts may be, the conclusions will be true. On the other hand, suppose that we reason as follows: "A certain man had the Asiatic cholera. He was in a state of collapse, livid, quite cold, and without perceptible pulse. He was bled copiously. During the process he came out of collapse, and the next morning was well enough to be about. Therefore, bleeding tends to cure the cholera." This is a fair probable inference, provided that the premisses represent our whole knowledge of the matter. But if we knew, for example, that recoveries from cholera were apt to be sudden, and that the physician who had reported this case had known of a

* Cf. 2.508ff.

hundred other trials of the remedy without communicating the result, then the inference would lose all its validity.

272. The absence of knowledge which is essential to the validity of any probable argument relates to some question which is determined by the argument itself. This question, like every other, is whether certain objects have certain characters. Hence, the absence of knowledge is either whether besides the objects which, according to the premisses, possess certain characters, any other objects possess them; or, whether besides the characters which, according to the premisses, belong to certain objects, any other characters not necessarily involved in these belong to the same objects. In the former case, the reasoning proceeds as though all the objects which have certain characters were known, and this is *induction*; in the latter case, the inference proceeds as though all the characters requisite to the determination of a certain object or class were known, and this is *hypothesis*. This distinction, also, may be made more plain by examples.

273. Suppose we count the number of occurrences of the different letters in a certain English book, which we may call A. Of course, every new letter which we add to our count will alter the relative number of occurrences of the different letters; but as we proceed with our counting, this change will be less and less. Suppose that we find that as we increase the number of letters counted, the relative number of *e*'s approaches nearly $11\frac{1}{4}$ per cent. of the whole, that of the *t*'s $8\frac{1}{2}$ per cent., that of the *a*'s 8 per cent., that of the *s*'s $7\frac{1}{2}$ per cent., etc. Suppose we repeat the same observations with half a dozen other English writings (which we may designate as B, C, D, E, F, G) with the like result. Then we may infer that in every English writing of some length, the different letters occur with nearly those relative frequencies.

Now this argument depends for its validity upon our *not* knowing the proportion of letters in any English writing besides A, B, C, D, E, F and G. For if we know it in respect to H, and it is not nearly the same as in the others, our conclusion is destroyed at once; if it is the same, then the legitimate inference is from A, B, C, D, E, F, G and H, and not from the first seven alone. This, therefore, is an *induction*.

Suppose, next, that a piece of writing in cipher is presented

to us, without the key. Suppose we find that it contains something less than 26 characters, one of which occurs about 11 *per cent.* of all the times, another $8\frac{1}{2}$ *per cent.*, another 8 *per cent.*, and another $7\frac{1}{2}$ *per cent.* Suppose that when we substitute for these *e*, *t*, *a* and *s*, respectively, we are able to see how single letters may be substituted for each of the other characters so as to make sense in English, provided, however, that we allow the spelling to be wrong in some cases. If the writing is of any considerable length, we may infer with great probability that this is the meaning of the cipher.

The validity of this argument depends upon there being no other known characters of the writing in cipher which would have any weight in the matter; for if there are — if we know, for example, whether or not there is any other solution of it — this must be allowed its effect in supporting or weakening the conclusion. This, then, is *hypothesis*.

274. All valid reasoning is either deductive, inductive, or hypothetic; or else it combines two or more of these characters. Deduction is pretty well treated in most logical textbooks; but it will be necessary to say a few words about induction and hypothesis in order to render what follows more intelligible.

275. Induction may be defined as an argument which proceeds upon the assumption that all the members of a class or aggregate have all the characters which are common to all those members of this class concerning which it is known, whether they have these characters or not; or, in other words, which assumes that that is true of a whole collection which is true of a number of instances taken from it at random. This might be called statistical argument. In the long run, it must generally afford pretty correct conclusions from true premisses. If we have a bag of beans partly black and partly white, by counting the relative proportions of the two colors in several different handfuls, we can approximate more or less to the relative proportions in the whole bag, since a sufficient number of handfuls would constitute all the beans in the bag. The central characteristic and key to induction is, that by taking the conclusion so reached as major premiss of a syllogism, and the proposition stating that such and such objects are taken from the class in question as the minor premiss, the other

premiss of the induction will follow from them deductively.* Thus, in the above example we concluded that all books in English have about $11\frac{1}{4}$ per cent. of their letters *e*'s. From that as major premiss, together with the proposition that A, B, C, D, E, F and G are books in English, it follows deductively that A, B, C, D, E, F and G have about $11\frac{1}{4}$ per cent. of their letters *e*'s. Accordingly, induction has been defined by Aristotle† as the inference of the major premiss of a syllogism from its minor premiss and conclusion. The function of an induction is to substitute for a series of many subjects, a single one which embraces them and an indefinite number of others. Thus it is a species of "reduction of the manifold to unity."

276. Hypothesis may be defined as an argument which proceeds upon the assumption that a character which is known necessarily to involve a certain number of others, may be probably predicated of any object which has all the characters which this character is known to involve. Just as induction may be regarded as the inference of the major premiss of a syllogism, so hypothesis may be regarded as the inference of the minor premiss, from the other two propositions. Thus, the example taken above consists of two such inferences of the minor premisses of the following syllogisms:

1. Every English writing of some length in which such and such characters denote *e*, *t*, *a*, and *s*, has about $11\frac{1}{4}$ per cent. of the first sort of marks, $8\frac{1}{2}$ of the second, 8 of the third, and $7\frac{1}{2}$ of the fourth.

This secret writing is an English writing of some length, in which such and such characters denote *e*, *t*, *a*, and *s*, respectively:

∴ This secret writing has about $11\frac{1}{4}$ per cent. of its characters of the first kind, $8\frac{1}{2}$ of the second, 8 of the third, and $7\frac{1}{2}$ of the fourth.

2. A passage written with such an alphabet makes sense when such and such letters are severally substituted for such and such characters.

This secret writing is written with such an alphabet.

* Cf. 2.623f.

† Cf. his *Analytica Priora*, Bk. III, ch. 23.

∴ This secret writing makes sense when such and such substitutions are made.

The function of hypothesis is to substitute for a great series of predicates forming no unity in themselves, a single one (or small number) which involves them all, together (perhaps) with an indefinite number of others. It is, therefore, also a reduction of a manifold to unity.¹ Every deductive syllogism may be put into the form

If A, then B;

But A:

∴ B.

And as the minor premiss in this form appears as antecedent or reason of a hypothetical proposition, hypothetic inference may be called reasoning from consequent to antecedent.

¹ Several persons versed in logic have objected that I have here quite misapplied the term *hypothesis*, and that what I so designate is an argument from *analogy*. It is a sufficient reply to say that the example of the cipher has been given as an apt illustration of hypothesis by Descartes (Rule 10 *Œuvres choisies*: Paris, 1865, page 334), by Leibniz (*Nouv. Ess.*, lib. 4, ch. 12, § 13, Ed. Erdmann, p. 383 b), and (as I learn from D. Stewart: *Works*, vol. 3, pp. 305 *et seq.*) by Gravesande, Boscovich, Hartley, and G. L. Le Sage. The term Hypothesis has been used in the following senses: 1. For the theme or proposition forming the subject of discourse. 2. For an assumption. Aristotle divides *theses* or propositions adopted without any reason into definitions and hypotheses. The latter are propositions stating the existence of something. Thus the geometer says, "Let there be a triangle." 3. For a condition in a general sense. We are said to seek other things than happiness ἐξ ὑποθέσεως, conditionally. The best republic is the ideally perfect, the second the best on earth, the third the best ἐξ ὑποθέσεως, under the circumstances. Freedom is the ὑπόθεσις or condition of democracy. 4. For the antecedent of a hypothetical proposition. 5. For an oratorical question which assumes facts. 6. In the *Synopsis* of Psellus, for the reference of a subject to the things it denotes. 7. Most commonly in modern times, for the conclusion of an argument from consequence and consequent to antecedent. This is my use of the term. 8. For such a conclusion when too weak to be a theory accepted into the body of a science. [Cf. 2.511n, 2.707.]

I give a few authorities to support the seventh use:

Chauvin.—*Lexicon Rationale*, 1st Ed. — "Hypothesis est propositio, quæ assumitur ad probandum aliam veritatem incognitam. Requiritur multi, ut hæc hypothesis vera esse cognoscatur, etiam antequam appareat, an alia ex ea deduci possint. Verum aiunt alii, hoc unum desiderari, ut hypothesis pro vera admittatur, quod nempe ex hac talia deducitur, quæ respondent phænomenis, et satisfaciunt omnibus difficultatibus, quæ hac parte in re, et in iis quæ de ea apparent, occurrerant."

Newton.— "Hactenus phænomena cœlorum et maris nostri per vim gravitatis

277. The argument from analogy, which a popular writer* upon logic calls reasoning from particulars to particulars, derives its validity from its combining the characters of *induc-exposui, sed causam gravitatis nondum assignavi . . . Rationem vero harum gravitatis proprietatum ex phænomenis nondum potui deducere, et hypotheses non fingo. Quicquid enim ex phænomenis non deducitur, hypothesis vocanda est . . . In hæc Philosophiâ Propositiones deducuntur ex phænomenis, et redduntur generales per inductionem.*" *Principia. Ad fin.*

Sir Wm. Hamilton. — "*Hypotheses*, that is, propositions which are assumed with probability, in order to explain or prove something else which cannot otherwise be explained or proved." — *Lectures on Logic* (Am. Ed.), p. 188.

"The name of *hypothesis* is more emphatically given to provisory suppositions, which serve to explain the phenomena in so far as observed, but which are only asserted to be true, if ultimately confirmed by a complete induction." — *Ibid.*, p. 364.

"When a phenomenon is presented which can be explained by no principle afforded through experience, we feel discontented and uneasy; and there arises an effort to discover some cause which may, at least provisionally, account for the outstanding phenomenon; and this cause is finally recognized as valid and true, if, through it, the given phenomenon is found to obtain a full and perfect explanation. The judgment in which a phenomenon is referred to such a problematic cause, is called a *Hypothesis*." — *Ibid.*, pp. 449, 450. See also *Lectures on Metaphysics*, p. 117.

J. S. Mill. — "An hypothesis is any supposition which we make (either without actual evidence, or on evidence avowedly insufficient), in order to endeavor to deduce from it conclusions in accordance with facts which are known to be real; under the idea that if the conclusions to which the hypothesis leads are known truths, the hypothesis itself either must be, or at least is likely to be true." — *Logic* (6th Ed.), vol. 2, p. 8. [Book III, ch. XIV, §4.]

Kant. — "*If all the consequents of a cognition are true, the cognition itself is true. . . . It is allowable, therefore, to conclude from consequent to a reason, but without being able to determine this reason. From the complexus of all consequents alone can we conclude the truth of a determinate reason. . . . The difficulty with this positive and direct mode of inference (modus ponens) is that the totality of the consequents cannot be apodeictically recognized, and that we are therefore led by this mode of inference only to a probable and hypothetically true cognition (Hypotheses).*" — *Logik* by Jäsche; *Werke*, Ed. Rosenk. and Sch., vol. 3, p. 221.

"A hypothesis is the judgment of the truth of a reason on account of the sufficiency of the consequents." — *Ibid.*, p. 262.

Herbart. — "We can make hypotheses, thence deduce consequents, and afterwards see whether the latter accord with experience. Such suppositions are termed hypotheses." — *Einleitung; Werke*, vol. 1, p. 53.

Beneke. — "Affirmative inferences from consequent to antecedent, or hypotheses." — *System der Logik*, vol. 2, p. 103.

There would be no difficulty in greatly multiplying these citations.

* See *J. S. Mill, Logic*, bk. II, ch. 3, § 3.

tion and hypothesis, being analyzable either into a deduction or an induction, or a deduction and a hypothesis.*

278. But though inference is thus of three essentially different species, it also belongs to one genus. We have seen that no conclusion can be legitimately derived which could not have been reached by successions of arguments having two premisses each, and implying no fact not asserted.

279. Either of these premisses is a proposition asserting that certain objects have certain characters. Every term of such a proposition stands either for certain objects or for certain characters. The conclusion may be regarded as a proposition substituted in place of either premiss, the substitution being justified by the fact stated in the other premiss. The conclusion is accordingly derived from either premiss by substituting either a new subject for the subject of the premiss, or a new predicate for the predicate of the premiss, or by both substitutions. Now the substitution of one term for another can be justified only so far as the term substituted represents only what is represented in the term replaced. If, therefore, the conclusion be denoted by the formula,

S is P;

and this conclusion be derived, by a change of subject, from a premiss which may on this account be expressed by the formula,

M is P,

then the other premiss must assert that whatever thing is represented by S is represented by M, or that

Every S is an M;

while, if the conclusion, S is P, is derived from either premiss by a change of predicate, that premiss may be written

S is M;

and the other premiss must assert that whatever characters are implied in P are implied in M, or that

Whatever is M is P.

In either case, therefore, the syllogism must be capable of expression in the form,

S is M; M is P:

∴ S is P.

* See 2.513.

Finally, if the conclusion differs from either of its premisses, both in subject and predicate, the form of statement of conclusion and premiss may be so altered that they shall have a common term. This can always be done, for if P is the premiss and C the conclusion, they may be stated thus:

The state of things represented in P is real, and

The state of things represented in C is real.

In this case the other premiss must in some form virtually assert that every state of things such as is represented by C is the state of things represented in P.

All valid reasoning, therefore, is of one general form; and in seeking to reduce all mental action to the formulæ of valid inference, we seek to reduce it to one single type.

280. An apparent obstacle to the reduction of all mental action to the type of valid inferences is the existence of fallacious reasoning. Every argument implies the truth of a general principle of inferential procedure (whether involving some matter of fact concerning the subject of argument, or merely a maxim relating to a system of signs), according to which it is a valid argument. If this principle is false, the argument is a fallacy; but neither a valid argument from false premisses, nor an exceedingly weak, but not altogether illegitimate, induction or hypothesis, however its force may be over-estimated, however false its conclusion, is a fallacy.

281. Now words, taken just as they stand, if in the form of an argument, thereby do imply whatever fact may be necessary to make the argument conclusive; so that to the formal logician, who has to do only with the meaning of the words according to the proper principles of interpretation, and not with the intention of the speaker as guessed at from other indications, the only fallacies should be such as are simply absurd and contradictory, either because their conclusions are absolutely inconsistent with their premisses, or because they connect propositions by a species of illative conjunction, by which they cannot under any circumstances be validly connected.

282. But to the psychologist an argument is valid only if the premisses from which the mental conclusion is derived would be sufficient, if true, to justify it, either by themselves, or by the aid of other propositions which had previously been held for true. But it is easy to show that all inferences made by

man, which are not valid in this sense, belong to four classes, viz.: 1. Those whose premisses are false; 2. Those which have some little force, though only a little; 3. Those which result from confusion of one proposition with another; 4. Those which result from the indistinct apprehension, wrong application, or falsity, of a rule of inference. For, if a man were to commit a fallacy not of either of these classes, he would, from true premisses conceived with perfect distinctness, without being led astray by any prejudice or other judgment serving as a rule of inference, draw a conclusion which had really not the least relevancy. If this could happen, calm consideration and care could be of little use in thinking, for caution only serves to insure our taking all the facts into account, and to make those which we do take account of, distinct; nor can coolness do anything more than to enable us to be cautious, and also to prevent our being affected by a passion in inferring that to be true which we wish were true, or which we fear may be true, or in following some other wrong rule of inference. But experience shows that the calm and careful consideration of the same distinctly conceived premisses (including prejudices) will insure the pronouncement of the same judgment by all men. Now if a fallacy belongs to the first of these four classes and its premisses are false, it is to be presumed that the procedure of the mind from these premisses to the conclusion is either correct, or errs in one of the other three ways; for it cannot be supposed that the mere falsity of the premisses should affect the procedure of reason when that falsity is not known to reason. If the fallacy belongs to the second class and has some force, however little, it is a legitimate probable argument, and belongs to the type of valid inference. If it is of the third class and results from the confusion of one proposition with another, this confusion must be owing to a resemblance between the two propositions; that is to say, the person reasoning, seeing that one proposition has some of the characters which belong to the other, concludes that it has all the essential characters of the other, and is equivalent to it. Now this is a hypothetic inference, which though it may be weak, and though its conclusion happens to be false, belongs to the type of valid inferences; and, therefore, as the *nodus* of the fallacy lies in this confusion, the procedure of the mind in these fallacies of the

third class conforms to the formula of valid inference. If the fallacy belongs to the fourth class, it either results from wrongly applying or misapprehending a rule of inference, and so is a fallacy of confusion, or it results from adopting a wrong rule of inference. In this latter case, this rule is in fact taken as a premiss, and therefore the false conclusion is owing merely to the falsity of a premiss. In every fallacy, therefore, possible to the mind of man, the procedure of the mind conforms to the formula of valid inference.

§3. THOUGHT-SIGNS^E

283. The third principle whose consequences we have to deduce is, that, whenever we think, we have present to the consciousness some feeling, image, conception, or other representation, which serves as a sign. But it follows from our own existence (which is proved by the occurrence of ignorance and error*) that everything which is present to us is a phenomenal manifestation of ourselves. This does not prevent its being a phenomenon of something without us, just as a rainbow is at once a manifestation both of the sun and of the rain. When we think, then, we ourselves, as we are at that moment, appear as a sign. Now a sign has, as such, three references: first, it is a sign *to* some thought which interprets it; second, it is a sign *for* some object to which in that thought it is equivalent; third, it is a sign, *in* some respect or quality, which brings it into connection with its object. Let us ask what the three correlates are to which a thought-sign refers.

284. (1) When we think, to what thought does that thought-sign which is ourself address itself? It may, through the medium of outward expression, which it reaches perhaps only after considerable internal development, come to address itself to thought of another person. But whether this happens or not, it is always interpreted by a subsequent thought of our own. If, after any thought, the current of ideas flows on freely, it follows the law of mental association. In that case, each former thought suggests something to the thought which follows it, i.e., is the sign of something to this latter. Our train of thought may, it is true, be interrupted. But we must remem-

* See 233f.

ber that, in addition to the principal element of thought at any moment, there are a hundred things in our mind to which but a small fraction of attention or consciousness is conceded. It does not, therefore, follow, because a new constituent of thought gets the uppermost that the train of thought which it displaces is broken off altogether. On the contrary, from our second principle, that there is no intuition or cognition not determined by previous cognitions, it follows that the striking in of a new experience is never an instantaneous affair, but is an *event* occupying time, and coming to pass by a continuous process. Its prominence in consciousness, therefore must probably be the consummation of a growing process; and if so, there is no sufficient cause for the thought which had been the leading one just before, to cease abruptly and instantaneously. But if a train of thought ceases by gradually dying out, it freely follows its own law of association as long as it lasts, and there is no moment at which there is a thought belonging to this series, subsequently to which there is not a thought which interprets or repeats it. There is no exception, therefore, to the law that every thought-sign is translated or interpreted in a subsequent one, unless it be that all thought comes to an abrupt and final end in death.

285. (2) The next question is: For what does the thought-sign stand — what does it name — what is its *suppositum*? The outward thing, undoubtedly, when a real outward thing is thought of. But still, as the thought is determined by a previous thought of the same object, it only refers to the thing through denoting this previous thought. Let us suppose, for example, that Toussaint is thought of, and first thought of as a *negro*, but not distinctly as a man. If this distinctness is afterwards added, it is through the thought that a *negro* is a *man*; that is to say, the subsequent thought, *man*, refers to the outward thing by being predicated of that previous thought, *negro*, which has been had of that thing. If we afterwards think of Toussaint as a general, then we think that this negro, this man, was a general. And so in every case the subsequent thought denotes what was thought in the previous thought.

286. (3) The thought-sign stands for its object in the respect which is thought; that is to say, this respect is the immediate object of consciousness in the thought, or, in other

words, it is the thought itself, or at least what the thought is thought to be in the subsequent thought to which it is a sign.

287. We must now consider two other properties of signs which are of great importance in the theory of cognition. Since a sign is not identical with the thing signified, but differs from the latter in some respects, it must plainly have some characters which belong to it in itself, and have nothing to do with its representative function. These I call the *material* qualities of the sign. As examples of such qualities, take in the word "man," its consisting of three letters — in a picture, its being flat and without relief. In the second place, a sign must be capable of being connected (not in the reason but really) with another sign of the same object, or with the object itself. Thus, words would be of no value at all unless they could be connected into sentences by means of a real copula which joins signs of the same thing. The usefulness of some signs — as a weathercock, a tally, etc.— consists wholly in their being really connected with the very things they signify. In the case of a picture such a connection is not evident, but it exists in the power of association which connects the picture with the brain-sign which labels it. This real, physical connection of a sign with its object, either immediately or by its connection with another sign, I call the *pure demonstrative application* of the sign. Now the representative function of a sign lies neither in its material quality nor in its pure demonstrative application; because it is something which the sign is, not in itself or in a real relation to its object, but which it is *to a thought*, while both of the characters just defined belong to the sign independently of its addressing any thought. And yet if I take all the things which have certain qualities and physically connect them with another series of things, each to each, they become fit to be signs. If they are not regarded as such they are not actually signs, but they are so in the same sense, for example, in which an unseen flower can be said to be *red*, this being also a term relative to a mental affection.

288. Consider a state of mind which is a conception. It is a conception by virtue of having a *meaning*, a logical comprehension; and if it is applicable to any object, it is because that object has the characters contained in the comprehension of this conception. Now the logical comprehension of a thought

is usually said to consist of the thoughts contained in it; but thoughts are events, acts of the mind. Two thoughts are two events separated in time, and one cannot literally be contained in the other. It may be said that all thoughts exactly similar are regarded as one; and that to say that one thought contains another, means that it contains one exactly similar to that other. But how can two thoughts be similar? Two objects can only be *regarded* as similar if they are compared and brought together in the mind. Thoughts have no existence except in the mind; only as they are regarded do they exist. Hence, two thoughts cannot *be* similar unless they are brought together in the mind. But, as to their existence, two thoughts are separated by an interval of time. We are too apt to imagine that we can frame a thought similar to a past thought, by matching it with the latter, as though this past thought were still present to us. But it is plain that the knowledge that one thought is similar to or in any way truly representative of another, cannot be derived from immediate perception, but must be an hypothesis (unquestionably fully justifiable by facts), and that therefore the formation of such a representing thought must be dependent upon a real effective force behind consciousness, and not merely upon a mental comparison. What we must mean, therefore, by saying that one concept is contained in another, is that we normally represent one to be in the other; that is, that we form a particular kind of judgment,¹ of which the subject signifies one concept and the predicate the other.

289. No thought in itself, then, no feeling in itself, contains any others, but is absolutely simple and unanalyzable; and to say that it is composed of other thoughts and feelings, is like saying that a movement upon a straight line is composed of the two movements of which it is the resultant; that is to say, it is a metaphor, or fiction, parallel to the truth. Every thought, however artificial and complex, is, so far as it is immediately present, a mere sensation without parts, and therefore, in itself, without similarity to any other, but incomparable with any other and absolutely *sui generis*.² Whatever

¹ A judgment concerning a minimum of information, for the theory of which see my paper on Comprehension and Extension [2.409ff].

² Observe that I say *in itself*. I am not so wild as to deny that my sensation

is wholly incomparable with anything else is wholly inexplicable, because explanation consists in bringing things under general laws or under natural classes. Hence every thought, in so far as it is a feeling of a peculiar sort, is simply an ultimate, inexplicable fact. Yet this does not conflict with my postulate that that fact should be allowed to stand as inexplicable; for, on the one hand, we never can think, "This is present to me," since, before we have time to make the reflection, the sensation is past, and, on the other hand, when once past, we can never bring back the quality of the feeling as it was *in and for itself*, or know what it was like *in itself*, or even discover the existence of this quality except by a corollary from our general theory of ourselves, and then not in its idiosyncrasy, but only as something present. But, as something present, feelings are all alike and require no explanation, since they contain only what is universal. So that nothing which we can truly predicate of feelings is left inexplicable, but only something which we cannot reflectively know. So that we do not fall into the contradiction of making the Mediate immediable. Finally, no present actual thought (which is a mere feeling) has any meaning, any intellectual value; for this lies not in what is actually thought, but in what this thought may be connected with in representation by subsequent thoughts; so that the meaning of a thought is altogether something virtual.* It may be objected, that if no thought has any meaning, all thought is without meaning. But this is a fallacy similar to saying, that, if in no one of the successive spaces which a body fills there is room for motion, there is no room for motion throughout the whole. At no one instant in my state of mind is there cognition or representation, but in the relation of my states of mind at different instants there is.¹ In short, the Immediate (and therefore in itself unsusceptible of mediation — the Unanalyzable, the Inexplicable, the Unintellectual)

of red today is like my sensation of red yesterday. I only say that the similarity can *consist* only in the physiological force behind consciousness — which leads me to say, I recognize this feeling the same as the former one, and so does not consist in a community of sensation. [Cf. 1.313, 1.383, 1.388; 3.419, 4.157.]

* See 504n.

¹ Accordingly, just as we say that a body is in motion, and not that motion is in a body we ought to say that we are in thought and not that thoughts are in us.

runs in a continuous stream through our lives; it is the sum total of consciousness, whose mediation, which is the continuity of it, is brought about by a real effective force behind consciousness.

290. Thus, we have in thought three elements: first, the representative function which makes it a *representation*; second, the pure denotative application, or real connection, which brings one thought into *relation* with another; and third, the material quality, or how it feels, which gives thought its *quality*.¹

291. That a sensation is not necessarily an intuition, or first impression of sense, is very evident in the case of the sense of beauty; and has been shown [in 222], in the case of sound. When the sensation beautiful is determined by previous cognitions, it always arises as a predicate; that is, we think that something is beautiful. Whenever a sensation thus arises in consequence of others, induction shows that those others are more or less complicated. Thus, the sensation of a particular kind of sound arises in consequence of impressions upon the various nerves of the ear being combined in a particular way, and following one another with a certain rapidity. A sensation of color depends upon impressions upon the eye following one another in a regular manner, and with a certain rapidity. The sensation of beauty arises upon a manifold of other impressions. And this will be found to hold good in all cases. Secondly, all these sensations are in themselves simple, or more so than the sensations which give rise to them. Accordingly, a sensation is a simple predicate taken in place of a complex predicate; in other words, it fulfills the function of an hypothesis. But the general principle that every thing to which such and such a sensation belongs, has such and such a complicated series of predicates, is not one determined by reason (as we have seen), but is of an arbitrary nature. Hence, the class of hypothetic inferences which the arising of a sensation resembles, is that of reasoning from definition to definitum, in which the major premiss is of an arbitrary nature. Only in this mode of reasoning, this premiss is determined by the conventions of language, and expresses the occasion upon which a word is to be used; and in the formation of a sensa-

¹ On quality, relation, and representation, see 1.553f.

tion, it is determined by the constitution of our nature, and expresses the occasions upon which sensation, or a natural mental sign, arises. Thus, the sensation, so far as it represents something, is determined, according to a logical law, by previous cognitions; that is to say, these cognitions determine that there shall be a sensation. But so far as the sensation is a mere feeling of a particular sort, it is determined only by an inexplicable, occult power; and so far, it is not a representation, but only the material quality of a representation. For just as in reasoning from definition to definitum, it is indifferent to the logician how the defined word shall sound, or how many letters it shall contain, so in the case of this constitutional word, it is not determined by an inward law how it shall feel in itself. A feeling, therefore, as a feeling, is merely the *material quality* of a mental sign.

292. But there is no feeling which is not also a representation, a predicate of something determined logically by the feelings which precede it. For if there are any such feelings not predicates, they are the emotions. Now every emotion has a subject. If a man is angry, he is saying to himself that this or that is vile and outrageous. If he is in joy, he is saying "this is delicious." If he is wondering, he is saying "this is strange." In short, whenever a man feels, he is thinking of *something*. Even those passions which have no definite object — as melancholy — only come to consciousness through tingling the *objects of thought*. That which makes us look upon the emotions more as affections of self than other cognitions, is that we have found them more dependent upon our accidental situation at the moment than other cognitions; but that is only to say that they are cognitions too narrow to be useful. The emotions, as a little observation will show, arise when our attention is strongly drawn to complex and inconceivable circumstances. Fear arises when we cannot predict our fate; joy, in the case of certain indescribable and peculiarly complex sensations. If there are some indications that something greatly for my interest, and which I have anticipated would happen, may not happen; and if, after weighing probabilities, and inventing safeguards, and straining for further information, I find myself unable to come to any fixed conclusion in reference to the future, in the place of that intellectual hypo-

thetic inference which I seek, the feeling of *anxiety* arises. When something happens for which I cannot account, I *wonder*. When I endeavor to realize to myself what I never can do, a pleasure in the future, I *hope*. "I do not understand you," is the phrase of an angry man. The indescribable, the ineffable, the incomprehensible, commonly excite emotion; but nothing is so chilling as a scientific explanation. Thus an emotion is always a simple predicate substituted by an operation of the mind for a highly complicated predicate.* Now if we consider that a very complex predicate demands explanation by means of an hypothesis, that that hypothesis must be a simpler predicate substituted for that complex one; and that when we have an emotion, an hypothesis, strictly speaking, is hardly possible — the analogy of the parts played by emotion and hypothesis is very striking. There is, it is true, this difference between an emotion and an intellectual hypothesis, that we have reason to say in the case of the latter, that to whatever the simple hypothetic predicate can be applied, of that the complex predicate is true; whereas, in the case of an emotion this is a proposition for which no reason can be given, but which is determined merely by our emotional constitution. But this corresponds precisely to the difference between hypothesis and reasoning from definition to definitum, and thus it would appear that emotion is nothing but sensation. There appears to be a difference, however, between emotion and sensation, and I would state it as follows:

293. There is some reason to think that, corresponding to every feeling within us, some motion takes place in our bodies. This property of the thought-sign, since it has no rational dependence upon the meaning of the sign, may be compared with what I have called the material quality of the sign; but it differs from the latter inasmuch as it is not essentially necessary that it should be felt in order that there should be any thought-sign. In the case of a sensation, the manifold of impressions which precede and determine it are not of a kind, the bodily motion corresponding to which comes from any large ganglion or from the brain, and probably for this reason the sensation produces no great commotion in the bodily organism; and the sensation itself is not a thought which has

* Cf. 2.643.

a very strong influence upon the current of thought except by virtue of the information it may serve to afford. An emotion, on the other hand, comes much later in the development of thought — I mean, further from the first beginning of the cognition of its object — and the thoughts which determine it already have motions corresponding to them in the brain, or the chief ganglion; consequently, it produces large movements in the body, and independently of its representative value, strongly affects the current of thought. The animal motions to which I allude, are, in the first place and obviously, blushing, blenching, staring, smiling, scowling, pouting, laughing, weeping, sobbing, wriggling, flinching, trembling, being petrified, sighing, sniffing, shrugging, groaning, heartsinking, trepidation, swelling of the heart, etc., etc. To these may, perhaps, be added, in the second place, other more complicated actions, which nevertheless spring from a direct impulse and not from deliberation.

294. That which distinguishes both sensations proper and emotions from the feeling of a thought, is that in the case of the two former the material quality is made prominent, because the thought has no relation of reason to the thoughts which determine it, which exists in the last case and detracts from the attention given to the mere feeling. By there being no relation of reason to the determining thoughts, I mean that there is nothing in the content of the thought which explains why it should arise only on occasion of these determining thoughts. If there is such a relation of reason, if the thought is essentially limited in its application to these objects, then the thought comprehends a thought other than itself; in other words, it is then a complex thought. An incomplex thought can, therefore, be nothing but a sensation or emotion, having no rational character. This is very different from the ordinary doctrine, according to which the very highest and most metaphysical conceptions are absolutely simple. I shall be asked how such a conception of a *being* is to be analyzed, or whether I can ever define *one*, *two*, and *three*, without a diallelon. Now I shall admit at once that neither of these conceptions can be separated into two others higher than itself; and in that sense, therefore, I fully admit that certain very metaphysical and eminently intellectual notions are absolutely simple. But

though these concepts cannot be defined by genus and difference, there is another way in which they can be defined. All determination is by negation; we can first recognize any character only by putting an object which possesses it into comparison with an object which possesses it not. A conception, therefore, which was quite universal in every respect would be unrecognizable and impossible. We do not obtain the conception of Being, in the sense implied in the copula, by observing that all the things which we can think of have something in common, for there is no such thing to be observed. We get it by reflecting upon signs — words or thoughts; we observe that different predicates may be attached to the same subject, and that each makes some conception applicable to the subject; then we imagine that a subject has something true of it merely because a predicate (no matter what) is attached to it — and that we call Being. The conception of being is, therefore, a conception about a sign — a thought, or word; and since it is not applicable to every sign, it is not primarily universal, although it is so in its mediate application to things. Being, therefore, may be defined; it may be defined, for example, as that which is common to the objects included in any class, and to the objects not included in the same class.* But it is nothing new to say that metaphysical conceptions are primarily and at bottom thoughts about words, or thoughts about thoughts; it is the doctrine both of Aristotle (whose categories are parts of speech) and of Kant (whose categories are the characters of different kinds of propositions).

295. Sensation and the power of abstraction or attention may be regarded as, in one sense, the sole constituents of all thought. Having considered the former, let us now attempt some analysis of the latter. By the force of attention, an emphasis is put upon one of the objective elements of consciousness. This emphasis is, therefore, not itself an object of immediate consciousness; and in this respect it differs entirely from a feeling. Therefore, since the emphasis, nevertheless, consists in some effect upon consciousness, and so can exist only so far as it affects our knowledge; and since an act cannot be supposed to determine that which precedes it in time, this act can consist only in the capacity which the cognition

* Cf. 1.550ff; 3.7, 3.44.

emphasized has for producing an effect upon memory, or otherwise influencing subsequent thought. This is confirmed by the fact that attention is a matter of continuous quantity; for continuous quantity, so far as we know it, reduces itself in the last analysis to time. Accordingly, we find that attention does, in fact, produce a very great effect upon subsequent thought. In the first place, it strongly affects memory, a thought being remembered for a longer time the greater the attention originally paid to it. In the second place, the greater the attention, the closer the connection and the more accurate the logical sequence of thought. In the third place, by attention a thought may be recovered which has been forgotten. From these facts, we gather that attention is the power by which thought at one time is connected with and made to relate to thought at another time; or, to apply the conception of thought as a sign, that it is the *pure demonstrative application* of a thought-sign.

296. Attention is roused when the same phenomenon presents itself repeatedly on different occasions, or the same predicate in different subjects. We see that A has a certain character, that B has the same, C has the same; and this excites our attention, so that we say, "*These* have this character." Thus attention is an act of induction; but it is an induction which does not increase our knowledge, because our "*these*" covers nothing but the instances experienced. It is, in short, an argument from enumeration.

297. Attention produces effects upon the nervous system. These effects are habits, or nervous associations.* A habit arises, when, having had the sensation of performing a certain act, *m*, on several occasions *a*, *b*, *c*, we come to do it upon every occurrence of the general event, *l*, of which *a*, *b* and *c* are special cases. That is to say, by the cognition that

Every case of *a*, *b*, or *c*, is a case of *m*, is determined the cognition that

Every case of *l* is a case of *m*.

Thus the formation of a habit is an induction, and is therefore necessarily connected with attention or abstraction. Voluntary actions result from the sensations produced by habits, as instinctive actions result from our original nature.

298. We have thus seen that every sort of modification of

* Cf. 372ff, 394ff, 1.351, 1.390ff, 2.711, 3.155ff.

consciousness — Attention, Sensation, and Understanding — is an inference. But the objection may be made that inference deals only with general terms, and that an image, or absolutely singular representation, cannot therefore be inferred.

299. “Singular” and “individual” are equivocal terms.* A singular may mean that which can be but in one place at one time. In this sense it is not opposed to general. *The sun* is a singular in this sense, but, as is explained in every good treatise on logic, it is a general term. I may have a very general conception of Hermolaus Barbarus, but still I conceive him only as able to be in one place at one time. When an image is said to be singular, it is meant that it is absolutely determinate in all respects. Every possible character, or the negative thereof, must be true of such an image. In the words of the most eminent expounder of the doctrine, the image of a man “must be either of a white, or a black, or a tawny; a straight or a crooked; a tall, or a low, or a middle-sized man.”† It must be of a man with his mouth open or his mouth shut, whose hair is precisely of such and such a shade, and whose figure has precisely such and such proportions. No statement of Locke has been so scouted by all friends of images as his denial that the “idea” of a triangle must be either of an obtuse-angled, right-angled, or acute-angled triangle. In fact, the image of a triangle must be of one, each of whose angles is of a certain number of degrees, minutes, and seconds.

300. This being so, it is apparent that no man has a *true* image of the road to his office, or of any other real thing. Indeed he has no image of it at all unless he can not only recognize it, but imagines it (truly or falsely) in all its infinite details. This being the case, it becomes very doubtful whether we ever have any such thing as an image in our imagination. Please, reader, to look at a bright red book, or other brightly colored object, and then to shut your eyes and say whether you *see* that color, whether brightly or faintly— whether, indeed, there is anything like sight there. Hume and the other followers of Berkeley maintain that there is no difference between the sight and the memory of the red book except in “their different degrees of force and vivacity.” “The colors which the memory

* Cf. 3.93.

† Berkeley, *Principles of Human Knowledge*, §10 of the Introduction.

employs," says Hume, "are faint and dull compared with those in which our original perceptions are clothed."* If this were a correct statement of the difference, we should remember the book as being less red than it is; whereas, in fact, we remember the color with very great precision for a few moments (please to test this point, reader), although we do not see anything like it. We carry away absolutely nothing of the color except the *consciousness that we could recognize it*. As a further proof of this, I will request the reader to try a little experiment. Let him call up, if he can, the image of a horse — not of one which he has ever seen, but of an imaginary one — and before reading further let him by contemplation¹ fix the image in his memory . . . [sic]. Has the reader done as requested? for I protest that it is not fair play to read further without doing so.—— Now, the reader can say in general of what color that horse was, whether grey, bay, or black. But he probably cannot say *precisely* of what shade it was. He cannot state this as exactly as he could just after having *seen* such a horse. But why, if he

* Cf. his *Treatise of Human Nature*, Pt. I, § 3 and Pt. III, § 5.

¹ No person whose native tongue is English will need to be informed that contemplation is essentially (1) protracted, (2) voluntary, and (3) an action, and that it is never used for that which is set forth to the mind in this act. A foreigner can convince himself of this by the proper study of English writers. Thus, Locke (*Essay concerning Human Understanding*, Book II, chap. 19, § 1) says, "If it [an idea] be held there [in view] long under attentive consideration, 'tis *Contemplation*;" and again (*ibid.*, Book II, chap. 10, § 1) "keeping the *Idea* which is brought into it [the mind] for some time actually in view, which is called *Contemplation*." This term is therefore unfitted to translate *Anschauung*; for this latter does not imply an act which is necessarily protracted or voluntary, and denotes most usually a mental presentation, sometimes a faculty, less often the reception of an impression in the mind, and seldom, if ever, an action. To the translation of *Anschauung* by intuition, there is, at least, no such insufferable objection. Etymologically, the two words precisely correspond. The original philosophical meaning of intuition was a cognition of the present manifold in that character; and it is now commonly used, as a modern writer says, "to include all the products of the perceptive (external or internal) and imaginative faculties; every act of consciousness, in short, of which the immediate object is an *individual*, thing, act, or state of mind, presented under the condition of distinct existence in space and time." Finally, we have the authority of Kant's own example for translating his *Anschauung* by *Intuitus*; and indeed this is the common usage of Germans writing Latin. Moreover, *intuitiv* frequently replaces *anschauend* or *anschaulich*. If this constitutes a misunderstanding of Kant, it is one which is shared by himself and nearly all his countrymen. [See an anonymous comment on this note in the *Journal of Speculative Philosophy*, vol. II, p. 191.]

had an image in his mind which no more had the general color than it had the particular shade, has the latter vanished so instantaneously from his memory while the former still remains? It may be replied, that we always forget the details before we do the more general characters; but that this answer is insufficient is, I think, shown by the extreme disproportion between the length of time that the exact shade of something looked at is remembered as compared with that instantaneous oblivion to the exact shade of the thing imagined, and the but slightly superior vividness of the memory of the thing seen as compared with the memory of the thing imagined.

301. The nominalists, I suspect, confound together thinking a triangle without thinking that it is either equilateral, isosceles, or scalene, and thinking a triangle without thinking whether it is equilateral, isosceles, or scalene.

302. It is important to remember that we have no intuitive power of distinguishing between one subjective mode of cognition and another;* and hence often think that something is presented to us as a picture, while it is really constructed from slight data by the understanding. This is the case with dreams, as is shown by the frequent impossibility of giving an intelligible account of one without adding something which we feel was not in the dream itself. Many dreams, of which the waking memory makes elaborate and consistent stories, must probably have been in fact mere jumbles of these feelings of the ability to recognize this and that which I have just alluded to.

303. I will now go so far as to say that we have no images even in actual perception. It will be sufficient to prove this in the case of vision; for if no picture is seen when we look at an object, it will not be claimed that hearing, touch, and the other senses, are superior to sight in this respect. That the picture is not painted on the nerves of the retina is absolutely certain, if, as physiologists inform us, these nerves are needle-points pointing to the light and at distances considerably greater than the *minimum visibile*. The same thing is shown by our not being able to perceive that there is a large blind spot near the middle of the retina. If, then, we have a picture before us when we see, it is one constructed by the mind at the suggestion of previous sensations. Supposing these sensations

* See 238ff.

to be signs, the understanding by reasoning from them could attain all the knowledge of outward things which we derive from sight, while the sensations are quite inadequate to forming an image or representation absolutely determinate. If we have such an image or picture, we must have in our minds a representation of a surface which is only a part of every surface we see, and we must see that each part, however small, has such and such a color. If we look from some distance at a speckled surface, it seems as if we did not see whether it were speckled or not; but if we have an image before us, it must appear to us either as speckled, or as not speckled. Again, the eye by education comes to distinguish minute differences of color; but if we see only absolutely determinate images, we must, no less before our eyes are trained than afterwards, see each color as particularly such and such a shade. Thus to suppose that we have an image before us when we see, is not only a hypothesis which explains nothing whatever, but is one which actually creates difficulties which require new hypotheses in order to explain them away.

304. One of these difficulties arises from the fact that the details are less easily distinguished than, and forgotten before, the general circumstances. Upon this theory, the general features exist in the details: the details are, in fact, the whole picture. It seems, then, very strange that that which exists only secondarily in the picture should make more impression than the picture itself. It is true that in an old painting the details are not easily made out; but this is because we know that the blackness is the result of time, and is no part of the picture itself. There is no difficulty in making out the details of the picture as it looks at present; the only difficulty is in guessing what it used to be. But if we have a picture on the retina, the minutest details are there as much as, nay, more than, the general outline and significancy of it. Yet that which must actually be seen, it is extremely difficult to recognize; while that which is only abstracted from what is seen is very obvious.

305. But the conclusive argument against our having any images, or absolutely determinate representations in perception, is that in that case we have the materials in each such representation for an infinite amount of conscious cognition,

which we yet never become aware of. Now there is no meaning in saying that we have something in our minds which never has the least effect on what we are conscious of knowing. The most that can be said is, that when we see we are put in a condition in which we are able to get a very large and perhaps indefinitely great amount of knowledge of the visible qualities of objects.

306. Moreover, that perceptions are not absolutely determinate and singular is obvious from the fact that each sense is an abstracting mechanism. Sight by itself informs us only of colors and forms. No one can pretend that the images of sight are determinate in reference to taste. They are, therefore, so far general that they are neither sweet nor non-sweet, bitter nor non-bitter, having savor nor insipid.

307. The next question is whether we have any general conceptions except in judgments. In perception, where we know a thing as existing, it is plain that there is a judgment that the thing exists, since a mere general concept of a thing is in no case a cognition of it as existing. It has usually been said, however, that we can call up any concept without making any judgment; but it seems that in this case we only arbitrarily suppose ourselves to have an experience. In order to conceive the number 7, I suppose, that is, I arbitrarily make the hypothesis or judgment, that there are certain points before my eyes, and I judge that these are seven. This seems to be the most simple and rational view of the matter, and I may add that it is the one which has been adopted by the best logicians. If this be the case, what goes by the name of the association of images is in reality an association of judgments. The association of ideas is said to proceed according to three principles — those of resemblance, of contiguity, and of causality. But it would be equally true to say that signs denote what they do on the three principles of resemblance, contiguity, and causality. There can be no question that anything *is* a sign of whatever is associated with it by resemblance, by contiguity, or by causality: nor can there be any doubt that any sign recalls the thing signified. So, then, the association of ideas consists in this, that a judgment occasions another judgment, of which it is the sign. Now this is nothing less nor more than inference.

308. Everything in which we take the least interest creates

in us its own particular emotion, however slight this may be. This emotion is a sign and a predicate of the thing. Now, when a thing resembling this thing is presented to us, a similar emotion arises; hence, we immediately infer that the latter is like the former. A formal logician of the old school may say, that in logic no term can enter into the conclusion which had not been contained in the premisses, and that therefore the suggestion of something new must be essentially different from inference. But I reply that that rule of logic applies only to those arguments which are technically called completed. We can and do reason —

Elias was a man;
∴ He was mortal.

And this argument is just as valid as the full syllogism, although it is so only because the major premiss of the latter happens to be true. If to pass from the judgment “Elias was a man” to the judgment “Elias was mortal,” without actually saying to one’s self that “All men are mortal,” is not inference, then the term “inference” is used in so restricted a sense that inferences hardly occur outside of a logic-book.

309. What is here said of association by resemblance is true of all association. All association is by signs. Everything has its subjective or emotional qualities, which are attributed either absolutely or relatively, or by conventional imputation to anything which is a sign of it. And so we reason,

The sign is such and such;
∴ The sign is that thing.

This conclusion receiving, however, a modification, owing to other considerations, so as to become —

The sign is almost (is representative of) that thing.

§5. MAN, A SIGN^E

310. We come now to the consideration of the last of the four principles whose consequences we were to trace; namely, that the absolutely incognizable is absolutely inconceivable. That upon Cartesian principles the very realities of things can never be known in the least, most competent persons must

long ago have been convinced. Hence the breaking forth of idealism, which is essentially anti-Cartesian, in every direction, whether among empiricists (Berkeley, Hume), or among no-ologists (Hegel, Fichte). The principle now brought under discussion is directly idealistic; for, since the meaning of a word is the conception it conveys, the absolutely incognizable has no meaning because no conception attaches to it. It is, therefore, a meaningless word; and, consequently, whatever is meant by any term as "the real" is cognizable in some degree, and so is of the nature of a cognition, in the objective sense of that term.

311. At any moment we are in possession of certain information, that is, of cognitions which have been logically derived by induction and hypothesis from previous cognitions which are less general, less distinct, and of which we have a less lively consciousness. These in their turn have been derived from others still less general, less distinct, and less vivid; and so on back to the ideal¹ first, which is quite singular, and quite out of consciousness. This ideal first is the particular thing-in-itself. It does not exist *as such*. That is, there is no thing which is in-itself in the sense of not being relative to the mind, though things which are relative to the mind doubtless are, apart from that relation. The cognitions which thus reach us by this infinite series of inductions and hypotheses (which though infinite *a parte ante logice*, is yet as one continuous process not without a beginning *in time*) are of two kinds, the true and the untrue, or cognitions whose objects are *real* and those whose objects are *unreal*. And what do we mean by the real? It is a conception which we must first have had when we discovered that there was an unreal, an illusion; that is, when we first corrected ourselves. Now the distinction for which alone this fact logically called, was between an *ens* relative to private inward determinations, to the negations belonging to idiosyncrasy, and an *ens* such as would stand in the long run. The real, then, is that which, sooner or later, information and reasoning would finally result in, and which is therefore independent of the vagaries of me and you. Thus, the very origin of the conception of reality shows that this conception essentially involves the notion of a COMMUNITY, without defi-

¹ By an ideal, I mean the limit which the possible cannot attain.

nite limits, and capable of a definite increase of knowledge.* And so those two series of cognition — the real and the unreal — consist of those which, at a time sufficiently future, the community will always continue to re-affirm; and of those which, under the same conditions, will ever after be denied. Now, a proposition whose falsity can never be discovered, and the error of which therefore is absolutely incognizable, contains, upon our principle, absolutely no error. Consequently, that which is thought in these cognitions is the real, as it really is. There is nothing, then, to prevent our knowing outward things as they really are, and it is most likely that we do thus know them in numberless cases, although we can never be absolutely certain of doing so in any special case.

312. But it follows that since no cognition of ours is absolutely determinate, generals must have a real existence. Now this scholastic realism is usually set down as a belief in metaphysical fictions. But, in fact, a realist is simply one who knows no more recondite reality than that which is represented in a true representation. Since, therefore, the word "man" is true of something, that which "man" means is real. The nominalist must admit that man is truly applicable to something; but he believes that there is beneath this a thing in itself, an incognizable reality. His is the metaphysical figment. Modern nominalists are mostly superficial men, who do not know, as the more thorough Roscellinus and Occam did, that a reality which has no representation is one which has no relation and no quality. The great argument for nominalism is that there is no man unless there is some particular man. That, however, does not affect the realism of Scotus; for although there is no man of whom all further determination can be denied, yet there is a man, abstraction being made of all further determination. There is a real difference between man irrespective of what the other determinations may be, and man with this or that particular series of determinations, although undoubtedly this difference is only relative to the mind and not *in re*. Such is the position of Scotus.¹ Occam's great objec-

* Cf. 354f, 2.654f.

¹ Eadem natura est, quae in existentia per gradum singularitatis est determinata, et in intellectu, hoc est ut habet relationem ad intellectum ut cognitum ad cognoscens, est indeterminata.— Quaest. Subtillissimae, lib. 7, qu. 18.

tion is, there can be no real distinction which is not *in re*, in the thing-in-itself; but this begs the question for it is itself based only on the notion that reality is something independent of representative relation.¹

313.* Such being the nature of reality in general, in what does the reality of the mind consist? We have seen that the content of consciousness, the entire phenomenal manifestation of mind, is a sign resulting from inference. Upon our principle, therefore, that the absolutely incognizable does not exist, so that the phenomenal manifestation of a substance is the substance, we must conclude that the mind is a sign developing according to the laws of inference. What distinguishes a man from a word? There is a distinction doubtless. The material qualities, the forces which constitute the pure denotative application, and the meaning of the human sign, are all exceedingly complicated in comparison with those of the word. But these differences are only relative. What other is there? It may be said that man is conscious, while a word is not. But consciousness is a very vague term. It may mean that emotion which accompanies the reflection that we have animal life. This is a consciousness which is dimmed when animal life is at its ebb in old age, or sleep, but which is not dimmed when the spiritual life is at its ebb; which is the more lively the better *animal* a man is, but which is not so, the better *man* he is. We do not attribute this sensation to words, because we have reason to believe that it is dependent upon the possession of an animal body. But this consciousness, being a mere sensation, is only a part of the *material quality* of the man-sign. Again, consciousness is sometimes used to signify the *I think*, or unity in thought; but the unity is nothing but consistency, or the recognition of it. Consistency belongs to every sign, so far as it is a sign; and therefore every sign, since it signifies primarily that it is a sign, signifies its own consistency. The man-sign acquires information, and comes to mean more than he did before. But so do words. Does not electricity mean more now than it did in the days of Franklin? Man makes the word, and the word means nothing which the man has not made it mean, and that only to some man. But since man can think only by means of words or other external symbols, these might turn

¹ See his argument *Summa logices*, part. 1, cap. 16.

* Cf. 6.270.

round and say: "You mean nothing which we have not taught you, and then only so far as you address some word as the interpretant of your thought." In fact, therefore, men and words reciprocally educate each other; each increase of a man's information involves and is involved by, a corresponding increase of a word's information.

314. Without fatiguing the reader by stretching this parallelism too far, it is sufficient to say that there is no element whatever of man's consciousness which has not something corresponding to it in the word; and the reason is obvious. It is that the word or sign which man uses *is* the man himself. For, as the fact that every thought is a sign, taken in conjunction with the fact that life is a train of thought, proves that man is a sign; so, that every thought is an *external* sign, proves that man is an external sign. That is to say, the man and the external sign are identical, in the same sense in which the words *homo* and *man* are identical. Thus my language is the sum total of myself; for the man is the thought.

315. It is hard for man to understand this, because he persists in identifying himself with his will, his power over the animal organism, with brute force. Now the organism is only an instrument of thought. But the identity of a man consists in the *consistency* of what he does and thinks, and consistency is the intellectual character of a thing; that is, is its expressing something.

316. Finally, as what anything really is, is what it may finally come to be known to be in the ideal state of complete information, so that reality depends on the ultimate decision of the community; so thought is what it is, only by virtue of its addressing a future thought which is in its value as thought identical with it, though more developed. In this way, the existence of thought now depends on what is to be hereafter; so that it has only a potential existence, dependent on the future thought of the community.

317. The individual man, since his separate existence is manifested only by ignorance and error, so far as he is anything apart from his fellows, and from what he and they are to be, is only a negation. This is man,

". . . proud man,
Most ignorant of what he's most assured,
His glassy essence."

III

FOUNDATIONS OF VALIDITY OF THE LAWS OF LOGIC: FURTHER CONSEQUENCES OF FOUR INCAPACITIES*

§1. OBJECTIONS TO THE SYLLOGISM^E

318. If, as I maintained in an article in the last number of this Journal,† every judgment results from inference, to doubt every inference is to doubt everything. It has often been argued that absolute scepticism is self-contradictory; but this is a mistake: and even if it were not so, it would be no argument against the absolute sceptic, inasmuch as he does not admit that no contradictory propositions are true. Indeed, it would be impossible to move such a man, for his scepticism consists in considering every argument and never deciding upon its validity; he would, therefore, act in this way in reference to the arguments brought against him.

But then there are no such beings as absolute sceptics. Every exercise of the mind consists in inference, and so, though there are inanimate objects without beliefs, there may be‡ no intelligent beings in that condition.

Yet it is quite possible that a person should doubt every principle of inference. He may not have studied logic, and though a logical formula may sound very obviously true to him, he may feel a little uncertain whether some subtile deception may not lurk in it. Indeed, I certainly shall have, among the most cultivated and respected of my readers, those who deny that those laws of logic, which men generally admit, have universal validity. But I address myself, also, to those who have no such doubts, for even to them it may be interesting to consider how it is that these principles come to be true. Finally, having put forth in former numbers of this Journal some rather

* *Journal of Speculative Philosophy*, vol. 2, pp. 193-208 (1868); with corrections of 1893; intended as Essay VI of the "Search for a Method," 1893.

† See 295ff.

‡ Originally "are."

heretical principles of philosophical research, one of which is nothing can be admitted to be absolutely inexplicable,* it behooves me to take up a challenge which has been given me to show how upon my principles the validity of the laws of logic can be other than inexplicable.

319. I shall be arrested, at the outset, by a sweeping objection to my whole undertaking. It will be said that my deduction of logical principles, being itself an argument, depends for its whole virtue upon the truth of the very principles in question; so that whatever my proof may be, it must take for granted the very things to be proved. But to this I reply, that I am neither addressing absolute sceptics, nor men in any state of fictitious doubt whatever. I require the reader to be candid; and if he becomes convinced of a conclusion, to admit it. There is nothing to prevent a man's perceiving the force of certain special arguments, although he does not yet know that a certain general law of arguments holds good; for the general rule may hold good in some cases and not in others. A man may reason well without understanding the principles of reasoning, just as he may play billiards well without understanding analytical mechanics. If you, the reader, actually find that my arguments have a convincing force with you, it is a mere pretence to call them illogical.†

320. That if one sign denotes generally everything denoted by a second, and this second denotes generally everything denoted by a third, then the first denotes generally everything denoted by the third, is not doubted by anybody who distinctly apprehends the meaning of these words. The deduction of the general form of syllogism, therefore, will consist only of an explanation of the *suppositio communis*.¹ Now, what the

* See 254, 265.

† Cf. 2.186ff.

¹ The word *suppositio* is one of the useful technical terms of the middle ages which was condemned by the purists of the *renaissance* as incorrect. The early logicians made a distinction between *significatio* and *suppositio*. [Cf. Prantl, II, 286ff; III, 51f.] *Significatio* is defined as "rei per vocem secundum placitum representatio." [*Ibid.*, footnote 199.] It is a mere affair of lexicography, and depends on a special convention (*secundum placitum*), and not on a general principle. *Suppositio* belongs, not directly to the *vox*, but to the *vox* as having this or that *significatio*. "Unde significatio prior est suppositione et differunt in hoc, quia significatio est vocis, suppositio vero est termini jam compositi

formal logician means by an expression of the form, "Every M is P ," is that anything of which M is predicable is P ; thus, if S is M , that S is P . The premiss that "Every M is P " may, therefore, be denied; but to admit it, unambiguously, in the sense intended, is to admit that the inference is good that S is P if S is M . He, therefore, who does not deny that S is P — M , S , P , being any terms such that S is M and every M is P — denies nothing that the formal logician maintains in reference to this matter; and he who does deny this, simply is deceived by an ambiguity of language. How we come to make any judgments in the sense of the above "Every M is P ," may be understood from the theory of reality put forth in the article in the last number. It was there shown that real things are of a cognitive and therefore significative nature, so that the real is that which signifies something real.* Consequently, to predicate anything of anything real is to predicate it of that of which that subject (the real) is itself predicated; for to predicate one thing of another is to state that the former is a sign of the latter.

321. These considerations show the reason of the validity of the formula,

$$\begin{aligned} S \text{ is } M; M \text{ is } P: \\ \therefore S \text{ is } P. \end{aligned}$$

They hold good whatever S and P may be, provided that they be such that any middle term between them can be found. That P should be a negative term, therefore, or that S should

ex voce et significatione." [*Ibid.*, footnote 201.] The various *suppositiones* which may belong to one word with one *significatio* are the different senses in which the word may be taken, according to the general principles of the language or of logic. Thus, the word *table* has different *significationes* in the expressions "table of logarithms" and "writing-table"; but the word *man* has one and the same *significatio*, and only different *suppositiones*, in the following sentences: "A man is an animal," "a butcher is a man," "man cooks his food," "man appeared upon the earth at such a date," &c. Some later writers have endeavored to make "*acceptio*" do service for "*suppositio*"; but it seems to me better, now that scientific terminology is no longer forbidden, to revive *suppositio*. I should add that as the principles of logic and language for the different uses of the different parts of speech are different, *suppositio* must be restricted to the acceptance of a *substantive*. The term *copulatio* was used for the acceptance of an adjective or verb.

* See 311.

be a particular term, would not interfere at all with the validity of this formula. Hence, the following formulæ are also valid:

- S is M ; M is not P :
 $\therefore S$ is not P .
- Some S is M ; M is P :
 \therefore Some S is P .
- Some S is M ; M is not P :
 \therefore Some S is not P .

322. Moreover, as all that class of inferences which depend upon the introduction of relative terms can be reduced to the general form, they also are shown to be valid. Thus, it is proved to be correct to reason thus:

Every relation of a subject to its predicate is a relation of the relative "not X'd, except by the X of some," to its correlate, where X is any relative I please.

Every relation of "man" to "animal" is a relation of a subject to its predicate.

- \therefore Every relation of "man" to "animal" is a relation of the relative "not X'd, except by the X of some," to its correlate, where X is any relative I please.

Every relation of the relative "not X'd, except by the X of some," to its correlate, where X is any relative I please, is a relation of the relative "not *headed*, except by the *head* of some," to its correlate.

- \therefore Every relation of "man" to "animal" is a relation of the relative "not headed, except by the head of some," to its correlate.¹

323. At the same time, as will be seen from this example, the proof of the validity of these inferences depends upon the assumption of the truth of certain general statements concerning relatives. These formulæ can all be deduced from the principle, that in a system of signs in which no sign is taken in two different senses, two signs which differ only in their manner of representing their object, but which are equivalent

¹ "If any one will by ordinary syllogism prove that because every man is an animal, therefore every head of a man is a head of an animal, I shall be ready to — set him another question."—De Morgan: "On the Syllogism No. IV. and on the Logic of Relations." [*Transactions, Cambridge Philosophical Society*, X, pt. II, p. 337. Cf. *Principia Mathematica*, *37.62.]

in meaning, can always be substituted for one another. Any case of the falsification of this principle would be a case of the dependence of the mode of existence of the thing represented upon the mode of this or that representation of it, which, as has been shown in the article in the last number, is contrary to the nature of reality.*

324. The next formula of syllogism to be considered is the following:

$$\begin{aligned} S \text{ is other than } P; M \text{ is } P: \\ \therefore S \text{ is other than } M. \end{aligned}$$

The meaning of "not" or "other than" seems to have greatly perplexed the German logicians, and it may be, therefore, that it is used in different senses. If so, I propose to defend the validity of the above formula only when *other than* is used in a particular sense. By saying that one thing or class is other than a second, I mean that any third whatever is identical with the class which is composed of that third and of whatever is, at once, the first and second. For example, if I say that rats are not mice, I mean that any third class as dogs is identical with dogs *plus*† rats-which-are-mice; that is to say, the addition of rats-which-are-mice, to anything, leaves the latter just what it was before. This being all that I mean by *S* is other than *P*, I mean absolutely the same thing when I say that *S* is other than *P*, that I do when I say that *P* is other than *S*; and the same when I say that *S* is other than *M*, that I do when I say that *M* is other than *S*. Hence the above formula is only another way of writing the following:

$$\begin{aligned} M \text{ is } P; P \text{ is not } S: \\ \therefore M \text{ is not } S. \end{aligned}$$

But we have already seen that this is valid.

325. A very similar formula to the above is the following:

$$\begin{aligned} S \text{ is } M; \text{ some } S \text{ is } P: \\ \therefore \text{Some } M \text{ is } P. \end{aligned}$$

By saying that some of a class is of any character, I mean simply that no statement which implies that none of that class

* See 311.

† Originally "and."

is of that character is true. But to say that none of that class is of that character, is, as I take the word "not," to say that nothing of that character is of that class. Consequently, to say that some of *A* is *B*, is, as I understand words and in the only sense in which I defend this formula, to say that some *B* is *A*. In this way the formula is reduced to the following, which has already been shown to be valid:

Some *P* is *S*; *S* is *M*:
 \therefore Some *P* is *M*.

326. The only demonstrative syllogisms which are not included among the above forms are the Theophrastean moods, which are all easily reduced by means of simple conversions.*

327. Let us now consider what can be said against all this, and let us take up the objections which have actually been made to the syllogistic formulæ, beginning with those which are of a general nature and then examining those sophisms which have been pronounced irresolvable by the rules of ordinary logic.

It is a very ancient notion that no proof can be of any value, because it rests on premisses which themselves equally require proof, which again must rest on other premisses, and so back to infinity. This really does show that nothing can be proved beyond the *possibility*† of a doubt; that no argument could be legitimately used against an absolute sceptic; and that inference is only a transition from one cognition to another, and not the creation of a cognition. But the objection is intended to go much further than this, and to show (as it certainly seems to do) that inference not only cannot produce *infallible* cognition, but that it cannot *produce* cognition at all. It is true, that since some judgment precedes every judgment inferred, either the first premisses were not inferred, or there have been no first premisses. But it does not follow that because there has been no first in a series, therefore that series has had no beginning in time; for the series may be *continuous*,¹ and may have begun gradually, as was shown in an article in this volume,‡ where this difficulty has already been resolved.

* See 2.480f, 2.500ff.

† Not italicized in the original.

¹ That is, in the Kantian sense.— 1893.

‡ See 263.

328. A somewhat similar objection has been made by Locke* and others,† to the effect that the ordinary demonstrative syllogism is a *petitio principii*, inasmuch as the conclusion is already implicitly stated in the major premiss. Take, for example, the syllogism,

All men are mortal;
Socrates is a man:
∴ Socrates is mortal.

This attempt to prove that Socrates is mortal begs the question, it is said, since if the conclusion is denied by anyone, he thereby denies that all men are mortal. But what such considerations really prove is that the syllogism is demonstrative. To call it a *petitio principii* is a mere confusion of language. It is strange that philosophers, who are so suspicious of the words *virtual* and *potential*, should have allowed this "implicit" to pass unchallenged. A *petitio principii* consists in reasoning from the unknown to the unknown.‡ Hence, a logician who is simply engaged in stating what general forms of argument are valid, can, at most, have nothing more to do with the consideration of this fallacy than to note those cases in which from logical principles a premiss of a certain form cannot be better known than a conclusion of the corresponding form. But it is plainly beyond the province of the logician, who has only proposed to state what forms of facts involve what others, to inquire whether man can have a knowledge of universal propositions without a knowledge of every particular contained under them, by means of natural insight, divine revelation, induction, or testimony. The only *petitio principii*, therefore, which he can notice is the assumption of the conclusion itself in the premiss; and this, no doubt, those who call the syllogism a *petitio principii* believe is done in that formula. But the proposition "All men are mortal" does not in itself involve the statement that Socrates is mortal, but only that "whatever has man truly predicated of it is mortal." In other words, the *conclusion* is not involved in the meaning of the premiss, but only the *validity of the syllogism*. So that this objection merely

* *An Essay Concerning Human Understanding*, Bk. IV, ch. xvii, §4.

† E.g. J. S. Mill; see his *System of Logic*, Bk. II, ch. iii.

‡ Cf. 2.614.

amounts to arguing that the syllogism is not valid, because it is demonstrative.¹

329. A much more interesting objection is that a syllogism is a purely mechanical process. It proceeds according to a bare rule or formula; and a machine might be constructed which would so transpose the terms of premisses. This being so (and it is so), it is argued that this cannot be *thought*; that there is no life in it. Swift has ridiculed the syllogism in the "Voyage to Laputa," by describing a machine for making science:

"By this contrivance, the most ignorant person, at a reasonable charge, and with little bodily labor, might write books in philosophy, poetry, politics, laws, mathematics, and theology, without the least assistance from genius or study."

The idea involved in this objection seems to be that it requires mind to apply any formula or use any machine. If, then, this mind is itself only another formula, it requires another mind behind it to set it into operation, and so on *ad infinitum*. This objection fails in much the same way that the first one which we considered failed. It is as though a man should address a land surveyor as follows: "You do not make a true representation of the land; you only measure lengths from point to point — that is to say, lines. If you observe angles, it is only to solve triangles and obtain the lengths of their sides. And when you come to make your map, you use a pencil which can only make lines, again. So, you have to do solely with lines. But the land is a surface; and no number of lines, however great, will make any surface, however small. You, therefore, fail entirely to represent the land." The surveyor, I think, would reply, "Sir, you have proved that *my* lines cannot make up the land, and that, therefore, my map *is not* the land. I never pretended that it was. But that does not prevent it from truly representing the land, as far as it goes. It cannot, indeed, represent every blade of grass; but it does not represent that there is not a blade of grass where there is. To abstract from a circumstance is not to deny it." Suppose the objector were, at this point, to say, "To abstract from a

¹ Mr. Mill thinks the syllogism is merely a formula for recalling forgotten facts. Whether he means to deny, what all logicians since Kant have held, that the syllogism serves to render confused thoughts distinct, or whether he does not know that this is the usual doctrine, does not appear.

circumstance *is* to deny it. Wherever your map does not represent a blade of grass, it represents there is no blade of grass. Let us take things on their own valuation." Would not the surveyor reply: "This map is my description of the country. Its own valuation can be nothing but what I say, and all the world understands, that I mean by it. Is it very unreasonable that I should demand to be taken as I mean, especially when I succeed in making myself understood?" What the objector's reply to this question would be, I leave it to anyone to say who thinks his position well taken. Now this line of objection is parallel to that which is made against the syllogism. It is shown that no number of syllogisms can constitute the sum total of any mental action, however restricted. This may be freely granted, and yet it will not follow that the syllogism does not truly represent the mental action, as far as it purports to represent it at all. There is reason to believe that the act on of the mind is, as it were, a continuous movement. Now the doctrine embodied in syllogistic formulæ (so far as it applies to the mind at all) is, that if two successive positions, occupied by the mind in this movement, be taken, they will be found to have certain relations. It is true that no number of successions of positions can make up a continuous movement; and this, I suppose, is what is meant by saying that a syllogism is a dead formula, while thinking is a living process. But the reply is that the syllogism is not intended to represent the mind, as to its life or deadness, but only as to the relation of its different judgments concerning the same thing. And it should be added that the relation between syllogism and thought does not spring from considerations of formal logic, but from those of psychology. All that the formal logician has to say is, that if facts capable of expression in such and such forms of words are true, another fact whose expression is related in a certain way to the expression of these others is also true.

330. Hegel taught that ordinary reasoning is "one-sided." A part of what he meant was that by such inference a part only of all that is true of an object can be learned, owing to the generality or abstractedness of the predicates inferred. This objection is, therefore, somewhat similar to the last; for the point of it is that no number of syllogisms would give a complete knowledge of the object. This, however, presents a diffi-

culty which the other did not; namely, that if nothing incognizable exists, and all knowledge is by mental action, by mental action everything is cognizable. So that if by syllogism everything is not cognizable, syllogism does not exhaust the modes of mental action. But grant the validity of this argument and it proves too much; for it makes, not the syllogism particularly, but all finite knowledge to be worthless. However much we know, more may come to be found out. Hence, all can never be known. This seems to contradict the fact that nothing is absolutely incognizable; and it would really do so *if our knowledge* were something absolutely limited. For, to say that all can never be known, means that information may increase beyond any assignable point; that is, that an absolute termination of all increase of knowledge is absolutely incognizable, and therefore does not exist. In other words, the proposition merely means that the sum of all that will be known up to any time, however advanced, into the future, has a ratio less than any assignable ratio to all that may be known at a time still more advanced. This, however,* does not, in the least,† contradict the fact that everything is cognizable; it only contradicts a proposition, which no one can maintain, that it is possible to cognize everything,¹ that is, that at some time all things will be known.‡ It may, however, very justly be said that the difficulty still remains, how at every future time, however late, there can be something yet to happen. It is no longer a contradiction, but it is a difficulty; that is to say, *lengths of time* are shown not to afford an adequate conception of futurity in general; and the question arises, in what other way we are to conceive of it. I might indeed, perhaps, fairly drop the question here, and say that the difficulty had become so entirely removed from the syllogism in particular, that the formal logician need not feel himself specially called on to consider it. The solution, however, is very simple. It is that we conceive of the future, as a

* Added, 1893.

† Added, 1893.

‡ The phrase "that . . . known" was originally, "that everything will be known at some time some number of years into the future."

¹ The difference between the two statements is like that between "Every man is the son of some woman," and "Some woman is the mother of every man." — 1893.

whole, by considering that this *word*, like any other general term, as "inhabitant of St. Louis," may be taken distributively or collectively. We conceive of the infinite, therefore, not directly or on the side of its infinity, but by means of a consideration concerning words or a second intention.

331. Another objection to the syllogism is that its "therefore" is merely subjective; that, because a certain conclusion syllogistically follows from a premiss, it does not follow that the fact denoted by the conclusion really depends upon the fact denoted by the premiss, so that the syllogism does not represent things as they really are. But it has been fully shown that if the facts are as the premisses represent, they are also as the conclusion represents. Now this is a purely objective statement: therefore, there is a real connection between the facts stated as premisses and those stated as conclusion. It is true that there is often an appearance of reasoning deductively from effects to causes. Thus we may reason as follows: "There is smoke; there is never smoke without fire: hence, there has been fire." Yet smoke is not the cause of fire, but the effect of it. Indeed, it is evident, that in many cases an event is a demonstrative sign of a certain previous event having occurred. Hence, we can reason deductively from relatively future to relatively past, whereas causation¹ really determines events in the direct order of time. Nevertheless, if we can thus reason against the stream of time, it is because there really are such facts as that "If there is smoke, there has been fire," in which the following event is the antecedent. Indeed, if we consider the manner in which such a proposition became known to us, we shall find that what it really means is that "If we find smoke, we *shall* find evidence on the whole that there has been fire"; and this, if reality consists in the agreement that the whole community would eventually come to, is the very same thing as to say that there really has been fire. In short, the whole present difficulty is resolved instantly by this theory of reality, because it makes all reality something which is constituted by an event indefinitely future.

332. Another objection, for which I am quite willing to allow a great German philosopher the whole credit, is that sometimes the conclusion is false, although both the premisses

¹ So far as there is any validity in this conception. — 1893.

and the syllogistic form are correct.¹ Of this he gives the following examples. From the middle term that a wall has been painted blue, it may correctly be concluded that it is blue; but notwithstanding this syllogism it may be green if it has also received a coat of yellow, from which last circumstance by itself it would follow that it is yellow. If from the middle term of the sensuous faculty it be concluded that man is neither good nor bad, since neither can be predicated of the sensuous, the syllogism is correct; but the conclusion is false, since of man in the concrete, spirituality is equally true, and may serve as middle term in an opposite syllogism. From the middle term of the gravitation of the planets, satellites, and comets, towards the sun, it follows correctly that these bodies fall into the sun; but they do not fall into it, because (!) they equally gravitate to their own centres, or, in other words (!!), they are supported by centrifugal force. Now, does Hegel mean to say that these syllogisms satisfy the rules for syllogism given by those who defend syllogism? or does he mean to grant that they do not satisfy *those* rules, but to set up some rules of his own for syllogism which shall insure its yielding false conclusions from true premisses? If the latter, he ignores the real issue, which is whether the syllogism as defined by the rules of formal logic is correct, and not whether the syllogism as represented by Hegel is correct. But if he means that the above examples satisfy the usual definition of a true syllogism, he is mistaken. The first, stated in form, is as follows:

Whatever has been painted blue is blue;
 This wall has been painted blue:
 ∴ This wall is blue.

Now "painted blue" may mean painted with blue paint, or painted so as to be blue. If, in the example, the former were meant, the major premiss would be false. As he has stated that it is true, the latter meaning of "painted blue" must be the one intended. Again, "blue" may mean blue at some time, or blue at this time. If the latter be meant, the major premiss is plainly false; therefore, the former is meant. But the conclu-

¹ "So zeigt sich jener Schlussatz dadurch als falsch, obgleich für sich dessen Prämissen und ebenso dessen Consequenz ganz richtig sind."—Hegel's *Werke*, vol. v., p. 124. [Berlin, 1841.]

sion is said to contradict the statement that the wall is yellow. If blue were here taken in the more general sense, there would be no such contradiction. Hence, he means in the conclusion that this wall is now blue; that is to say, he reasons thus:

Whatever has been made blue has been blue;
 This has been made blue:
 \therefore This is blue now.

Now substituting letters for the subjects and predicates, we get the form,

M is P ;
 S is M :
 $\therefore S$ is Q .

This is not a syllogism in the ordinary sense of that term, or in any sense in which anybody maintains that the syllogism is valid.

The second example given by Hegel, when written out in full, is as follows:

Sensuality is neither good nor bad;
 Man *has* (not *is*) sensuality:
 \therefore Man is neither good nor bad.

Or, the same argument may be stated as follows:

The sensuous, *as such*, is neither good nor bad;
 Man is sensuous:
 \therefore Man is neither good nor bad.

When letters are substituted for subject and predicate in either of these arguments, it takes the form,

M is P ;
 S is N :
 $\therefore S$ is P .

This, again, bears but a very slight resemblance to a syllogism

The third example, when stated at full length, is as follows

Whatever tends towards the sun, *on the whole*, falls into the sun;
 The planets tend toward the sun:
 \therefore The planets fall into the sun.

This is a fallacy similar to the last.

I wonder that this eminent logician did not add to his list of examples of correct syllogism the following:

It either rains, or it does not rain;

It does not rain:

∴ It rains.

This is fully as deserving of serious consideration as any of those which he has brought forward. The rainy day and the pleasant day are both, in the first place, days. Secondly, each is the negation of a day. It is indifferent which be regarded as the positive. The pleasant is Other to the rainy, and the rainy is in like manner Other to the pleasant. Thus, both are equally Others. Both are Others of each other, or each is Other for itself. So this day being other than rainy, that to which it is Other is itself. But it is Other than itself. Hence, it is itself Rainy.

§2. THE THREE KINDS OF SOPHISMS^E

333. Some sophisms have, however, been adduced, mostly by the Eleatics and Sophists, which really are extremely difficult to resolve by syllogistic rules; and according to some modern authors this is actually impossible. These sophisms fall into three classes: first, those which relate to continuity; second, those which relate to consequences of supposing things to be other than they are; third, those which relate to propositions which imply their own falsity. Of the first class, the most celebrated are Zeno's arguments concerning motion. One of these is, that if Achilles overtakes a tortoise in any finite time, and the tortoise has the start of him by a distance which may be called a , then Achilles has to pass over the sum of distances represented by the polynomial

$$\frac{1}{2}a + \frac{1}{4}a + \frac{1}{8}a + \frac{1}{16}a + \frac{1}{32}a \text{ etc.}$$

up to infinity. Every term of this polynomial is finite, and it has an infinite number of terms; consequently, Achilles must in a finite time pass over a distance equal to the sum of an infinite number of finite distances. Now this distance must be infinite, because no finite distance, however small, can be multiplied by an infinite number without giving an infinite distance. So that even if none of these finite distances were

larger than the smallest (which is finite since all are finite), the sum of the whole would be infinite. But Achilles cannot pass over an infinite distance in a finite time; therefore, he cannot overtake the tortoise in any time, however great.

The solution of this fallacy is as follows: The conclusion is supposed to follow from the undoubted* fact that Achilles cannot overtake the tortoise without passing over an infinite number of terms of that series of finite distances. That is, no case of his overtaking the tortoise would be a case of his not passing over a non-finite number of terms; that is (by simple conversion), no case of his not passing over a non-finite number of terms would be a case of his overtaking the tortoise. But if he does not pass over a non-finite number of terms, he either passes over a finite number, or he passes over none; and conversely. Consequently, nothing more has been said than that every case of his passing over only a finite number of terms, or of his not passing over any, is a case of his not overtaking the tortoise. Consequently, nothing more can be concluded than that he passes over a distance greater than the sum of any finite number of the above series of terms. But because a quantity is greater than any quantity of a certain series, it does not follow that it is greater than any quantity.¹

In fact, the reasoning in this sophism may be exhibited as follows: We start with the series of numbers,

$$\begin{aligned} & \frac{1}{2}a \\ & \frac{1}{2}a + \frac{1}{4}a \\ & \frac{1}{2}a + \frac{1}{4}a + \frac{1}{8}a \\ & \frac{1}{2}a + \frac{1}{4}a + \frac{1}{8}a + \frac{1}{16}a \\ & \text{etc. etc. etc.} \end{aligned}$$

Then, the implied argument is

Any number of this series is less than a ;

But any number you please is less than the number of terms of this series:

Hence, any number you please is less than a .

This involves an obvious confusion between the number of terms and the value of the greatest term.

* "is . . . undoubted" originally "is dependent on the."

¹ Again the distinction is analogous to that between "Every man is the son of some woman or other," and "Some one woman is the mother of all men." — 1893.

334. Another argument by Zeno against motion, is that a body fills a space no larger than itself. In that place there is no room for motion. Hence, while in the place where it is, it does not move. But it never is other than in the place where it is. Hence, it never moves. Putting this into form, it will read:

No body in a place no larger than itself is moving;
 But every body is a body in a place no larger than itself;
 ∴ No body is moving.

The error of this consists in the fact that the minor premiss is only true in the sense that during a time sufficiently short the space occupied by a body is as little larger than itself as you please. All that can be inferred from this is, that during no time a body will move no distance.

335. All the arguments of Zeno depend on supposing that a *continuum* has ultimate parts. But a *continuum* is precisely that, every part of which has parts, in the same sense.* Hence, he makes out his contradictions only by making a self-contradictory supposition. In ordinary and mathematical language, we allow ourselves to speak of such parts — *points* — and whenever we are led into contradiction thereby, we have simply to express ourselves more accurately to resolve the difficulty.

336. Suppose a piece of glass to be laid on a sheet of paper so as to cover half of it. Then, every part of the paper is *covered*, or *not covered*; for “not” means merely outside of, or other than. But is the line under the edge of the glass covered or not? It is no more on one side of the edge than it is on the other. Therefore, it is either on both sides, or neither side. It is not on neither side; for if it were it would be *not* on either side, therefore not on the covered side, therefore not covered, therefore on the uncovered side. It is not partly on one side and partly on the other, because it has no width. Hence, it is wholly on both sides, or both covered and not covered.

The solution of this is, that we have supposed a part too narrow to be partly uncovered and partly covered; that is to say, a part which has no parts in a continuous surface, which

* Cf. 2.646, 4.121ff, 4.219ff, 6.174ff.

by definition has no such parts. The reasoning, therefore, simply serves to reduce this supposition to an absurdity.

It may be said that there really is such a thing as a line. If a shadow falls on a surface, there really is a division between the light and the darkness. That is true. But it does not follow that because we attach a definite meaning to the part of a surface being covered, therefore we know what we mean when we say that a line is covered. We may define a covered line as one which separates two surfaces both of which are covered, or as one which separates two surfaces *either* of which is covered. In the former case, the line under the edge is uncovered; in the latter case, it is covered.

337. In the sophisms thus far considered, the appearance of contradiction depends mostly upon an ambiguity; in those which we are now to consider, two true propositions really do in form conflict with one another. We are apt to think that formal logic forbids this, whereas a familiar argument, the *reductio ad absurdum*, depends on showing that contrary predicates are true of a subject, and *that therefore that subject does not exist*. Many logicians, it is true, make affirmative propositions assert the existence of their subjects.¹ The objection to this is that it cannot be extended to hypotheticals. The proposition

If *A* then *B*

may conveniently be regarded as equivalent to

Every case of the truth of *A* is a case of the truth of *B*.

But this cannot be done if the latter proposition asserts the existence of its subject; that is, asserts that *A* really happens. If, however, a categorical affirmative be regarded as asserting the existence of its subject, the principle of the *reductio ad absurdum* is that two propositions of the forms,

If *A* were true, *B* would not be true,

and

If *A* were true, *B* would be true,

may both be true at once; and that if they are so, *A* is not true. It will be well, perhaps, to illustrate this point. No man of common sense would deliberately upset his inkstand

¹ The usage of ordinary language has no relevancy in the matter.

if there were ink in it; that is, if any ink would run out. Hence, by simple conversion,

If he were deliberately to upset his inkstand, no ink would be spilt.

But suppose there is ink in it. Then, it is also true, that

If he were deliberately to upset his inkstand, the ink would be spilt.

These propositions are both true, and the law of contradiction is not violated which asserts only that nothing has contradictory predicates: only, it follows from these propositions that the man will not deliberately overturn his inkstand.

338. There are two ways in which deceptive sophisms may result from this circumstance. In the first place, contradictory propositions are never both true. Now, as a universal proposition may be true when the subject does not exist, it follows that the contradictory of a universal — that is, a particular — cannot be taken in such a sense as to be true when the subject does not exist. But a particular simply asserts a part of what is asserted in the universal over it; therefore, the universal over it asserts the subject to exist. Consequently, there are two kinds of universals, those which do not assert the subject to exist, and these have no particular propositions under them, and those which do assert that the subject exists, and these strictly speaking have no contradictions. For example, there is no use of such a form of proposition as “Some griffins would be dreadful animals,” as particular under the useful form “The griffin would be a dreadful animal”; and the apparent contradictories “All of John Smith’s family are ill,” and “Some of John Smith’s family are not ill,” are both false at once if John Smith has no family. Here, though an inference from a universal to the particular under it is always valid, yet a procedure which greatly resembles this would be sophistical if the universal were one of those propositions which does not assert the existence of its subject. The following sophism depends upon this; I call it the True Gorgias:

Gorgias. What say you, Socrates, of black? Is any black, white?

Socrates. No, by Zeus!

Gor. Do you say, then, that no black is white? *Soc.* None at all.

Gor. But is everything either black or non-black? *Soc.* Of course.

Gor. And everything either white or non-white? *Soc.* Yes.

Gor. And everything either rough or smooth? *Soc.* Yes.

Gor. And everything either real or unreal? *Soc.* Oh, bother! yes.

Gor. Do you say, then, that all black is either rough black or smooth black? *Soc.* Yes.

Gor. And that all white is either real white or unreal white? *Soc.* Yes.

Gor. And yet is no black, white? *Soc.* None at all.

Gor. Nor no white, black? *Soc.* By no means.

Gor. What? Is no smooth black, white? *Soc.* No; you cannot prove that, Gorgias.

Gor. Nor no rough black, white? *Soc.* Neither.

Gor. Nor no real white, black? *Soc.* No.

Gor. Nor no unreal white, black? *Soc.* No, I say. No white at all is black.

Gor. What if black is smooth, is it not white? *Soc.* Not in the least.

Gor. And if the last is false, is the first false? *Soc.* It follows.

Gor. If, then, black is white, does it follow, that black is not smooth? *Soc.* It does.

Gor. Black-white is not smooth? *Soc.* What do you mean?

Gor. Can any dead man speak? *Soc.* No, indeed.

Gor. And is any speaking man dead? *Soc.* I say, no.

Gor. And is any good king tyrannical? *Soc.* No.

Gor. And is any tyrannical king good? *Soc.* I just said no.

Gor. And you said, too, that no rough black is white, did you not? *Soc.* Yes.

Gor. Then, is any black-white, rough? *Soc.* No.

Gor. And is any unreal black, white? *Soc.* No.

Gor. Then, is any black-white unreal? *Soc.* No.

Gor. No black-white is rough? *Soc.* None.

Gor. All black-white, then, is non-rough? *Soc.* Yes.

Gor. And all black-white, non-unreal? *Soc.* Yes.

Gor. All black-white is then smooth? *Soc.* Yes.

Gor. And all real? *Soc.* Yes.

- Gor.* Some smooth, then, is black-white? *Soc.* Of course.
Gor. And some real is black-white? *Soc.* So it seems.
Gor. Some black-white smooth is black-white? *Soc.* Yes.
Gor. Some black smooth is black-white? *Soc.* Yes.
Gor. Some black smooth is white? *Soc.* Yes.
Gor. Some black real is black-white? *Soc.* Yes.
Gor. Some black real is white? *Soc.* Yes.
Gor. Some real black is white? *Soc.* Yes.
Gor. And some smooth black is white? *Soc.* Yes.
Gor. Then, some black is white? *Soc.* I think so myself.

339. The principle of the *reductio ad absurdum* also occasions deceptions in another way, owing to the fact that we have many words, such as *can*, *may*, *must*, etc., which imply more or less vaguely an otherwise unexpressed condition, so that these propositions are in fact hypotheticals. Accordingly, if the unexpressed condition is some state of things which does not actually come to pass, the two propositions may appear to be contrary to one another. Thus, the moralist says, "You ought to do this, and you can do it." This "You can do it" is principally hortatory in its force: so far as it is a statement of fact, it means merely, "If you try, you will do it." Now, if the act is an outward one and the act is not performed, the scientific man, in view of the fact that every event in the physical world depends exclusively on physical antecedents, says that in this case the laws of nature prevented the thing from being done, and that therefore, "Even if you had tried, you would not have done it." Yet the reproachful conscience still says you might have done it; that is, that "If you had tried, you would have done it." This is called the paradox of freedom and fate; and it is usually supposed that one of these propositions must be true and the other false.* But since, in fact, you have not tried, there is no reason why the supposition that you have tried should not be reduced to an absurdity. In the same way, if you had tried and had performed the action, the conscience might say, "If you had not tried, you would not have done it"; while the understanding would say, "Even if you had not tried, you would have done it." These propositions are perfectly consistent,

* Cf. 403.

and only serve to reduce the supposition that you did not try to an absurdity.¹

340.* The third class of sophisms consists of the so-called *Insolubilia*. Here is an example of one of them with its resolution:

THIS PROPOSITION IS NOT TRUE	
IS IT TRUE OR NOT?	
Suppose it true. Then, The proposition is true; But, that it is not true is the proposition: ∴ That it is not true is true; ∴ It is not true.	Suppose it not true. Then, It is not true. ∴ It is true that it is not true. But, the proposition is that it is not true. ∴ The proposition is true.
Besides, It is true. ∴ It is true that it is true, ∴ It is not true that it is not true; But, the proposition is that it is not true, ∴ The proposition is not true.	Besides, The proposition is not true. But that it is not true is the proposition. ∴ That it is not true, is not true. ∴ That it is true, is true. ∴ It is true.
∴ Whether it is true or not, it is both true and not. ∴ It is both true and not, which is absurd.	

Since the conclusion is false, the reasoning is bad, or the premisses are not all true. But the reasoning is a dilemma; either, then, the disjunctive principle that it is either true or not is false, or the reasoning under one or the other branch is bad, or the reasoning is altogether valid. If the principle

¹ This seems to me to be the main difficulty of freedom and fate. But the question is overlaid with many others. The Necessitarians seem now to maintain less that every physical event is completely determined by physical causes (which seems to me { in 1869 seemed—1893 } irrefragable) than that every act of will is determined by the strongest motive. This has never been proved. Its advocates seem to think that it follows from universal causation, but why need the cause of an act lie within the consciousness at all? If I act from a reason at all, I act voluntarily; but which of two reasons shall appear strongest to me on a particular occasion may be owing to what I have eaten for dinner. Unless there is a perfect regularity as to what is the strongest motive with me, to say that I act from the strongest motive is mere tautology. If there is no calculating how a man will act except by taking into account external facts, the character of his motives does not determine how he acts. Mill and others have, therefore, not shown that a man always acts from the strongest motive. Hobbes [*Leviathan*, ch. VI] maintained that a man always acts from a reflection upon what will please him most. This is a very crude opinion. Men are not always thinking of themselves.

Self-control seems to be the capacity for rising to an extended view of a practical subject instead of seeing only temporary urgency. This is the only freedom of which man has any reason to be proud; and it is because love of what is good for all on the whole, which is the widest possible consideration, is the essence of Christianity, that it is said that the service of Christ is perfect freedom.

* Cf. 2.618.

that it is either true or not is false, it is other than true and other than not true; that is, not true and not not true; that is, not true and true. But this is absurd. Hence, the disjunctive principle is valid. There are two arguments under each horn of the dilemma; both the arguments under one or the other branch must be false. But, in each case, the second argument involves all the premisses and forms of inference involved in the first; hence, if the first is false, the second necessarily is so. We may, therefore, confine our attention to the first arguments in the two branches. The forms of argument contained in these are two: first, the simple syllogism in Barbara, and, second, the consequence from the truth of a proposition to the proposition itself. These are both correct. Hence, the whole form of reasoning is correct, and nothing remains to be false but a premiss. But since the repetition of an alternative supposition is not a premiss, there is, properly speaking, but one premiss in the whole. This is that the proposition is the same as that that proposition is not true. This, then, must be false. Hence the proposition signifies either less or more than this. If it does not signify as much as this, it signifies nothing, and hence it is not true, and hence another proposition which says of it what it says of itself is true. But if the proposition in question signifies something more than that it is itself not true, then the premiss that

Whatever is said in the proposition is that it is not true, is not true. And as a proposition is true only if whatever is said in it is true, but is false if anything said in it is false, the first argument on the second side of the dilemma contains a false premiss, and the second an undistributed middle. But the first argument on the first side remains good. Hence, if the proposition means more than that it is not true, it is not true, and another proposition which repeats this of it is true. Hence, whether the proposition does or does not mean that it is not true, it is not true, and a proposition which repeats this of it is true.

Since this repeating proposition is true, it has a meaning. Now, a proposition has a meaning if any part of it has a meaning. Hence, the original proposition (a part of which repeated has a meaning) has itself a meaning. Hence, it must

imply something besides that which it explicitly states. But it has no particular determination to any further implication. Hence, what more it signifies it must signify by virtue of being a proposition at all. That is to say, every proposition must imply something analogous to what this implies. Now, the repetition of this proposition does not contain this implication, for otherwise it could not be true; hence, what every proposition implies must be something concerning itself. What every proposition implies concerning itself must be something which is false of the proposition now under discussion, for the whole falsity of this proposition lies therein, since all that it explicitly lays down is true. It must be something which would not be false if the proposition were true, for in that case some true proposition would be false. Hence, it must be that it is itself true. That it is, *every proposition asserts its own truth*.

The proposition in question, therefore, is true in all other respects but its implication of its own truth.¹

§3. THE SOCIAL THEORY OF LOGIC^E

341. The difficulty of showing how the law of deductive reasoning is true depends upon our inability to conceive of its not being true. In the case of probable reasoning the difficulty is of quite another kind; here, where we see precisely what the procedure is, we wonder how such a process can have any validity at all. How magical it is that by examining a part of a class we can know what is true of the whole of the class, and by study of the past can know the future; in short, that we can know what we have not experienced!

¹ This is the principle which was most usually made the basis of the resolution of the *Insolubilia*. See, for example, Pauli Veneti, *Sophismata Aurea*. Soph. 50. The authority of Aristotle is claimed for this mode of solution. *Sophist. Elench.*, cap. 25. The principal objection which was made to this mode of solution, viz., that the principle that every proposition implies its own truth, cannot be proved, I believe that I have removed. The only arguments against the truth of this principle were based on the imperfect doctrines of *modales* and *obligationes*. Other methods of solution suppose that a part of a proposition cannot denote the whole proposition, or that no intellection is a formal cognition of itself. A solution of this sort will be found in Occam's *Summa Totius Logices*, 3d part of 3d part, cap. 38. Such modern authors as think the solution "very easy" do not understand its difficulties. See Mansel's *Aldrich*, p. 145.

Is not this an intellectual intuition! Is it not that besides ordinary experience which is dependent on there being a certain physical connection between our organs and the thing experienced, there is a second avenue of truth dependent only on there being a certain intellectual connection between our previous knowledge and what we learn in that way? Yes, this is true. Man has this faculty, just as opium has a somnific virtue; but some further questions may be asked, nevertheless. How is the existence of this faculty accounted for? In one sense, no doubt, by natural selection. Since it is absolutely essential to the preservation of so delicate an organism as man's, no race which had it not has been able to sustain itself. This accounts for the prevalence of this faculty, provided it was only a possible one. But how can it be possible? What could enable the mind to know physical things which do not physically influence it and which it does not influence? The question cannot be answered by any statement concerning the human mind, for it is equivalent to asking what makes the facts usually to be, as inductive and hypothetic conclusions from true premisses represent them to be? Facts of a certain kind are usually true when facts having certain relations to them are true; what is the cause of this? That is the question.

342. The usual reply is that nature is everywhere regular; as things have been, so they will be; as one part of nature is, so is every other. But this explanation will not do. Nature is not regular. No disorder would be less orderly than the existing arrangement. It is true that the special laws and regularities are innumerable; but nobody thinks of the irregularities, which are infinitely more frequent. Every fact true of any one thing in the universe is related to every fact true of every other. But the immense majority of these relations are fortuitous and irregular. A man in China bought a cow three days and five minutes after a Greenlander had sneezed. Is that abstract circumstance connected with any regularity whatever? And are not such relations infinitely more frequent than those which are regular? But if a very large number of qualities were to be distributed among a very large number of things in almost any way, there would chance to be some few regularities. If, for example, upon a checker-board of an

enormous number of squares, painted all sorts of colors, myriads of dice were to be thrown, it could hardly fail to happen, that upon some color, or shade of color, out of so many, some one of the six numbers should not be uppermost on any die. This would be a regularity; for, the universal proposition would be true that upon that color that number is never turned up. But suppose this regularity abolished, then a far more remarkable regularity would be created, namely, that on every color every number is turned up. Either way, therefore, a regularity must occur. Indeed, a little reflection will show that, although we have here only variations of color and of the numbers of the dice, many regularities must occur. And the greater the number of objects, the more respects in which they vary, and the greater the number of varieties in each respect, the greater will be the number of regularities. Now, in the universe, all these numbers are infinite. Therefore, however disorderly the chaos, the *number* of regularities must be infinite. The orderliness of the universe, therefore, if it exists, must consist in the large *proportion* of relations which present a regularity to those which are quite irregular. But this proportion in the actual universe is, as we have seen, as small as it can be; and, therefore, the orderliness of the universe is as little as that of any arrangement whatever.

343. But even if there were such an orderliness in things, it never could be discovered. For it would belong to things either collectively or distributively. If it belonged to things collectively, that is to say, if things formed a system, the difficulty would be that a system can only be known by seeing some considerable proportion of the whole. Now we never can know how great a part of the whole of nature we have discovered. If the order were distributive, that is, belonged to all things only by belonging to each thing, the difficulty would be that a character can only be known by comparing something which has it* with something which has it not. *Being, quality, relation*, and other universals are not known except as characters of words or other signs, attributed by a figure of speech to things. Thus, in neither case could the order of things be known. But the order of things would not help the validity of our reasoning — that is, would not help

* "With" and "it" were originally transposed.

us to reason correctly — unless we knew what the order of things required the relation between the known reason *from* to the unknown reasoned *to*, to be.

344. But even if this order both existed and were known, the knowledge would be of no use except as a general principle, from which things could be deduced. It would not explain how knowledge could be increased (in contradistinction to being rendered more distinct), and so it would not explain how it could itself have been acquired.

345. Finally, if the validity of induction and hypothesis were dependent on a particular constitution of the universe, we could imagine a universe in which these modes of inference should not be valid, just as we can imagine a universe in which there would be no attraction, but things should merely drift about. Accordingly, J. S. Mill, who explains the validity of induction by the uniformity of nature,¹ maintains that he can imagine a universe without any regularity, so that no probable inference would be valid in it.² In the universe as it is, probable arguments sometimes fail, nor can any definite proportion of cases be stated in which they hold good; all that can be said is that in the long run they prove approximately correct. Can a universe be imagined in which this would not be the case? It must be a universe where probable argument can have some application, in order that it may fail half the time. It must, therefore, be a universe experienced. Of the finite number of propositions true of a finite amount of experience of such a universe, no one would be universal in form, unless the subject of it were an individual. For if there were a plural universal proposition, inferences by analogy from one

¹ *Logic*, Book 3, chap. 3, sec. 1. [Cf. 2.761ff.]

² *Ibid.* Book 3, chap. 21, sec. 1. "I am convinced that any one accustomed to abstraction and analysis, who will fairly exert his faculties for the purpose, will, when his imagination has once learnt to entertain the notion, find no difficulty in conceiving that in some one, for instance, of the many firmaments into which sidereal astronomy divides the universe, events may succeed one another at random, without any fixed law; nor can anything in our experience or mental nature constitute a sufficient, or indeed any, reason for believing that this is nowhere the case.

Were we to suppose (what it is perfectly possible to imagine) that the present order of the universe were brought to an end, and that a chaos succeeded, in which there was no fixed succession of events, and the past gave no assurance of the future," etc.

particular to another would hold good invariably in reference to that subject. So that these arguments might be no better than guesses in reference to other parts of the universe, but they would invariably hold good in a finite proportion of it, and so would on the whole be somewhat better than guesses. There could, also, be no individuals in that universe, for there must be some general class — that is, there must be some things more or less alike — or probable argument would find no premisses there; therefore, there must be two mutually exclusive classes, since every class has a residue outside of it; hence, if there were any individual, that individual would be wholly excluded from one or other of these classes. Hence, the universal plural proposition would be true, that no one of a certain class was that individual. Hence, no universal proposition would be true. Accordingly, every combination of characters would occur in such a universe. But this would not be disorder, but the simplest order; it would not be unintelligible, but, on the contrary, everything conceivable would be found in it with equal frequency. The notion, therefore, of a universe in which probable arguments should fail as often as hold true, is absurd.* We can suppose it in general terms, but we cannot specify how it should be other than self-contradictory.¹

346. Since we cannot conceive of probable inferences as not generally holding good, and since no special supposition will serve to explain their validity, many logicians have sought to base this validity on that of deduction, and that in a variety of ways. The only attempt of this sort, however, which deserves to be noticed is that which seeks to determine the probability of a future event by the theory of probabilities, from the fact that a certain number of similar events have been observed. Whether this can be done or not depends on the meaning assigned to the word probability. But if this

* Cf. 2.683f, 2.745f, 6.400ff.

¹ Boole (*Laws of Thought*, p. 370) has shown, in a very simple and elegant manner, that an *infinite* number of balls may have characters distributed in such a way, that from the characters of the balls already drawn, we could infer nothing in regard to that of the characters of the next one. The same is true of some arrangements of a finite number of balls, provided the inference takes place after a fixed number of drawings. But this does not invalidate the reasoning above, although it is an important fact without doubt.

word is to be taken in such a sense that a form of conclusion which is probable is valid; since the validity of an inference (or its correspondence with facts) consists solely in this, that when such premisses are true, such a conclusion is generally true, then probability can mean nothing but the ratio of the frequency of occurrence of a specific event to a general one over it. In this sense of the term, it is plain that the probability of an inductive conclusion cannot be *deduced* from the premisses; for from the inductive premisses

$$\begin{aligned} S', S'', S''' \text{ are } M, \\ S', S'', S''' \text{ are } P, \end{aligned}$$

nothing follows deductively, except that any M , which is S' , or S'' , or S''' is P ; or, less explicitly, that some M is P .

347. Thus, we seem to be driven to this point. On the one hand, no determination of things, no *fact*, can result in the validity of probable argument; nor, on the other hand, is such argument reducible to that form which holds good, however the facts may be. This seems very much like a reduction to absurdity of the validity of such reasoning; and a paradox of the greatest difficulty is presented for solution.

348. There can be no doubt of the importance of this problem. According to Kant, the central question of philosophy is "How are synthetical judgments *a priori* possible?" But antecedently to this comes the question how synthetical judgments in general, and still more generally, how synthetical reasoning is possible at all. When the answer to the general problem has been obtained, the particular one will be comparatively simple. This is the lock upon the door of philosophy.*

349. All probable inference, whether induction or hypothesis, is inference from the parts to the whole. It is essentially the same, therefore, as statistical inference. Out of a bag of black and white beans I take a few handfuls, and from this sample I can judge approximately the proportions of black and white in the whole. This is identical with induction. Now we know upon what the validity of this inference depends. It depends upon the fact that in the long run, any one bean would be taken out as often as any other. For were this not so, the mean of a large number of results of such testings of

* Cf. 2.690ff.

the contents of the bag would not be precisely the ratio of the numbers of the two colors of beans in the bag. Now we may divide the question of the validity of induction into two parts: first, why of all inductions premisses for which occur, the generality should hold good, and second, why men are not fated always to light upon the small proportion of worthless inductions. Then, the first of these two questions is readily answered. For since all the members of any class are the same as all that are to be known; and since from any part of those which are to be known an induction is competent to the rest, in the long run any one member of a class will occur as the subject of a premiss of a possible induction as often as any other, and, therefore, the validity of induction depends simply upon the fact that the parts make up and constitute the whole. This in its turn depends simply upon there being such a state of things that any general terms are possible. But it has been shown in 311 that being at all is being in general. And thus this part of the validity of induction depends merely on there being any reality.

350. From this it appears that we cannot say that the generality of inductions are true, but only that in the long run they approximate to the truth. This is the truth of the statement, that the universality of an inference from induction is only the analogue of true universality. Hence, also, it cannot be said that we know an inductive conclusion to be true, however loosely we state it; we only know that by accepting inductive conclusions, in the long run our errors balance one another. In fact, insurance companies proceed upon induction; — they do not know what will happen to this or that policyholder; they only know that they are secure in the long run.

351. The other question relative to the validity of induction, is why men are not fated always to light upon those inductions which are highly deceptive. The explanation of the former branch of the problem we have seen to be that there is something real. Now, since if there is anything real, then (on account of this reality consisting in the ultimate agreement of all men, and on account of the fact that reasoning from parts to whole, is the only kind of synthetic reasoning which men possess) it follows necessarily that a sufficiently

long succession of inferences from parts to whole will lead men to a knowledge of it, so that in that case they cannot be fated on the whole to be thoroughly unlucky in their inductions. This second branch of the problem is in fact equivalent to asking why there is anything real, and thus its solution will carry the solution of the former branch one step further.

352.* The answer to this question may be put into a general and abstract, or a special detailed form. If men were not to be able to learn from induction, it must be because as a general rule, when they had made an induction, the order of things (as they appear in experience), would then undergo a revolution. Just herein would the unreality of such a universe consist; namely, that the order of the universe should depend on how much men should know of it. But this general rule would be capable of being itself discovered by induction; and so it must be a law of such a universe, that when this was discovered it would cease to operate. But this second law would itself be capable of discovery. And so in such a universe there would be nothing which would not sooner or later be known; and it would have an order capable of discovery by a sufficiently long course of reasoning. But this is contrary to the hypothesis, and therefore that hypothesis is absurd. This is the particular answer. But we may also say, in general, that if nothing real exists, then, since every question supposes that something exists — for it maintains its own urgency — it supposes only illusions to exist. But the existence even of an illusion is a reality; for an illusion affects all men, or it does not. In the former case, it is a reality according to our theory of reality; in the latter case, it is independent of the state of mind of any individuals except those whom it happens to affect. So that the answer to the question, Why is anything real? is this: That question means, “supposing anything to exist, why is something real?” The answer is, that that very existence is reality by definition.

All that has here been said, particularly of induction, applies to all inference from parts to whole, and therefore to hypothesis, and so to all probable inference.

Thus, I claim to have shown, in the first place, that it is

* Cf. 405ff.

possible to hold a consistent theory of the validity of the laws of ordinary logic.

353. But now let us suppose the idealistic theory of reality, which I have in this paper taken for granted to be false. In that case, inductions would not be true unless the world were so constituted that every object should be presented in experience as often as any other; and further, unless we were so constituted that we had no more tendency to make bad inductions than good ones. These facts might be explained by the benevolence of the Creator; but, as has already been argued, they could not explain, but are absolutely refuted by the fact that no state of things can be conceived in which probable arguments should not lead to the truth. This affords a most important argument in favor of that theory of reality, and thus of those denials of certain faculties from which it was deduced, as well as of the general style of philosophizing by which those denials were reached.

354. Upon our theory of reality and of logic, it can be shown that no inference of any individual can be thoroughly logical without certain determinations of his mind which do not concern any one inference immediately; for we have seen that that mode of inference which alone can teach us anything, or carry us at all beyond what was implied in our premisses — in fact, does not give us to know any more than we knew before; only, we know that, by faithfully adhering to that mode of inference, we shall, on the whole, approximate to the truth. Each of us is an insurance company, in short. But, now, suppose that an insurance company, among its risks, should take one exceeding in amount the sum of all the others. Plainly, it would then have no security whatever. Now, has not every single man such a risk? What shall it profit a man if he shall gain the whole world and lose his own soul? If a man has a transcendent personal interest infinitely outweighing all others, then, upon the theory of validity of inference just developed, he is devoid of all security, and can make no valid inference whatever. What follows? That logic rigidly requires, before all else, that no determinate fact, nothing which can happen to a man's self, should be of more consequence to him than everything else. He who would not sacrifice his own soul to save the whole world, is illogical in

all his inferences, collectively. So the social principle is rooted intrinsically in logic.*

355. That being the case, it becomes interesting to inquire how it is with men as a matter of fact. There is a psychological theory that man cannot act without a view to his own pleasure. This theory is based on a falsely assumed subjectivism. Upon our principles of the objectivity of knowledge, it could not be based; and if they are correct, it is reduced to an absurdity. It seems to me that the usual opinion of the selfishness of man is based in large measure upon this false theory. I do not think that the facts bear out the usual opinion. The immense self-sacrifices which the most wilful men often make, show that wilfulness is a very different thing from selfishness. The care that men have for what is to happen after they are dead, cannot be selfish. And finally and chiefly, the constant use of the word "*we*"—as when we speak of our possessions on the Pacific—our destiny as a republic—in cases in which no personal interests at all are involved, show conclusively that men do not make their personal interests their only ones, and therefore may, at least, subordinate them to the interests of the community.

356. But just the revelation of the possibility of this complete self-sacrifice in man, and the belief in its saving power, will serve to redeem the logicality of all men. For he who recognizes the logical necessity of complete self-identification of one's own interests with those of the community, and its potential existence in man, even if he has it not himself, will perceive that only the inferences of that man who has it are logical, and so views his own inferences as being valid only so far as they would be accepted by that man. But so far as he has this belief, he becomes identified with that man. And that ideal perfection of knowledge by which we have seen that reality is constituted must thus belong to a community in which this identification is complete.

357. This would serve as a complete establishment of private logicality, were it not that the assumption, that man or the community (which may be wider than man) shall ever arrive at a state of information greater than some definite finite information, is entirely unsupported by reasons. There

* Cf. 2.654f.

cannot be a scintilla of evidence to show that at some time all living beings shall not be annihilated at once, and that forever after there shall be throughout the universe any intelligence whatever. Indeed, this very assumption involves itself a transcendent and supreme interest, and therefore from its very nature is unsusceptible of any support from reasons. This infinite hope which we all have (for even the atheist will constantly betray his calm expectation that what is Best will come about) is something so august and momentous, that all reasoning in reference to it is a trifling impertinence. We do not want to know what are the weights of reasons *pro* and *con* — that is, how much *odds* we should wish to receive on such a venture in the long run — because there is no long run in the case; the question is single and supreme, and ALL is at stake upon it. We are in the condition of a man in a life and death struggle; if he have not sufficient strength, it is wholly indifferent to him how he acts, so that the only assumption upon which he can act rationally is the hope of success. So this sentiment is rigidly demanded by logic. If its object were any determinate fact, any private interest, it might conflict with the results of knowledge and so with itself; but when its object is of a nature as wide as the community can turn out to be, it is always a hypothesis uncontradicted by facts and justified by its indispensableness for making any action rational.

IV

THE FIXATION OF BELIEF*

§1. SCIENCE AND LOGIC^E

358. Few persons care to study logic, because everybody conceives himself to be proficient enough in the art of reasoning already. But I observe that this satisfaction is limited to one's own ratiocination, and does not extend to that of other men.

359. We come to the full possession of our power of drawing inferences, the last of all our faculties; for it is not so much a natural gift as a long and difficult art. The history of its practice would make a grand subject for a book. The medieval schoolman, following the Romans, made logic the earliest of a boy's studies after grammar, as being very easy. So it was as they understood it. Its fundamental principle,

* *Popular Science Monthly*, pp. 1-15, vol. 12 (1877), the first of six papers of a series entitled "Illustrations of the Logic of Science"; with corrections and notes from several revised versions, one of which was intended as chapter 5 of the "Grand Logic" of 1893 and another of which was intended as Essay VII of the "Search for a Method" of 1893. The second paper is no. V of this book, the third, fourth and sixth occur as chapters 6, 7 and 5 respectively of vol. 2, bk. III, while the fifth paper serves as chapter 1 of bk. II, vol. 6. About 1903 the following introduction was attached to this and the following paper: "The two chapters composing this Essay ['My Plea for Pragmatism'] were first published, without any title for the whole [they appeared with a title] in the *Popular Science Monthly* for November 1877 and January 1878. A French version by the author (the second having in fact been first written in French on board a steamer in September 1877) appeared in the *Revue Philosophique*, vols. 6 and 7. They received as little attention as they laid claim to; but some years later the potent pen of Professor James brought their chief thesis to the attention of the philosophic world (pressing it, indeed, further than the tether of their author would reach, who continues to acknowledge, not indeed the Existence, but yet the Reality, of the Absolute, nearly as it has been set forth, for example, by Royce in his *The World and the Individual*, a work not free from faults of logic, yet valid in the main). The doctrine of this pair of chapters had already for some years been known among friends of the writer by the name he had proposed for it, which was 'Pragmatism.'"

according to them, was, that all knowledge rests either on* authority or reason; but that whatever is deduced by reason depends ultimately on a premiss derived from authority. Accordingly, as soon as a boy was perfect in the syllogistic procedure, his intellectual kit of tools was held to be complete.

360. To Roger Bacon,† that remarkable mind who in the middle of the thirteenth century was almost a scientific man, the schoolmen's conception of reasoning appeared only an obstacle to truth. He saw that experience alone teaches anything — a proposition which to us seems easy to understand, because a distinct conception of experience has been handed down to us from former generations; which to him likewise‡ seemed perfectly clear, because its difficulties had not yet unfolded themselves. Of all kinds of experience, the best, he thought, was interior illumination, which teaches many things about Nature which the external senses could never discover, such as the transubstantiation of bread.

361. Four centuries later, the more celebrated Bacon, in the first book of his *Novum Organum*, gave his clear account of experience as something which must be open to verification and reëxamination. But, superior as Lord Bacon's conception is to earlier notions, a modern reader who is not in awe of his grandiloquence is chiefly struck by the inadequacy of his view of scientific procedure. That we have only to make some crude experiments, to draw up briefs of the results in certain blank forms, to go through these by rule, checking off everything disproved and setting down the alternatives, and that thus in a few years physical science would be finished up — what an idea! “He wrote on science like a Lord Chancellor,”¹ indeed, as Harvey, a genuine man of science said.§

362. The early scientists, Copernicus, Tycho Brahe, Kepler, Galileo, Harvey¶, and Gilbert, had methods more like those of their modern brethren. Kepler undertook to draw a curve through the places of Mars,² and to state the times occu-

* “On” and “either” originally transposed.

† See his *Opus Majus*, pars VI.

‡ Originally “also.”

¹ Cf. J. Aubrey's *Brief Lives* (Oxford ed. 1898), I, 299.

§ “as . . . said” added c. 1910.

¶ Not in the original.

² Not quite so, but as nearly so as can be told in a few words.

pied by the planet in describing the different parts of that curve;* but perhaps† his greatest service to science was in impressing on men's minds that this was the thing to be done if they wished to improve astronomy; that they were not to content themselves with inquiring whether one system of epicycles was better than another but that they were to sit down to the figures and find out what the curve, in truth, was. He accomplished this by his incomparable energy and courage, blundering along in the most inconceivable way (to us), from one irrational hypothesis to another, until, after trying twenty-two of these, he fell, by the mere exhaustion of his invention, upon the orbit which a mind well furnished with the weapons of modern logic would have tried almost at the outset.¹

363. In the same way, every work of science great enough to be well‡ remembered for a few generations affords some exemplification of the defective state of the art of reasoning of the time when it was written; and each chief step in science has been a lesson in logic. It was so when Lavoisier and his contemporaries took up the study of Chemistry. The old chemist's maxim had been, "Lege, lege, lege, labora, ora, et relege." Lavoisier's method was not to read and pray, but to dream that some long and complicated chemical process would have a certain effect, to put it into practice with dull patience, after its inevitable failure, to dream that with some modification it would have another result, and to end by publishing the last dream as a fact: his way was to carry his mind into his laboratory, and literally§ to make of his alembics and cucurbits instruments of thought, giving a new conception of reasoning as something which was to be done with one's eyes open, in¶ manipulating real things instead of words and fancies.

* "and . . . curve" added c. 1910.

† "but perhaps," originally "and."

¹ I am ashamed at being obliged to confess that this volume contains a very false and foolish remark about Kepler. When I wrote it, I had never studied the original book as I have since. It is now my deliberate opinion that it is the most marvellous piece of inductive reasoning I have been able to find. — 1893. [Peirce partially rectifies this error c. 1910 by deleting the expression "in . . . us." See also 1.72ff, 2.96f.]

‡ Not in original.

§ Not in original.

¶ Originally 'by.'

364. The Darwinian controversy is, in large part, a question of logic. Mr. Darwin proposed to apply the statistical method to biology.¹ The same thing has been done in a widely different branch of science, the theory of gases. Though unable to say what the movements of any particular molecule of gas would be on a certain hypothesis regarding the constitution of this class of bodies, Clausius and Maxwell were yet able, eight years before the publication of Darwin's immortal work,* by the application of the doctrine of probabilities, to predict that in the long run such and such a proportion of the molecules would, under given circumstances, acquire such and such velocities; that there would take place, every second, such and such a relative† number of collisions, etc.; and from these propositions were able to deduce certain properties of gases, especially in regard to their heat-relations. In like manner, Darwin, while unable to say what the operation of variation and natural selection in any individual case will be, demonstrates that in the long run they will, or‡ would,‡ adapt animals to their circumstances. Whether or not existing animal forms are due to such action, or what position the theory ought to take, forms the subject of a discussion in which questions of fact and questions of logic are curiously interlaced.

§2. GUIDING PRINCIPLES^E

365. The object of reasoning is to find out, from the consideration of what we already know, something else which we do not know. Consequently, reasoning is good if it be such as to² give a true conclusion from true premisses, and not otherwise. Thus, the question of validity is purely one of fact and not of thinking. A being the facts stated in the§ premisses

¹ What he did, a most instructive illustration of the logic of science, will be described in another chapter [where?]; and we now know what was authoritatively denied when I first suggested it, that he took a hint from Malthus' book on Population.— 1903.

* "eight . . . work" inserted c. 1910.

† Not in original.

‡ Not in original.

² I.e., be dominated by such a habit as generally to give. — 1903.

§ "facts . . . the" not in original.

and B being that concluded,* the question is, whether these facts are really so related that if A were B would generally be.† If so, the inference is valid; if not, not. It is not in the least the question whether, when the premisses are accepted by the mind, we feel an impulse to accept the conclusion also. It is true that we do generally reason correctly by nature. But that is an accident; the true conclusion would remain true if we had no impulse to accept it; and the false one would remain false, though we could not resist the tendency to believe in it.

366. We are, doubtless, in the main logical animals, but we are not perfectly so. Most of us, for example, are naturally more sanguine and hopeful than logic would justify. We seem to be so constituted that in the absence of any facts to go upon we are happy and self-satisfied; so that the effect of experience is continually to contract our hopes and aspirations. Yet a lifetime of the application of this corrective does not usually eradicate our sanguine disposition. Where hope is unchecked by any experience, it is likely that our optimism is extravagant. Logicality in regard to practical matters (if this be understood, not in the old sense, but as consisting in a wise union of security with fruitfulness of reasoning‡) is the most useful quality an animal can possess, and might, therefore, result from the action of natural selection; but outside of these it is probably of more advantage to the animal to have his mind filled with pleasing and encouraging visions, independently of their truth; and thus, upon unpractical subjects, natural selection might occasion a fallacious tendency of thought.¹

367. That which determines us, from given premisses, to draw one inference rather than another, is some habit of mind, whether it be constitutional or acquired. The habit is good or otherwise, according as it produces true conclusions from true premisses or not; and an inference is regarded as valid or not, without reference to the truth or falsity of its conclu-

* Originally "the conclusion."

† "A . . . be," originally "A is B is."

‡ The portion within the parentheses was inserted c. 1910.

¹ Let us not, however, be cocksure that natural selection is the only factor of evolution; and until this momentous proposition has been much better proved than as yet it has been, let it not blind us to the force [of] very sound reasoning. — 1903.

sion specially, but according as the habit which determines it is such as to produce true conclusions in general or not. The particular habit of mind which governs this or that inference may be formulated in a proposition whose truth depends on the validity of the inferences which the habit determines; and such a formula is called a *guiding principle* of inference. Suppose, for example, that we observe that a rotating disk of copper quickly comes to rest when placed between the poles of a magnet, and we infer that this will happen with every disk of copper. The guiding principle is, that what is true of one piece of copper is true of another. Such a guiding principle with regard to copper would be much safer than with regard to many other substances — brass, for example.

368. A book might be written to signalize all the most important of these guiding principles of reasoning. It would probably be, we must confess, of no service to a person whose thought is directed wholly to practical subjects, and whose activity moves along thoroughly-beaten paths. The problems that* present themselves to such a mind are matters of routine which he has learned once for all to handle in learning his business. But let a man venture into an unfamiliar field, or where his results are not continually checked by experience, and all history shows that the most masculine intellect will oftentimes lose his orientation and waste his efforts in directions which bring him no nearer to his goal, or even carry him entirely astray. He is like a ship in the open sea, with no one on board who understands the rules of navigation. And in such a case some general study of the guiding principles of reasoning would be sure to be found useful.

369. The subject could hardly be treated, however, without being first limited; since almost any fact may serve as a guiding principle. But it so happens that there exists a division among facts, such that in one class are all those which are absolutely essential as guiding principles, while in the others are all which have any other interest as objects of research. This division is between those which are necessarily taken for granted in asking why† a certain conclusion is thought

* Originally "which."

† Originally "whether."

to follow* from certain premisses, and those which are not implied in such a† question. A moment's thought will show that a variety of facts are already assumed when the logical question is first asked. It is implied, for instance, that there are such states of mind as doubt and belief — that a passage from one to the other is possible, the object of thought remaining the same, and that this transition is subject to some rules by‡ which all minds are alike bound. As these are facts which we must already know before we can have any clear conception of reasoning at all, it cannot be supposed to be any longer of much interest to inquire into their truth or falsity. On the other hand, it is easy to believe that those rules of reasoning which are deduced from the very idea of the process are the ones which are the most essential; and, indeed, that so long as it conforms to these it will, at least, not lead to false conclusions from true premisses. In point of fact, the importance of what may be deduced from the assumptions involved in the logical question turns out to be greater than might be supposed, and this for reasons which it is difficult to exhibit at the outset. The only one which I shall here mention is, that conceptions which are really products of logical reflection, without being readily seen to be so, mingle with our ordinary thoughts, and are frequently the causes of great confusion. This is the case, for example, with the conception of quality. A quality, as such, is never an object of observation. We can see that a thing is blue or green, but the quality of being blue and the quality of being green are not things which we see; they are products of logical reflections. The truth is, that common-sense, or thought as it first emerges above the level of the narrowly practical, is deeply imbued with that bad logical quality to which the epithet *metaphysical* is commonly applied; and nothing can clear it up but a severe course of logic.

§3. DOUBT AND BELIEF^E

370. We generally know when we wish to ask a question and when we wish to pronounce a judgment, for there is a

* "is . . . follow," originally "follows."

† "such a" originally "that."

‡ "by" originally at the end of the sentence.

dissimilarity between the sensation of doubting and that of believing.

371. But this is not all which distinguishes doubt from belief. There is a practical difference. Our beliefs guide our desires and shape our actions. The Assassins, or followers of the Old Man of the Mountain, used to rush into death at his least command, because they believed that obedience to him would insure everlasting felicity. Had they doubted this, they would not have acted as they did. So it is with every belief, according to its degree. The feeling of believing is a more or less sure indication of there being established in our nature some habit which will determine our actions.¹ Doubt never has such an effect.

372. Nor must we overlook a third point of difference. Doubt is an uneasy and dissatisfied state from which we struggle to free ourselves and pass into the state of belief;² while the latter is a calm and satisfactory state which we do not wish to avoid, or to change to a belief in anything else.³

¹ Let us recall the nature of a sign and ask ourselves how we can know that a feeling of any sort is a sign that we have a habit implanted within us.

We can understand one habit by likening it to another habit. But to understand what any habit is, there must be some habit of which we are directly conscious in its generality. That is to say, we must have a certain generality in our direct consciousness. Bishop Berkeley and a great many clear thinkers laugh at the idea of our being able to imagine a triangle that is neither equilateral, isosceles, nor scalene. They seem to think the object of imagination must be precisely determinate in every respect. But it seems certain that something general we must imagine. I do not intend, in this book, to go into questions of psychology. It is not necessary for us to know in detail how our thinking is done, but only how it can be done. Still, I may as well say, at once, that I think our direct consciousness covers a duration of time, although only an infinitely brief duration. At any rate, I can see no way of escaping the proposition that to attach any general significance to a sign and to know that we do attach a general significance to it, we must have a direct imagination of something not in all respects determinate. — 1893. [Cf. 299f.]

² In this, it is like any other stimulus. It is true that just as men may, for the sake of the pleasures of the table, like to be hungry and take means to make themselves so, although hunger always involves a desire to fill the stomach, so for the sake of the pleasures of inquiry, men may like to seek out doubts. Yet, for all that, doubt essentially involves a struggle to escape it. — 1893.

³ I am not speaking of secondary effects occasionally produced by the interference of other impulses. ["secondary . . . produced by" changed in 1910 to "accidental . . . superinduced by reflexion or . . ."]

On the contrary, we cling tenaciously, not merely to believing, but to believing just what we do believe.

373. Thus, both doubt and belief have positive effects upon us, though very different ones. Belief does not make us act at once, but puts us into such a condition that we shall behave in some* certain way, when the occasion arises. Doubt has not the least such† active‡ effect,‡ but stimulates us to inquiry§ until it is destroyed. This reminds us of the irritation of a nerve and the reflex action produced thereby; while for the analogue of belief, in the nervous system, we must look to what are called nervous associations¶ — for example, to that habit of the nerves in consequence of which the smell of a peach will make the mouth water.¹

§4. THE END OF INQUIRY^E

374. The irritation of doubt causes a struggle to attain a state of belief. I shall term this struggle *Inquiry*, though it must be admitted that this is sometimes not a very apt designation.

* Originally "a."

† Not in the original.

‡ "Of this sort" originally followed "effect."

§ Originally "action."

¶ Cf. 297, 394ff, 1.351, 1.390ff, 2.711, 3.155ff.

¹ Doubt, however, is not usually hesitancy about what is to be done then and there. It is anticipated hesitancy about what I shall do hereafter, or a feigned hesitancy about a fictitious state of things. It is the power of making believe we hesitate, together with the pregnant fact that the decision upon the merely make-believe dilemma goes toward forming a bona fide habit that will be operative in a real emergency. It is these two things in conjunction that constitute us intellectual beings.

Every answer to a question that has any meaning is a decision as to how we would act under imagined circumstances, or how the world would be expected to react upon our senses. Thus, suppose I am told that if two straight lines in one plane are cut by a third making the sum of the internal angles on one side less than two right angles, then those lines if sufficiently produced will meet on the side on which the said sum is less than two right angles. This means to me that if I had two lines drawn on a plane and wished to find where they would meet, I could draw a third line cutting them and ascertaining on which side the sum of the two interval angles was less than two right angles, and should lengthen the lines on that side. In like manner, all doubt is a state of hesitancy about an imagined state of things.— 1893.

375. The irritation of doubt is the only immediate motive for the struggle to attain belief. It is certainly best for us that our beliefs should be such as may truly guide our actions so as to satisfy our desires; and this reflection will make us reject every* belief which does not seem to have been so formed as to insure this result. But it will only do so by creating a doubt in the place of that belief.¹ With the doubt, therefore, the struggle begins, and with the cessation of doubt it ends. Hence, the sole object of inquiry is the settlement of opinion. We may fancy that this is not enough for us, and that we seek, not merely an opinion, but a true opinion. But put this fancy to the test, and it proves groundless; for as soon as a firm belief is reached we are entirely satisfied, whether the belief be true or false. And it is clear that nothing out of the sphere of our knowledge can be our object, for nothing which does not affect the mind can be the motive for mental effort. The most that can be maintained is, that we seek for a belief that we shall *think* to be true. But we think each one of our beliefs to be true, and, indeed, it is mere tautology to say so.²

That the settlement of opinion is the sole end of inquiry is a very important proposition. It sweeps away, at once, various vague and erroneous conceptions of proof. A few of these may be noticed here.

376. 1. Some philosophers have imagined that to start an inquiry it was only necessary to utter a question whether orally or by setting† it down upon paper, and have even recommended us to begin our studies with questioning everything! But the mere putting of a proposition into the interrogative form does not stimulate the mind to any struggle after belief. There must be a real and living doubt, and without this all discussion is idle.³

* Originally "any."

¹ Unless, indeed, it leads us to modify our desires. — 1903.

² For truth is neither more nor less than that character of a proposition which consists in this, that belief in the proposition would, with sufficient experience and reflection, lead us to such conduct as would tend to satisfy the desires we should then have. To say that truth means more than this is to say that it has no meaning at all.— 1903.

† "whether . . . setting" originally "or set."

³ So long as we cannot put our fingers on our erroneous opinions, they remain

2. It is a very common idea that a demonstration must rest on some ultimate and absolutely indubitable propositions. These, according to one school, are first principles of a general nature; according to another, are first sensations. But, in point of fact, an inquiry, to have that completely satisfactory result called demonstration, has only to start with propositions perfectly free from all actual doubt. If the premisses are not in fact doubted at all, they cannot be more satisfactory than they are.¹

3. Some people seem to love to argue a point after all the world is fully convinced of it. But no further advance can be made. When doubt ceases, mental action on the subject comes to an end; and, if it did go on, it would be without a purpose.²

§5. METHODS OF FIXING BELIEF^E

377. If the settlement of opinion is the sole object of inquiry, and if belief is of the nature of a habit, why should

our opinions, still. It will be wholesome enough for us to make a general review of the causes of our beliefs; and the result will be that most of them have been taken upon trust and have been held since we were too young to discriminate the credible from the incredible. Such reflections may awaken real doubts about some of our positions. But in cases where no real doubt exists in our minds inquiry will be an idle farce, a mere whitewashing commission which were better let alone. This fault in philosophy was very widespread in those ages in which Disputations were the principal exercises in the universities; that is, from their rise in the thirteenth century down to the middle of the eighteenth, and even to this day in some Catholic institutions. But since those disputations went out of vogue, this philosophic disease is less virulent.—1893.

¹ We have to acknowledge that doubts about them may spring up later; but we can find no propositions which are not subject to this contingency. We ought to construct our theories so as to provide for such discoveries; first, by making them rest on as great a variety of different considerations as possible, and second, by leaving room for the modifications which cannot be foreseen but which are pretty sure to prove needful. Some systems are much more open to this criticism than others. All those which repose heavily upon an "inconceivability of the opposite" have proved particularly fragile and short-lived. Those, however, which rest upon positive evidences and which avoid insisting upon the absolute precision of their dogmas are hard to destroy.—1893.

² Except that of self-criticism. Insert here a section upon self-control and the analogy between Moral and Rational self-control.—1903.

we not attain the desired end, by taking as* answer to a question any† we may fancy, and constantly reiterating it to ourselves, dwelling on all which may conduce to that belief, and learning to turn with contempt and hatred from anything that‡ might disturb it? This simple and direct method is really pursued by many men. I remember once being entreated not to read a certain newspaper lest it might change my opinion upon free-trade. "Lest I might be entrapped by its fallacies and misstatements," was the form of expression. "You are not," my friend said, "a special student of political economy. You might, therefore, easily be deceived by fallacious arguments upon the subject. You might, then, if you read this paper, be led to believe in protection. But you admit that free-trade is the true doctrine; and you do not wish to believe what is not true." I have often known this system to be deliberately adopted. Still oftener, the instinctive dislike of an undecided state of mind, exaggerated into a vague dread of doubt, makes men cling spasmodically to the views they already take. The man feels that, if he only holds to his belief without wavering, it will be entirely satisfactory. Nor can it be denied that a steady and immovable faith yields great peace of mind. It may, indeed, give rise to inconveniences, as if a man should resolutely continue to believe that fire would not burn him, or that he would be eternally damned if he received his *ingesta* otherwise than through a stomach-pump. But then the man who adopts this method will not allow that its inconveniences are greater than its advantages. He will say, "I hold steadfastly to the truth, and the truth is always wholesome." And in many cases it may very well be that the pleasure he derives from his calm faith overbalances any inconveniences resulting from its deceptive character. Thus, if it be true that death is annihilation, then the man who believes that he will certainly go straight to heaven when he dies, provided he have fulfilled certain simple observances in this life, has a cheap pleasure which will not be followed by the least disappointment.¹ A similar considera-

* Originally "any."

† Originally "which."

‡ Originally "which."

¹ Although it certainly may be that it will cause a line of conduct leading to pains that deeper reflection would have avoided.— 1903.

tion seems to have weight with many persons in religious topics, for we frequently hear it said, "Oh, I could not believe so-and-so, because I should be wretched if I did." When an ostrich buries its head in the sand as danger approaches, it very likely takes the happiest course. It hides the danger, and then calmly says there is no danger; and, if it feels perfectly sure there is none, why should it raise its head to see? A man may go through life, systematically keeping out of view all that might cause a change in his opinions, and if he only succeeds — basing his method, as he does, on two fundamental psychological laws — I do not see what can be said against his doing so. It would be an egotistical impertinence to object that his procedure is irrational, for that only amounts to saying that his method of settling belief is not ours. He does not propose to himself to be rational, and, indeed, will often talk with scorn of man's weak and illusive reason. So let him think as he pleases.

378. But this method of fixing belief, which may be called the method of tenacity, will be unable to hold its ground in practice. The social impulse is against it. The man who adopts it will find that other men think differently from him, and it will be apt to occur to him, in some saner moment, that their opinions are quite as good as his own, and this will shake his confidence in his belief. This conception, that another man's thought or sentiment may be equivalent to one's own, is a distinctly new step, and a highly important one. It arises from an impulse too strong in man to be suppressed, without danger of destroying the human species. Unless we make ourselves hermits, we shall necessarily influence each other's opinions; so that the problem becomes how to fix belief, not in the individual merely, but in the community.

379. Let the will of the state act, then, instead of that of the individual. Let an institution be created which shall have for its object to keep correct doctrines before the attention of the people, to reiterate them perpetually, and to teach them to the young; having at the same time power to prevent contrary doctrines from being taught, advocated, or expressed. Let all possible causes of a change of mind be removed from men's apprehensions. Let them be kept ignorant, lest they should learn of some reason to think otherwise than they do.

Let their passions be enlisted, so that they may regard private and unusual opinions with hatred and horror. Then, let all men who reject the established belief be terrified into silence. Let the people turn out and tar-and-feather such men, or let inquisitions be made into the manner of thinking of suspected persons, and when they are found guilty of forbidden beliefs, let them be subjected to some signal punishment. When complete agreement could not otherwise be reached, a general massacre of all who have not thought in a certain way has proved a very effective means of settling opinion in a country. If the power to do this be wanting, let a list of opinions be drawn up, to which no man of the least independence of thought can assent, and let the faithful be required to accept all these propositions, in order to segregate them as radically as possible from the influence of the rest of the world.

This method has, from the earliest times, been one of the chief means of upholding correct theological and political doctrines, and of preserving their universal or catholic character. In Rome, especially, it has been practised from the days of Numa Pompilius to those of Pius Nonus. This is the most perfect example in history; but wherever there is a priesthood — and no religion has been without one — this method has been more or less made use of. Wherever there is an aristocracy, or a guild, or any association of a class of men whose interests depend, or are supposed to depend, on certain propositions, there will be inevitably found some traces of this natural product of social feeling. Cruelties always accompany this system; and when it is consistently carried out, they become atrocities of the most horrible kind in the eyes of any rational man. Nor should this occasion surprise, for the officer of a society does not feel justified in surrendering the interests of that society for the sake of mercy, as he might his own private interests. It is natural, therefore, that sympathy and fellowship should thus produce a most ruthless power.

380. In judging this method of fixing belief, which may be called the method of authority, we must, in the first place, allow its immeasurable mental and moral superiority to the method of tenacity. Its success is proportionately greater; and, in fact, it has over and over again worked the most majestic results. The mere structures of stone which it has caused to

be put together — in Siam, for example, in Egypt, and in Europe — have many of them a sublimity hardly more than rivaled by the greatest works of Nature. And, except the geological epochs, there are no periods of time so vast as those which are measured by some of these organized faiths.¹ If we scrutinize the matter closely, we shall find that there has not been one of their creeds which has remained always the same; yet the change is so slow as to be imperceptible during one person's life, so that individual belief remains sensibly fixed. For the mass of mankind, then, there is perhaps no better method than this. If it is their highest impulse to be intellectual slaves, then slaves they ought to remain.

381. But no institution can undertake to regulate opinions upon every subject. Only the most important ones can be

¹ Unify them in the sense of Alexander Pope's *Universal Prayer*, and who is the individual whose conceit shall stand up and place his dictum against theirs? These faiths lay claim to divine authorship; and it is true that men have no more *invented* them, than the birds have invented their songs. It is a relapse toward the method of tenacity that segregates them and blinds the ecclesiastic to the value of anything but hatred. Every distinctive creed was as a historical fact invented to harm somebody. Still, the upshot has, on the whole, been success unparalleled. If slavery of opinion is natural and wholesome for men, then slaves they ought to remain.

Every such system was first established by some individual legislator or prophet; and once established it grew of itself. But within this principle of growth lurk germs of decay. The power of individualism becomes extinct; the organization alone has life. Now, in the course of ages old questions pass out of mind: new questions become urgent. The sea advances or recedes; some horde which has always lived by conquest happens to make a conquest of consequence to the world at large. In one way or another, commerce is diverted from its ancient roads. Such change brings novel experiences and new ideas. Men begin to rebel at doings of the authorities to which in former times they would have submitted. Questions never before raised come up for decision; yet an individual legislator would no longer be listened to. Never has the instinct of rulers failed to see that the summoning of a council of the people was a measure fraught with peril to authority. Yet however they strive to avoid it, they in effect invoke public opinion, which is a momentous appeal to a new method of settling opinion. Disturbances occur; knots of men discuss the state of affairs; and a suspicion is kindled, which runs about like a train of gun powder, that the Dicta men have been reverencing, originated in caprice, in the pertinacity of some busybody, in the schemes of an ambitious man, or in other influences which are seen to edify a deliberative assembly. Men now begin to demand that, as the power which maintains the belief has become no longer capricious but public and methodical, so the propositions to be believed shall be determined in a public and methodical manner.— 1893.

attended to, and on the rest men's minds must be left to the action of natural causes. This imperfection will be no source of weakness so long as men are in such a state of culture that one opinion does not influence another — that is, so long as they cannot put two and two together. But in the most priest-ridden states some individuals will be found who are raised above that condition. These men possess a wider sort of social feeling; they see that men in other countries and in other ages have held to very different doctrines from those which they themselves have been brought up to believe; and they cannot help seeing that it is the mere accident of their having been taught as they have, and of their having been surrounded with the manners and associations they have, that has caused them to believe as they do and not far differently. Nor can their candour* resist the reflection that there is no reason to rate their own views at a higher value than those of other nations and other centuries; thus giving† rise to doubts in their minds.

382. They will further perceive that such doubts as these must exist in their minds with reference to every belief which seems to be determined by the caprice either of themselves or of those who originated the popular opinions. The willful adherence to a belief, and the arbitrary forcing of it upon others, must, therefore, both be given up. A different‡ new method of settling opinions must be adopted, that§ shall not only produce an impulse to believe, but shall also decide what proposition it is which is to be believed. Let the action of natural preferences be unimpeded, then, and under their influence let men, conversing together and regarding matters in different lights, gradually develop beliefs in harmony with natural causes. This method resembles that by which conceptions of art have been brought to maturity. The most perfect example of it is to be found in the history of metaphysical philosophy. Systems of this sort have not usually rested upon any observed facts, at least not in any great degree. They have been chiefly adopted because their fundamental propositions seemed "agreeable to reason." This is an apt

* "Nor . . . candour" originally "And their candor cannot."

† "thus giving" originally "and this gives."

‡ "A different" originally "And a."

§ Originally "Which."

expression; it does not mean that which agrees with experience, but that which we find ourselves inclined to believe. Plato, for example, finds it agreeable to reason that the distances of the celestial spheres from one another should be proportional to the different lengths of strings which produce harmonious chords. Many philosophers have been led to their main conclusions by considerations like this;¹ but this is the lowest and

¹ Let us see in what manner a few of the greatest philosophers have undertaken to settle opinion, and what their success has been. Descartes, who would have a man begin by doubting everything, remarks that there is one thing he will find himself unable to doubt, and that is, that he does doubt; and when he reflects that he doubts, he can no longer doubt that he exists. Then, because he is all the while doubting whether there are any such things as shape and motion, Descartes thinks he must be persuaded that shape and motion do not belong to his nature, or anything else but consciousness. This is taking it for granted that nothing in his nature lies hidden beneath the surface. Next, Descartes asks the doubter to remark that he has the idea of a Being, in the highest degree intelligent, powerful, and perfect. Now a Being would not have these qualities unless he existed necessarily and eternally. By existing necessarily he means existing by virtue of the existence of the idea. Consequently, all doubt as to the existence of this Being must cease. This plainly supposes that belief is to be fixed by what men find in their minds. He is reasoning like this: I find it written in the volume of my mind that there is something X, which is such a sort of thing that the moment it is written down it exists. Plainly, he is aiming at a kind of truth which saying so can make to be so. He gives two further proofs of God's existence. Descartes makes God easier to know than anything else; for whatever we think He is, He is. He fails to remark that this is precisely the definition of a *figment*. In particular, God cannot be a deceiver; whence it follows, that whatever we quite clearly and distinctly think to be true about any subject, must *be* true. Accordingly, if people will thoroughly discuss a subject, and quite clearly and distinctly make up their minds what they think about it, the desired settlement of the question will be reached. I may remark that the world has pretty thoroughly deliberated upon that theory and has quite distinctly come to the conclusion that it is utter nonsense; whence that judgment is indisputably right.

Many critics have told me that I misrepresent the *a priori* philosophers, when I represent them as adopting whatever opinion there seems to be a natural inclination to adopt. But nobody can say the above does not accurately define the position of Descartes, and upon what does he repose except natural ways of thinking? Perhaps I shall be told however, that since Kant, that vice has been cured. Kant's great boast is that he critically examines into our natural inclinations toward certain opinions. An opinion that something is *universally* true clearly goes further than experience can warrant. An opinion that something is *necessarily* true (that is, not merely is true in the existing state of things, but would be true in every state of things) equally goes further than experience will warrant. Those remarks had been made by Leibniz and admitted

least developed form which the method takes, for it is clear that another man might find Kepler's theory, that the celestial spheres are proportional to the inscribed and circumscribed spheres of the different regular solids, more agreeable to *his* reason. But the shock of opinions will soon lead men to rest by Hume; and Kant reiterates them. Though they are propositions of a nominalistic cast, they can hardly be denied. I may add that whatever is held to be precisely true goes further than experience can possibly warrant. Accepting those criteria of the origin of ideas, Kant proceeds to reason as follows: Geometrical propositions are held to be universally true. Hence, they are not given by experience. Consequently, it must be owing to an inward necessity of man's nature that he sees everything in space. Ergo, the sum of the angles of a triangle will be equal to two right angles for all the objects of our vision. Just that, and nothing more, is Kant's line of thought. But the dry-rot of reason in the seminaries has gone to the point where such stuff is held to be admirable argumentation. I might go through the *Critic of the Pure Reason*, section by section, and show that the thought throughout is precisely of this character. He everywhere shows that ordinary objects, such as trees and gold-pieces, involve elements not contained in the first presentations of sense. But we cannot persuade ourselves to give up the reality of trees and gold-pieces. There is a general inward insistence upon them, and that is the warrant for swallowing the entire bolus of general belief about them. This is merely accepting without question a belief as soon as it is shown to please a great many people very much. When he comes to the ideas of God, Freedom, and Immortality, he hesitates; because people who think only of bread and butter, pleasure and power, are indifferent to those ideas. He subjects these ideas to a different kind of examination, and finally admits them upon grounds which appear to the seminarists more or less suspicious, but which in the eyes of laboratorists are infinitely stronger than the grounds upon which he has accepted space, time, and causality. Those last grounds amount to nothing but this, that what there is a very decided and general inclination to believe must be true. Had Kant merely said, I shall adopt for the present the belief that the three angles of a triangle are equal to two right angles because nobody but brother Lambert and some Italian has ever called it in question, his attitude would be well enough. But on the contrary, he and those who today represent his school distinctly maintain the proposition is *proved*, and the Lambertists *refuted*, by what comes merely to general disinclination to think with them.

As for Hegel, who led Germany for a generation, he recognizes clearly what he is about. He simply launches his boat into the current of thought and allows himself to be carried wherever the current leads. He himself calls his method *dialectic*, meaning that a frank discussion of the difficulties to which any opinion spontaneously gives rise will lead to modification after modification until a tenable position is attained. This is a distinct profession of faith in the method of inclinations.

Other philosophers appeal to "the test of inconceivability of the opposite," to "presuppositions" (by which they mean *Voraussetzungen*, properly translated, *postulates*), and other devices; but all these are but so many systems

on preferences of a far more universal nature. Take, for example, the doctrine that man only acts selfishly — that is, from the consideration that acting in one way will afford him more pleasure than acting in another. This rests on no fact in the world, but it has had a wide acceptance as being the only reasonable theory.¹

383. This method is far more intellectual and respectable from the point of view of reason than either of the others which we have noticed. Indeed, as long as no better method can be applied, it ought to be followed, since it is then the expression of instinct which must be the ultimate cause of belief in all cases.* But its failure has been the most manifest. It makes of inquiry something similar to the development of taste; but taste, unfortunately, is always more or less a matter of fashion, and accordingly metaphysicians have never come to any fixed agreement, but the pendulum has swung backward and forward between a more material and a more spiritual philosophy, from the earliest times to the latest. And so from this, which has been called the *a priori* method, we are driven, of rummaging the garret of the skull to find an enduring opinion about the Universe.

When we pass from the perusal of works upholding the method of authority to those of the philosophers, we not only find ourselves in a vastly higher intellectual atmosphere, but also in a clearer, freer, brighter, and more refreshing moral atmosphere. All this, however, is beside the one significant question of whether the method succeeds in fixing men's opinions. The projects of these authors are most persuasive. One dare swear they should succeed. But in point of fact, up to date they decidedly do not; and the outlook in this direction is most discouraging. The difficulty is that the opinions which today seem most unshakable are found tomorrow to be out of fashion. They are really far more changeable than they appear to a hasty reader to be; since the phrases made to dress out defunct opinions are worn at second hand by their successors.

We still talk of "cause and effect" although, in the mechanical world, the opinion that phrase was meant to express has been shelved long ago. We now know that the acceleration of a particle at any instant depends upon its position relative to other particles at that same instant; while the old idea was that the past affects the future, while the future does not affect the past. So the "law of demand and supply" has utterly different meanings with different economists.— 1893.

¹ An acceptance whose real support has been the opinion that pleasure is the only ultimate good. But this opinion, or even the opinion that pleasure *per se* is any good at all, is only tenable so long as he who holds it remains without any distinct idea of what he means by "good."— 1903.

* This sentence inserted c. 1910.

in Lord Bacon's phrase, to a true induction. We have examined into this *a priori* method as something which promised to deliver our opinions from their accidental and capricious element. But development, while it is a process which eliminates the effect of some casual circumstances, only magnifies that of others. This method, therefore, does not differ in a very essential way from that of authority. The government may not have lifted its finger to influence my convictions; I may have been left outwardly quite free to choose, we will say, between monogamy and polygamy, and, appealing to my conscience only, I may have concluded that the latter practice is in itself licentious. But when I come to see that the chief obstacle to the spread of Christianity among a people of as high culture as the Hindoos has been a conviction of the immorality of our way of treating women, I cannot help seeing that, though governments do not interfere, sentiments in their development will be very greatly determined by accidental causes. Now, there are some people, among whom I must suppose that my reader is to be found, who, when they see that any belief of theirs is determined by any circumstance extraneous to the facts, will from that moment not merely admit in words that that belief is doubtful, but will experience a real doubt of it, so that it ceases in some degree at least* to be a belief.

384. To satisfy our doubts, therefore, it is necessary that a method should be found by which our beliefs may be determined† by nothing human, but by some external permanency — by something upon which our thinking has no effect.¹ Some mystics imagine that they have such a method in a private inspiration from on high. But that is only a form of the method of tenacity, in which the conception of truth as something public is not yet developed. Our external permanency would not be external, in our sense, if it was restricted in its influence to one individual. It must be something which affects, or might affect, every man. And, though these affections are necessarily as various as are individual conditions, yet the method must be such that the ultimate conclusion of every

* "in . . . least" inserted c. 1910.

† Originally "caused."

¹ But which, on the other hand, unceasingly tends to influence thought; or in other words, by something Real.— 1903.

man shall be the same.¹ Such is the method of science. Its fundamental hypothesis, restated in more familiar language, is this: There are Real things, whose characters are entirely independent of our opinions about them; those Reals* affect our senses according to regular laws, and, though our sensations are as different as are † our relations to the objects, yet, by taking advantage of the laws of perception, we can ascertain by reasoning how things really and † truly † are; and any man, if he have sufficient experience and he ‡ reason enough about it, will be led to the one True conclusion. The new conception here involved is that of Reality. It may be asked how I know that there are any Reals. § If this hypothesis is the sole support of my method of inquiry, my method of inquiry must not be used to support my hypothesis. The reply ¶ is this: 1. If investigation cannot be regarded as proving that there are Real things, it at least does not lead to a contrary conclusion; but the method and the conception on which it is based remain ever in harmony. No doubts of the method, therefore, necessarily arise from its practice, as is the case with all the others. 2. The feeling which gives rise to any method of fixing belief is a dissatisfaction at two repugnant propositions. But here already is a vague concession that there is some *one* thing which a proposition should represent. || Nobody, therefore, can really doubt that there are Reals,[°] for,** if he did, doubt would not be a source of dissatisfaction. The hypothesis, therefore, is one which every mind admits. So that the social impulse does not cause men †† to doubt it. 3. Everybody uses the scientific method about a great many things, and only ceases to use it when he does not know how to apply it. 4. Experience of the method has not led us †† to doubt it, but, on the contrary,

¹ Or would be the same if inquiry were sufficiently persisted in.— 1903.

* Originally "realities."

† Not in the original.

‡ Not in the original.

§ Originally "realities."

¶ Cf. 351ff, 405ff.

|| Originally "conform."

[°] Originally "realities."

** Originally "or."

†† Originally "me."

‡‡ Originally "me."

scientific investigation has had the most wonderful triumphs in the way of settling opinion. These afford the explanation of my not doubting the method or the hypothesis which it supposes; and not having any doubt, nor believing that anybody else whom I could influence has, it would be the merest babble for me to say more about it. If there be anybody with a living doubt upon the subject, let him consider it.¹

385. To describe the method of scientific investigation is the object of this series of papers. At present I have only room to notice some points of contrast between it and other methods of fixing belief.

This is the only one of the four methods which presents any distinction of a right and a wrong way. If I adopt the method of tenacity, and shut myself out from all influences, whatever I think necessary to doing this, is necessary according to that method. So with the method of authority: the state may try to put down heresy by means which, from a scientific point of view, seem very ill-calculated to accomplish its purposes; but the only test *on that method* is what the state thinks; so that it cannot pursue the method wrongly. So with the *a priori* method. The very essence of it is to think as one is inclined to think. All metaphysicians will be sure to do that, however they may be inclined to judge each other to be perversely wrong. The Hegelian system recognizes every natural tendency of thought as logical, although it be certain to be abolished by counter-tendencies. Hegel thinks there is a regular

¹ Changes of opinion are brought about by events beyond human control. All mankind were so firmly of opinion that heavy bodies must fall faster than light ones, that any other view was scouted as absurd, eccentric, and probably insincere. Yet as soon as some of the absurd and eccentric men could succeed in inducing some of the adherents of common sense to look at their experiments — no easy task — it became apparent that nature would not follow human opinion, however unanimous. So there was nothing for it but human opinion must move to nature's position. That was a lesson in humility. A few men, the small band of laboratory men, began to see that they had to abandon the pride of an opinion assumed absolutely final in any respect, and to use all their endeavors to yield as unresistingly as possible to the overwhelming tide of experience, which must master them at last, and to listen to what nature seems to be telling us. The trial of this method of experience in natural science for these three centuries — though bitterly detested by the majority of men — encourages us to hope that we are approaching nearer and nearer to an opinion which is not destined to be broken down — though we cannot expect ever quite to reach that ideal goal. — 1893.

system in the succession of these tendencies, in consequence of which, after drifting one way and the other for a long time, opinion will at last go right. And it is true that metaphysicians do* get the right ideas at last; Hegel's system of Nature represents tolerably the science of his† day; and one may be sure that whatever scientific investigation shall‡ have‡ put out of doubt will presently receive *a priori* demonstration on the part of the metaphysicians. But with the scientific method the case is different. I may start with known and observed facts to proceed to the unknown; and yet the rules which I follow in doing so may not be such as investigation would approve. The test of whether I am truly following the method is not an immediate appeal to my feelings and purposes, but, on the contrary, itself involves the application of the method. Hence it is that bad reasoning as well as good reasoning is possible; and this fact is the foundation of the practical side of logic.

386. It is not to be supposed that the first three methods of settling opinion present no advantage whatever over the scientific method. On the contrary, each has some peculiar convenience of its own. The *a priori* method is distinguished for its comfortable conclusions. It is the nature of the process to adopt whatever belief we are inclined to, and there are certain flatteries to the vanity of man which we all believe by nature, until we are awakened from our pleasing dream by§ rough facts. The method of authority will always govern the mass of mankind; and those who wield the various forms of organized force in the state will never be convinced that dangerous reasoning ought not to be suppressed in some way. If liberty of speech is to be untrammelled from the grosser forms of constraint, then uniformity of opinion will be secured by a moral terrorism to which the respectability of society will give its thorough approval. Following the method of authority is the path of peace. Certain non-conformities are permitted; certain others (considered unsafe) are forbidden. These are different in different countries and in different ages; but, wherever you are, let it be known that you seriously hold a tabooed

* Not in the original.

† Originally "that."

‡ Originally "has."

§ "Some" deleted in 1893.

belief, and you may be perfectly sure of being treated with a cruelty less brutal but more refined than hunting you like a wolf. Thus, the greatest intellectual benefactors of mankind have never dared, and dare not now, to utter the whole of their thought; and thus a shade of *prima facie* doubt is cast upon every proposition which is considered essential to the security of society. Singularly enough, the persecution does not all come from without; but a man torments himself and is oftentimes most distressed at finding himself believing propositions which he has been brought up to regard with aversion. The peaceful and sympathetic man will, therefore, find it hard to resist the temptation to submit his opinions to authority. But most of all I admire the method of tenacity for its strength, simplicity, and directness. Men who pursue it are distinguished for their decision of character, which becomes very easy with such a mental rule. They do not waste time in trying to make up their minds what they want, but, fastening like lightning upon whatever alternative comes first, they hold to it to the end, whatever happens, without an instant's irresolution. This is one of the splendid qualities which generally accompany brilliant, unlasting success. It is impossible not to envy the man who can dismiss reason, although we know how it must turn out at last.

387. Such are the advantages which the other methods of settling opinion have over scientific investigation. A man should consider well of them; and then he should consider that, after all, he wishes his opinions to coincide with the fact, and that there is no reason why the results of those three first* methods should do so. To bring about this effect is the prerogative of the method of science. Upon such considerations he has to make his choice — a choice which is far more than the adoption of any intellectual opinion, which is one of the ruling decisions of his life, to which, when once made, he is bound to adhere. The force of habit will sometimes cause a man to hold on to old beliefs, after he is in a condition to see that they have no sound basis. But reflection upon the state of the case will overcome these habits, and he ought to allow reflection its full weight. People sometimes shrink from doing this, having an idea that beliefs are wholesome which they

* Not in the original.

cannot help feeling rest on nothing. But let such persons suppose an analogous though different case from their own. Let them ask themselves what they would say to a reformed Mussulman who should hesitate to give up his old notions in regard to the relations of the sexes; or to a reformed Catholic who should still shrink from reading the Bible. Would they not say that these persons ought to consider the matter fully, and clearly understand the new doctrine, and then ought to embrace it, in its entirety? But, above all, let it be considered that what is more wholesome than any particular belief is integrity of belief, and that to avoid looking into the support of any belief from a fear that it may turn out rotten is quite as immoral as it is disadvantageous. The person who confesses that there is such a thing as truth, which is distinguished from falsehood simply by this, that if acted on it should, on full consideration, carry* us to the point we aim at and not astray, and then, though convinced of this, dares not know the truth and seeks to avoid it, is in a sorry state of mind indeed.

¹ Yes, the other methods do have their merits: a clear logical conscience does cost something — just as any virtue, just as all that we cherish, costs us dear. But we should not desire it to be otherwise. The genius of a man's logical method should be loved and revered as his bride, whom he has chosen from all the world. He need not contemn the others; on the contrary, he may honor them deeply, and in doing so he only honors her the more. But she is the one that he has chosen, and he knows that he was right in making that choice. And having made it, he will work and fight for her, and will not complain that there are blows to take, hoping that there may be as many and as hard to give, and will strive to be the worthy knight and champion of her from the blaze of whose splendors he draws his inspiration and his courage.

* "should . . . carry" originally "will carry."

¹ Delete the remainder. — marginal note, 1893, 1903.

HOW TO MAKE OUR IDEAS CLEAR*

§1. CLEARNESS AND DISTINCTNESS^E

388. Whoever has looked into a modern treatise on logic of the common sort,¹ will doubtless remember the two distinctions between *clear* and *obscure* conceptions, and between *distinct* and *confused* conceptions. They have lain in the books now for nigh two centuries, unimproved and unmodified, and are generally reckoned by logicians as among the gems of their doctrine.

389. A clear idea is defined as one which is so apprehended that it will be recognized wherever it is met with, and so that no other will be mistaken for it. If it fails of this clearness, it is said to be obscure.

This is rather a neat bit of philosophical terminology; yet, since it is clearness that they were defining, I wish the logicians had made their definition a little more plain. Never to fail to recognize an idea, and under no circumstances to mistake another for it, let it come in how recondite a form it may, would indeed imply such prodigious force and clearness of intellect as is seldom met with in this world. On the other hand, merely to have such an acquaintance with the idea as to have become familiar with it, and to have lost all hesitancy in recognizing it in ordinary cases, hardly seems to deserve the name of clearness of apprehension, since after all it only amounts to a subjective feeling of mastery which may be entirely mistaken. I take it, however, that when the logicians speak of "clearness," they mean nothing more than such a familiarity with an idea, since they regard the quality as but

* *Popular Science Monthly*, vol. 12, pp. 286-302 (1878); the second of the papers on the "Illustrations of the Logic of Science"; with corrections and notes from revised versions, one of which was intended as ch. 16 of the "Grand Logic" of 1893 and as Essay IX of the "Search for a Method" of 1893.

¹ One of the treatises upon logic dating from *L'Art de Penser* of the Port Royalists down to very recent times.— 1893.

a small merit, which needs to be supplemented by another, which they call *distinctness*.

390. A distinct idea is defined as one which contains nothing which is not clear. This is technical language; by the *contents* of an idea logicians understand whatever is contained in its definition. So that an idea is *distinctly* apprehended, according to them, when we can give a precise definition of it, in abstract terms. Here the professional logicians leave the subject; and I would not have troubled the reader with what they have to say, if it were not such a striking example of how they have been slumbering through ages of intellectual activity, listlessly disregarding the enginery of modern thought, and never dreaming of applying its lessons to the improvement of logic. It is easy to show that the doctrine that familiar use and abstract distinctness make the perfection of apprehension has its only true place in philosophies which have long been extinct; and it is now time to formulate the method of attaining to a more perfect clearness of thought, such as we see and admire in the thinkers of our own time.

391. When Descartes set about the reconstruction of philosophy, his first step was to (theoretically) permit scepticism and to discard the practice of the schoolmen of looking to authority as the ultimate source of truth. That done, he sought a more natural fountain of true principles, and thought he found* it in the human mind; thus passing, in the directest way, from the method of authority to that of apriority, as described in my first paper.† Self-consciousness was to furnish us with our fundamental truths, and to decide what was agreeable to reason. But since, evidently, not all ideas are true, he was led to note, as the first condition of infallibility, that they must be clear. The distinction between an idea *seeming* clear and really being so, never occurred to him. Trusting to introspection, as he did, even for a knowledge of external things, why should he question its testimony in respect to the contents of our own minds? But then, I suppose, seeing men, who seemed to be quite clear and positive, holding opposite opinions upon fundamental principles, he was further led to say that clearness of ideas is not sufficient, but that they

* "thought he found" originally "professed to find."

† See 383.

need also to be distinct, i.e., to have nothing unclear about them. What he probably meant by this (for he did not explain himself with precision) was, that they must sustain the test of dialectical examination; that they must not only seem clear at the outset, but that discussion must never be able to bring to light points of obscurity connected with them.

392. Such was the distinction of Descartes, and one sees that it was precisely on the level of his philosophy. It was somewhat developed by Leibnitz. This great and singular genius was as remarkable for what he failed to see as for what he saw. That a piece of mechanism could not do work perpetually without being fed with power in some form, was a thing perfectly apparent to him; yet he did not understand that the machinery of the mind can only transform knowledge, but never originate it, unless it be fed with facts of observation. He thus missed the most essential point of the Cartesian philosophy, which is, that to accept propositions which seem perfectly evident to us is a thing which, whether it be logical or illogical, we cannot help doing. Instead of regarding the matter in this way, he sought to reduce the first principles of science to two* classes, those which cannot be denied without self-contradiction, and those which result from the principle of sufficient reason (of which more anon),* and was apparently unaware of the great difference between his position and that of Descartes.¹ So he reverted to the old trivialities† of logic; and, above all, abstract definitions played a great part in his philosophy. It was quite natural, therefore, that on observing that the method of Descartes labored under the difficulty that we may seem to ourselves to have clear apprehensions of ideas which in truth are very hazy, no better remedy occurred to him than to require an abstract definition of every important term. Accordingly, in adopting the distinction of *clear* and *distinct* notions, he described the latter quality as the clear

* "two . . . anon" originally "formulas which cannot be denied without self-contradiction."

¹ He was, however, above all, one of the minds that grow; while at first he was an extreme nominalist, like Hobbes, and dabbled in the nonsensical and impotent *Ars magna* of Raymond Lully, he subsequently embraced the law of continuity and other doctrines opposed to nominalism. I speak here of his earlier views.—1903.

† Originally "formalities."

apprehension of everything contained in the definition; and the books have ever since copied his words.* There is no danger that his chimerical scheme will ever again be over-valued. Nothing new can ever be learned by analyzing definitions. Nevertheless, our existing beliefs can be set in order by this process, and order is an essential element of intellectual economy, as of every other. It may be acknowledged, therefore, that the books are right in making familiarity with a notion the first step toward clearness of apprehension, and the defining of it the second. But in omitting all mention of any higher perspicuity of thought, they simply mirror a philosophy which was exploded a hundred years ago. That much-admired "ornament of logic" — the doctrine of clearness and distinctness — may be pretty enough, but it is high time to relegate to our cabinet of curiosities the antique *bijou*, and to wear about us something better adapted to modern uses.

393.¹ The very first lesson that we have a right to demand that logic shall teach us is, how to make our ideas clear; and a most important one it is, depreciated only by minds who stand in need of it. To know what we think, to be masters of our own meaning, will make a solid foundation for great and weighty thought. It is most easily learned by those whose ideas are meagre and restricted; and far happier they than such as wallow helplessly in a rich mud of conceptions. A nation, it is true, may, in the course of generations, overcome the disadvantage of an excessive wealth of language and its natural concomitant, a vast, unfathomable deep of ideas. We may see it in history, slowly perfecting its literary forms, sloughing at length its metaphysics, and, by virtue of the untirable patience which is often a compensation, attaining great excellence in every branch of mental acquirement. The page of history is not yet unrolled that † is to tell us whether such a people will or will not in the long run prevail over one whose ideas (like the words of their language) are few, but which possesses a wonderful mastery over those which it has. For an individual, however, there can be no question that a few clear ideas are worth more than many confused ones. A

* Cf. his "Meditationes de Cognitione," *Die Philosophische Schriften von Leibniz*, her. von C. I. Gerhardt, Bd. IV, S. 422-427; *Nouveaux Essais*, II, 29.

¹ Delete this paragraph. — 1903.

† Originally "which."

young man would hardly be persuaded to sacrifice the greater part of his thoughts to save the rest; and the muddled head is the least apt to see the necessity of such a sacrifice. Him we can usually only commiserate, as a person with a congenital defect. Time will help him, but intellectual maturity with regard to clearness is apt to* come rather late. This seems† an unfortunate arrangement of Nature, inasmuch as clearness is of less use to a man settled in life, whose errors have in great measure had their effect, than it would be to one whose path lay‡ before him. It is terrible to see how a single unclear idea, a single formula without meaning, lurking in a young man's head, will sometimes act like an obstruction of inert matter in an artery, hindering the nutrition of the brain, and condemning its victim to pine away in the fullness of his intellectual vigor and in the midst of intellectual plenty. Many a man has cherished for years as his hobby some vague shadow of an idea, too meaningless to be positively false; he has, nevertheless, passionately loved it, has made it his companion by day and by night, and has given to it his strength and his life, leaving all other occupations for its sake, and in short has lived with it and for it, until it has become, as it were, flesh of his flesh and bone of his bone; and then he has waked up some bright morning to find it gone, clean vanished away like the beautiful Melusina of the fable, and the essence of his life gone with it. I have myself known such a man; and who can tell how many histories of circle-squarers, metaphysicians, astrologers, and what not, may not be told in the old German [French!] story?

§2. THE PRAGMATIC MAXIM^E

394. The principles set forth in the first part of this essay§ lead, at once, to a method of reaching a clearness of thought of¶ higher grade than the "distinctness" of the logicians. It was there noticed|| that the action of thought is excited by the irritation of doubt, and ceases when belief is attained; so

* "is apt to" not in the original.

† "This seems" not in the original, replacing a semicolon.

‡ Originally "lies."

§ "part . . . essay" originally "of these papers."

¶ "a far," followed "of" in the original.

|| Originally "We have there found"

that the production of belief is the sole function of thought.* All these words, however, are too strong for my purpose. It is as if I had described the phenomena as they appear under a mental microscope. Doubt and Belief, as the words are commonly employed, relate to religious or other grave discussions. But here I use them to designate the starting of any question, no matter how small or how great, and the resolution of it. If, for instance, in a horse-car, I pull out my purse and find a five-cent nickel and five coppers, I decide, while my hand is going to the purse, in which way I will pay my fare. To call such a question Doubt, and my decision Belief, is certainly to use words very disproportionate to the occasion. To speak of such a doubt as causing an irritation which needs to be appeased, suggests a temper which is uncomfortable to the verge of insanity. Yet, looking at the matter minutely, it must be admitted that, if there is the least hesitation as to whether I shall pay the five coppers or the nickel (as there will be sure to be, unless I act from some previously contracted habit in the matter), though irritation is too strong a word, yet I am excited to such small mental activity as may be necessary to deciding how I shall act. Most frequently doubts arise from some indecision, however momentary, in our action. Sometimes it is not so. I have, for example, to wait in a railway-station, and to pass the time I read the advertisements on the walls. I compare the advantages of different trains and different routes which I never expect to take, merely fancying myself to be in a state of hesitancy, because I am bored with having nothing to trouble me. Feigned hesitancy, whether feigned for mere amusement or with a lofty purpose, plays a great part in the production of scientific inquiry. However the doubt may originate, it stimulates the mind to an activity which may be slight or energetic, calm or turbulent. Images pass rapidly through consciousness, one incessantly melting into another, until at last, when all is over — it may be in a fraction of a second, in an hour, or after long years — we find ourselves decided as to how we should act under such circumstances as those which occasioned our hesitation. In other words, we have attained belief.

395. In this process we observe two sorts of elements of consciousness, the distinction between which may best be made

* See 371ff.

clear by means of an illustration. In a piece of music there are the separate notes, and there is the air. A single tone may be prolonged for an hour or a day, and it exists as perfectly in each second of that time as in the whole taken together; so that, as long as it is sounding, it might be present to a sense from which everything in the past was as completely absent as the future itself. But it is different with the air, the performance of which occupies a certain time, during the portions of which only portions of it are played. It consists in an orderliness in the succession of sounds which strike the ear at different times; and to perceive it there must be some continuity of consciousness which makes the events of a lapse of time present to us. We certainly only perceive the air by hearing the separate notes; yet we cannot be said to directly hear it, for we hear only what is present at the instant, and an orderliness of succession cannot exist in an instant. These two sorts of objects, what we are *immediately* conscious of and what we are *mediately* conscious of, are found in all consciousness. Some elements (the sensations) are completely present at every instant so long as they last, while others (like thought) are actions having beginning, middle, and end, and consist in a congruence in the succession of sensations which flow through the mind. They cannot be immediately present to us, but must cover some portion of the past or future. Thought is a thread of melody running through the succession of our sensations.

396. We may add that just as a piece of music may be written in parts, each part having its own air, so various systems of relationship of succession subsist together between the same sensations. These different systems are distinguished by having different motives, ideas, or functions. Thought is only one such system, for its sole motive, idea, and function is to produce belief, and whatever does not concern that purpose belongs to some other system of relations. The action of thinking may incidentally have other results; it may serve to amuse us, for example, and among *dilettanti* it is not rare to find those who have so perverted thought to the purposes of pleasure that it seems to vex them to think that the questions upon which they delight to exercise it may ever get finally settled; and a positive discovery which takes a favorite subject out of the arena of literary debate is met with ill-concealed dislike. This

disposition is the very debauchery of thought. But the soul and meaning of thought, abstracted from the other elements which accompany it, though it may be voluntarily thwarted, can never be made to direct itself toward anything but the production of belief. Thought in action has for its only possible motive the attainment of thought at rest; and whatever does not refer to belief is no part of the thought itself.

397. And what, then, is belief? It is the demi-cadence which closes a musical phrase in the symphony of our intellectual life. We have seen that it has just three properties: First, it is something that we are aware of; second, it appeases the irritation of doubt; and, third, it involves the establishment in our nature of a rule of action, or, say for short, a *habit*. As it appeases the irritation of doubt, which is the motive for thinking, thought relaxes, and comes to rest for a moment when belief is reached. But, since belief is a rule for action, the application of which involves further doubt and further thought, at the same time that it is a stopping-place, it is also a new starting-place for thought. That is why I have permitted myself to call it thought at rest, although thought is essentially an action. The *final* upshot of thinking is the exercise of volition, and of this thought no longer forms a part; but belief is only a stadium of mental action, an effect upon our nature due to thought, which will influence future thinking.

398. The essence of belief is the establishment of a habit; and different beliefs are distinguished by the different modes of action to which they give rise. If beliefs do not differ in this respect, if they appease the same doubt by producing the same rule of action, then no mere differences in the manner of consciousness of them can make them different beliefs, any more than playing a tune in different keys is playing different tunes. Imaginary distinctions are often drawn between beliefs which differ only in their mode of expression;— the wrangling which ensues is real enough, however. To believe that any objects are arranged among themselves* as in Fig. 1, and to believe that they are arranged [as] in Fig. 2, are one and the same belief; yet it is conceivable that a man should assert one proposition and deny the other. Such false distinctions do as much harm as the confusion of beliefs really different, and are among the

* "among themselves" not in the original.

pitfalls of which we ought constantly to beware, especially when we are upon metaphysical ground. One singular deception of this sort, which often occurs, is to mistake the sensation

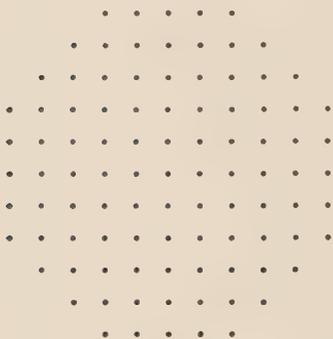


Fig. 1

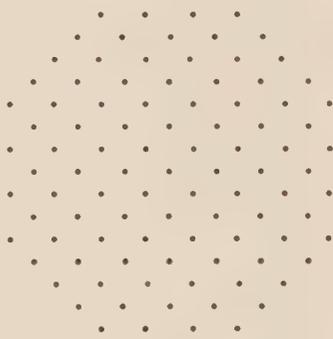


Fig. 2

produced by our own unclearness of thought for a character of the object we are thinking. Instead of perceiving that the obscurity is purely subjective, we fancy that we contemplate a quality of the object which is essentially mysterious; and if our conception be afterward presented to us in a clear form we do not recognize it as the same, owing to the absence of the feeling of unintelligibility. So long as this deception lasts, it obviously puts an impassable barrier in the way of perspicuous thinking; so that it equally interests the opponents of rational thought to perpetuate it, and its adherents to guard against it.

399. Another such deception is to mistake a mere difference in the grammatical construction of two words for a distinction between the ideas they express. In this pedantic age, when the general mob of writers attend so much more to words than to things, this error is common enough. When I just said that thought is an *action*, and that it consists in a *relation*, although a person performs an action but not a relation, which can only be the result of an action, yet there was no inconsistency in what I said, but only a grammatical vagueness.

400. From all these sophisms we shall be perfectly safe so long as we reflect that the whole function of thought is to produce habits of action; and that whatever there is connected with a thought, but irrelevant to its purpose, is an accretion to

it, but no part of it. If there be a unity among our sensations which has no reference to how we shall act on a given occasion, as when we listen to a piece of music, why we do not call that thinking. To develop its meaning, we have, therefore, simply to determine what habits it produces, for what a thing means is simply what habits it involves. Now, the identity of a habit depends on how it might lead us to act, not merely under such circumstances as are likely to arise, but under such as might possibly occur, no matter how improbable they may be.* What the habit is depends on *when* and *how* it causes us to act. As for the *when*, every stimulus to action is derived from perception; as for the *how*, every purpose of action is to produce some sensible result. Thus, we come down to what is tangible and † conceivably † practical, as the root of every real distinction of thought, no matter how subtle it may be; and there is no distinction of meaning so fine as to consist in anything but a possible difference of practice.

401. To see what this principle leads to, consider in the light of it such a doctrine as that of transubstantiation. The Protestant churches generally hold that the elements of the sacrament are flesh and blood only in a tropical sense; they nourish our souls as meat and the juice of it would our bodies. But the Catholics maintain that they are literally just meat and blood ‡; although they possess all the sensible qualities of wafers-cakes and diluted wine. But we can have no conception of wine except what may enter into a belief, either —

1. That this, that, or the other, is wine; or,
2. That wine possesses certain properties.

Such beliefs are nothing but self-notifications that we should, upon occasion, act in regard to such things as we believe to be wine according to the qualities which we believe wine to possess. The occasion of such action would be some sensible perception, the motive of it to produce some sensible result. Thus our action has exclusive reference to what affects the senses, our habit has the same bearing as our action, our belief the same as our habit, our conception the same as our belief; and we can consequently mean nothing by wine but what has certain

* No matter if contrary to all previous experience.— marginal note, 1893.

† Not in the original.

‡ “meat and blood” originally “that.”

effects, direct or indirect, upon our senses; and to talk of something as having all the sensible characters of wine, yet being in reality blood, is senseless jargon. Now, it is not my object to pursue the theological question; and having used it as a logical example I drop it, without caring to anticipate the theologian's reply. I only desire to point out how impossible it is that we should have an idea in our minds which relates to anything but conceived sensible effects of things. Our idea of anything *is* our idea of its sensible effects; and if we fancy that we have any other we deceive ourselves, and mistake a mere sensation accompanying the thought for a part of the thought itself. It is absurd to say that thought has any meaning unrelated to its only function. It is foolish for Catholics and Protestants to fancy themselves in disagreement about the elements of the sacrament, if they agree in regard to all their sensible effects, here and* hereafter.†

402. It appears, then, that the rule for attaining the third grade of clearness of apprehension is as follows: Consider what effects, that‡ might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object.^{1,2,3}

* Originally "or."

† Cf. 541.

‡ Originally "which."

¹ Long addition refuting what comes next.—1903. [This seems to refer to the following, which was written ten years earlier on a different sheet.]

² Before we undertake to apply this rule, let us reflect a little upon what it implies. It has been said to be a sceptical and materialistic principle. But it is only an application of the sole principle of logic which was recommended by Jesus; "Ye may know them by their fruits," and it is very intimately allied with the ideas of the gospel. We must certainly guard ourselves against understanding this rule in too individualistic a sense. To say that man accomplishes nothing but that to which his endeavors are directed would be a cruel condemnation of the great bulk of mankind, who never have leisure to labor for anything but the necessities of life for themselves and their families. But, without directly striving for it, far less comprehending it, they perform all that civilization requires, and bring forth another generation to advance history another step. Their fruit is, therefore, collective; it is the achievement of the whole people. What is it, then, that the whole people is about, what is this civilization that is the outcome of history, but is never completed? We cannot expect to attain a complete conception of it; but we can see that it is a gradual process, that it involves a realization of ideas in man's consciousness and in his works,

§3. SOME APPLICATIONS OF THE PRAGMATIC MAXIM^E

403. Let us illustrate this rule by some examples; and, to begin with the simplest one possible, let us ask what we mean by calling a thing *hard*. Evidently that it will not be scratched by many other substances. The whole conception of this qual-

and that it takes place by virtue of man's capacity for learning, and by experience continually pouring upon him ideas he has not yet acquired. We may say that it is the process whereby man, with all his miserable littlenesses, becomes gradually more and more imbued with the Spirit of God, in which Nature and History are rife. We are also told to believe in a world to come; but the idea is itself too vague to contribute much to the perspicuity of ordinary ideas. It is a common observation that those who dwell continually upon their expectations are apt to become oblivious to the requirements of their actual station. The great principle of logic is self-surrender, which does not mean that self is to lay low for the sake of an ultimate triumph. It may turn out so; but that must not be the governing purpose.

When we come to study the great principle of continuity [see vol. 6, Bk. I, B.] and see how all is fluid and every point directly partakes the being of every other, it will appear that individualism and falsity are one and the same. Meantime, we know that man is not whole as long as he is single, that he is essentially a possible member of society. Especially, one man's experience is nothing, if it stands alone. If he sees what others cannot, we call it hallucination. It is not "my" experience, but "our" experience that has to be thought of; and this "us" has indefinite possibilities.

Neither must we understand the practical in any low and sordid sense. Individual action is a means and not our end. Individual pleasure is not our end; we are all putting our shoulders to the wheel for an end that none of us can catch more than a glimpse at — that which the generations are working out. But we can see that the development of embodied ideas is what it will consist in.— 1893.

³ Note that in these three lines one finds, "conceivably," "conceive," "conception," "conception," "conception." Now I find there are many people who detect the authorship of my unsigned screeds; and I doubt not that one of the marks of my style by which they do so is my inordinate reluctance to repeat a word. This employment five times over of derivatives of *conci pere* must then have had a purpose. In point of fact it had two. One was to show that I was speaking of meaning in no other sense than that of *intellectual purport*. The other was to avoid all danger of being understood as attempting to explain a concept by perceptions, images, schemata, or by anything but concepts. I did not, therefore, mean to say that acts, which are more strictly singular than anything, could constitute the purport, or adequate proper interpretation, of any symbol. I compared action to the finale of the symphony of thought, belief being a demicadence. Nobody conceives that the few bars at the end of a musical movement are the *purpose* of the movement. They may be called its upshot. But the figure

ity, as of every other, lies in its conceived effects. There is absolutely no difference between a hard thing and a soft thing so long as they are not brought to the test. Suppose, then, that a diamond could be crystallized in the midst of a cushion of soft cotton, and should remain there until it was finally burned up. Would it be false to say that that diamond was soft? This seems a foolish question, and would be so, in fact, except in the realm of logic. There such questions are often of the greatest utility as serving to bring logical principles into sharper relief than real discussions ever could. In studying logic we must not put them aside with hasty answers, but must consider them with attentive care, in order to make out the principles involved. We may, in the present case, modify our question, and ask what prevents us from saying that all hard bodies remain

obviously would not bear detailed application. I only mention it to show that the suspicion I myself expressed (Baldwin's *Dictionary* Article, *Pragmatism*) [see 3] after a too hasty rereading of the forgotten magazine paper, that it expressed a stoic, that is, a nominalistic, materialistic, and utterly philistine state of thought, was quite mistaken.

No doubt, Pragmaticism [see 414] makes thought ultimately *apply* to action exclusively — to *conceived* action. But between admitting that and either saying that it makes thought, in the sense of the purport of symbols, to consist in acts, or saying that the true ultimate purpose of thinking is action, there is much the same difference as there is between saying that the artist-painter's living art is applied to dabbing paint upon canvas, and saying that that art-life consists in dabbing paint, or that its ultimate aim is dabbing paint. Pragmaticism makes thinking to consist in the living inferential metaboly of symbols whose purport lies in conditional general resolutions to act. As for the ultimate purpose of thought, which must be the purpose of everything, it is beyond human comprehension; but according to the stage of approach which my thought has made to it — with aid from many persons, among whom I may mention Royce (in his *World and Individual*), Schiller (in his *Riddles of the Sphinx*) as well, by the way, as the famous poet [Friedrich Schiller] (in his *Aesthetische Briefe*), Henry James the elder (in his *Substance and Shadow* and in his conversations), together with Swedenborg himself — it is by the indefinite replication of self-control upon self-control that the *vir* is begotten, and by action, through thought, he grows an esthetic ideal, not for the behoof of his own poor noddle merely, but as the share which God permits him to have in the work of creation.

This ideal, by modifying the rules of self-control modifies action, and so experience too — both the man's own and that of others, and this centrifugal movement thus rebounds in a new centripetal movement, and so on; and the whole is a bit of what has been going on, we may presume, for a time in comparison with which the sum of the geological ages is as the surface of an electron in comparison with that of a planet.— From "Consequences of Pragmaticism," 1906.

perfectly soft until they are touched, when their hardness increases with the pressure until they are scratched. Reflection will show that the reply is this: there would be no *falsity* in such modes of speech. They would involve a modification of our present usage of speech with regard to the words hard and soft, but not of their meanings. For they represent no fact to be different from what it is; only they involve arrangements of facts which would be exceedingly maladroit.* This leads us to remark that the question of what would occur under circumstances which do not actually arise is not a question of fact, but only of the most perspicuous arrangement of them. For example, the question of free-will and fate in its simplest form, stripped of verbiage, is something like this: I have done something of which I am ashamed; could I, by an effort of the will, have resisted the temptation, and done otherwise? The philosophical reply is, that this is not a question of fact, but only of the arrangement of facts.† Arranging them so as to exhibit what is particularly pertinent to my question — namely, that I ought to blame myself for having done wrong — it is perfectly true to say that, if I had willed to do otherwise than I did, I should have done otherwise. On the other hand, arranging the facts so as to exhibit another important consideration, it is equally true that, when a temptation has once been allowed to work, it will, if it has a certain force, produce its effect, let me struggle how I may. There is no objection to a contradiction in what would result from a false supposition. The *reductio ad absurdum* consists in showing that contradictory results would follow from a hypothesis which is consequently judged to be false. Many questions are involved in the free-will discussion, and I am far from desiring to say that both sides are equally right. On the contrary, I am of opinion that one side denies important facts, and that the other does not. But what I do say is, that the above single question was the origin of the whole doubt; that, had it not been for this question, the controversy would never have arisen; and that this question is perfectly solved in the manner which I have indicated.

Let us next seek a clear idea of Weight. This is another very

* But see 453, 457.

† Cf. 339.

easy case. To say that a body is heavy means simply that, in the absence of opposing force, it will fall. This (neglecting certain specifications of how it will fall, etc., which exist in the mind of the physicist who uses the word) is evidently the whole conception of weight. It is a fair question whether some particular facts may not *account* for gravity; but what we mean by the force itself is completely involved in its effects.

404. This leads us to undertake an account of the idea of Force in general. This is the great conception which, developed in the early part of the seventeenth century from the rude idea of a cause, and constantly improved upon since, has shown us how to explain all the changes of motion which bodies experience, and how to think about all physical phenomena; which has given birth to modern science, and changed the face of the globe; and which, aside from its more special uses, has played a principal part in directing the course of modern thought, and in furthering modern social development. It is, therefore, worth some pains to comprehend it. According to our rule, we must begin by asking what is the immediate use of thinking about force; and the answer is, that we thus account for changes of motion. If bodies were left to themselves, without the intervention of forces, every motion would continue unchanged both in velocity and in direction. Furthermore, change of motion never takes place abruptly; if its direction is changed, it is always through a curve without angles; if its velocity alters, it is by degrees. The gradual changes which are constantly taking place are conceived by geometers to be compounded together according to the rules of the parallelogram of forces. If the reader does not already know what this is, he will find it, I hope, to his advantage to endeavor to follow the following explanation; but if mathematics are insupportable to him, pray let him skip three paragraphs rather than that we should part company here.

A *path* is a line whose beginning and end are distinguished. Two paths are considered to be equivalent, which, beginning at the same point, lead to the same point. Thus the two paths, $A B C D E$ and $A F G H E$ (Fig. 3), are equivalent. Paths which do *not* begin at the same point are considered to be equivalent, provided that, on moving either of them without turning it, but keeping it always parallel to its original position,

when its beginning coincides with that of the other path, the ends also coincide. Paths are considered as geometrically added together, when one begins where the other ends; thus

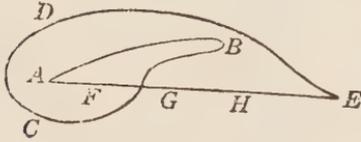


Fig. 3

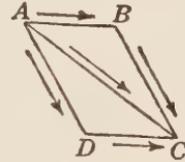


Fig. 4

the path $A E$ is conceived to be a sum of $A B$, $B C$, $C D$, and $D E$. In the parallelogram of Fig. 4 the diagonal $A C$ is the sum of $A B$ and $B C$; or, since $A D$ is geometrically equivalent to $B C$, $A C$ is the geometrical sum of $A B$ and $A D$.

All this is purely conventional. It simply amounts to this: that we choose to call paths having the relations I have described equal or added. But, though it is a convention, it is a convention with a good reason. The rule for geometrical addition may be applied not only to paths, but to any other things which can be represented by paths. Now, as a path is determined by the varying direction and distance of the point which moves over it from the starting-point, it follows that anything which from its beginning to its end is determined by a varying direction and a varying magnitude is capable of being represented by a line. Accordingly, *velocities* may be represented by lines, for they have only directions and rates. The same thing is true of *accelerations*, or changes of velocities. This is evident enough in the case of velocities; and it becomes evident for accelerations if we consider that precisely what velocities are to positions — namely, states of change of them — that accelerations are to velocities.

The so-called “parallelogram of forces” is simply a rule for compounding accelerations. The rule is, to represent the accelerations by paths, and then to geometrically add the paths. The geometers, however, not only use the “parallelogram of forces” to compound different accelerations, but also to resolve one acceleration into a sum of several. Let $A B$ (Fig. 5) be the path which represents a certain acceleration —

say, such a change in the motion of a body that at the end of one second the body will, under the influence of that change, be in a position different from what it would have had if its

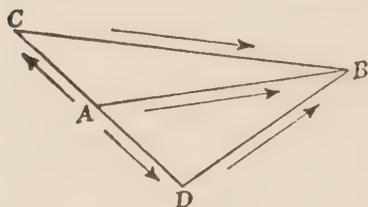


Fig. 5

motion had continued unchanged such that a path equivalent to AB would lead from the latter position to the former. This acceleration may be considered as the sum of the accelerations represented by AC and CB . It may also be considered as the sum of the very different accelerations represented by AD and DB , where AD is almost the opposite of AC . And it is clear that there is an immense variety of ways in which AB might be resolved into the sum of two accelerations.

After this tedious explanation, which I hope, in view of the extraordinary interest of the conception of force, may not have exhausted the reader's patience, we are prepared at last to state the grand fact which this conception embodies. This fact is that if the actual changes of motion which the different particles of bodies experience are each resolved in its appropriate way, each component acceleration is precisely such as is prescribed by a certain law of Nature, according to which bodies, in the relative positions which the bodies in question actually have at the moment,¹ always receive certain accelerations, which, being compounded by geometrical addition, give the acceleration which the body actually experiences.

This is the only fact which the idea of force represents, and whoever will take the trouble clearly to apprehend what this fact is, perfectly comprehends what force is. Whether we ought to say that a force *is* an acceleration, or that it *causes* an acceleration, is a mere question of propriety of language, which has no more to do with our real meaning than the difference between the French idiom "*Il fait froid*" and its English equivalent "*It is cold.*" Yet it is surprising to see how this simple affair has muddled men's minds. In how many profound treatises is not force spoken of as a "mysterious entity," which seems to be

¹ Possibly the velocities also have to be taken into account.

only a way of confessing that the author despairs of ever getting a clear notion of what the word means! In a recent admired work on *Analytic Mechanics** it is stated that we understand precisely the effect of force, but what force itself is we do not understand! This is simply a self-contradiction. The idea which the word force excites in our minds has no other function than to affect our actions, and these actions can have no reference to force otherwise than through its effects. Consequently, if we know what the effects of force are, we are acquainted with every fact which is implied in saying that a force exists, and there is nothing more to know. The truth is, there is some vague notion afloat that a question may mean something which the mind cannot conceive; and when some hair-splitting philosophers have been confronted with the absurdity of such a view, they have invented an empty distinction between positive and negative conceptions, in the attempt to give their non-idea a form not obviously nonsensical. The nullity of it is sufficiently plain from the considerations given a few pages back; and, apart from those considerations, the quibbling character of the distinction must have struck every mind accustomed to real thinking.

§4. REALITY^E

405. Let us now approach the subject of logic, and consider a conception which particularly concerns it, that of *reality*. Taking clearness in the sense of familiarity, no idea could be clearer than this. Every child uses it with perfect confidence, never dreaming that he does not understand it. As for clearness in its second grade, however, it would probably puzzle most men, even among those of a reflective turn of mind, to give an abstract definition of the real. Yet such a definition may perhaps be reached by considering the points of difference between reality and its opposite, fiction. A figment is a product of somebody's imagination; it has such characters as his thought impresses upon it. That those characters are independent of how you or I think is an external reality. There are, however, phenomena within our own minds, dependent upon our thought, which are at the same time real in the sense that we really think them. But though their characters depend on how we think, they do not depend on what we think

*Kirchhoff's *Vorlesungen über math. Physik*, Bd. I, Vorrede.

those characters to be. Thus, a dream has a real existence as a mental phenomenon, if somebody has really dreamt it; that he dreamt so and so, does not depend on what anybody thinks was dreamt, but is completely independent of all opinion on the subject. On the other hand, considering, not the fact of dreaming, but the thing dreamt, it retains its peculiarities by virtue of no other fact than that it was dreamt to possess them. Thus we may define the real as that whose characters are independent of what anybody may think them to be.

406. But, however satisfactory such a definition may be found, it would be a great mistake to suppose that it makes the idea of reality perfectly clear. Here, then, let us apply our rules. According to them, reality, like every other quality, consists in the peculiar sensible effects which things partaking of it produce. The only effect which real things have is to cause belief, for all the sensations which they excite emerge into consciousness in the form of beliefs. The question therefore is, how is true belief (or belief in the real) distinguished from false belief (or belief in fiction). Now, as we have seen in the former paper,* the ideas of truth and falsehood, in their full development, appertain exclusively to the experiential† method of settling opinion. A person who arbitrarily chooses the propositions which he will adopt can use the word truth only to emphasize the expression of his determination to hold on to his choice. Of course, the method of tenacity‡ never prevailed exclusively; reason is too natural to men for that. But in the literature of the dark ages we find some fine examples of it. When Scotus Erigena is commenting upon a poetical passage in which hellebore is spoken of as having caused the death of Socrates, he does not hesitate to inform the inquiring reader that Helleborus and Socrates were two eminent Greek philosophers, and that the latter, having been overcome in argument by the former, took the matter to heart and died of it! What sort of an idea of truth could a man have who could adopt and teach, without the qualification of a perhaps, an opinion taken so entirely at random? The real spirit of Socrates, who I hope would have been delighted to have been

* In 385.

† Originally "scientific."

‡ See 377f.

“overcome in argument,” because he would have learned something by it, is in curious contrast with the naive idea of the glossist, for whom (as for “the born missionary” of today)* discussion would seem to have been simply a struggle. When philosophy began to awake from its long slumber, and before theology completely dominated it, the practice seems to have been for each professor to seize upon any philosophical position he found unoccupied and which seemed a strong one, to intrench himself in it, and to sally forth from time to time to give battle to the others. Thus, even the scanty records we possess of those disputes enable us to make out a dozen or more opinions held by different teachers at one time concerning the question of nominalism and realism. Read the opening part of the *Historia Calamitatum* of Abelard,† who was certainly as philosophical as any of his contemporaries, and see the spirit of combat which it breathes. For him, the truth is simply his particular stronghold. When the method of authority‡ prevailed, the truth meant little more than the Catholic faith. All the efforts of the scholastic doctors are directed toward harmonizing their faith in Aristotle and their faith in the Church, and one may search their ponderous folios through without finding an argument which goes any further. It is noticeable that where different faiths flourish side by side, renegades are looked upon with contempt even by the party whose belief they adopt; so completely has the idea of loyalty replaced that of truth-seeking. Since the time of Descartes, the defect in the conception of truth has been less apparent. Still, it will sometimes strike a scientific man that the philosophers have been less intent on finding out what the facts are, than on inquiring what belief is most in harmony with their system. It is hard to convince a follower of the *a priori* method by adducing facts; but show him that an opinion he is defending is inconsistent with what he has laid down elsewhere, and he will be very apt to retract it. These minds do not seem to believe that disputation is ever to cease; they seem to think that the opinion which is natural for one man is not so for another, and that belief will, consequently, never be settled.

* The parenthetized phrase was not in the original.

† *Patrologica Latina*, vol. 178, p. 114 et seq., (1885).

‡ See 379f.

In contenting themselves with fixing their own opinions by a method which would lead another man to a different result, they betray their feeble hold of the conception of what truth is.

407. On the other hand, all the followers of science are animated by a cheerful hope* that the processes of investigation, if only pushed far enough, will give one certain solution to each† question to which they apply it‡. One man may investigate the velocity of light by studying the transits of Venus and the aberration of the stars; another by the oppositions of Mars and the eclipses of Jupiter's satellites; a third by the method of Fizeau; a fourth by that of Foucault; a fifth by the motions of the curves of Lissajoux; a sixth, a seventh, an eighth, and a ninth, may follow the different methods of comparing the measures of statical and dynamical electricity. They may at first obtain different results, but, as each perfects his method and his processes, the results are found to move§ steadily together toward a destined centre. So with all scientific research. Different minds may set out with the most antagonistic views, but the progress of investigation carries them by a force outside of themselves to one and the same conclusion. This activity of thought by which we are carried, not where we wish, but to a fore-ordained goal, is like the operation of destiny. No modification of the point of view taken, no selection of other facts for study, no natural bent of mind even, can enable a man to escape the predestinate opinion. This great hope¶ is embodied in the conception of truth and reality. The opinion which is fated¹ to be ultimately agreed to by all who investigate, is what we mean by the truth, and the object represented in this opinion is the real. That is the way I would explain reality.

408. But it may be said that this view is directly opposed to the abstract definition which we have given of reality, inasmuch as it makes the characters of the real depend on what is

* "are . . . hope" originally "are fully persuaded."

† Originally "every."

‡ "apply it" originally "can be applied."

§ "are . . . move" originally "will move."

¶ Originally "law."

¹ Fate means merely that which is sure to come true, and can nohow be avoided. It is a superstition to suppose that a certain sort of events are ever fated, and it is another to suppose that the word fate can never be freed from its superstitious taint. We are all fated to die.

ultimately thought about them. But the answer to this is that, on the one hand, reality is independent, not necessarily of thought in general, but only of what you or I or any finite number of men may think about it; and that, on the other hand, though the object of the final opinion depends on what that opinion is, yet what that opinion is does not depend on what you or I or any man thinks. Our perversity and that of others may indefinitely postpone the settlement of opinion; it might even conceivably cause an arbitrary proposition to be universally accepted as long as the human race should last. Yet even that would not change the nature of the belief, which alone could be the result of investigation carried sufficiently far; and if, after the extinction of our race, another should arise with faculties and disposition for investigation, that true opinion must be the one which they would ultimately come to. "Truth crushed to earth shall rise again," and the opinion which would finally result from investigation does not depend on how anybody may actually think. But the reality of that which is real does depend on the real fact that investigation is destined to lead, at last, if continued long enough, to a belief in it.

409. But I may be asked what I have to say to all the minute facts of history, forgotten never to be recovered, to the lost books of the ancients, to the buried secrets.

"Full many a gem of purest ray serene
The dark, unfathomed caves of ocean bear;
Full many a flower is born to blush unseen,
And waste its sweetness on the desert air."

Do these things not really exist because they are hopelessly beyond the reach of our knowledge? And then, after the universe is dead (according to the prediction of some scientists), and all life has ceased forever, will not the shock of atoms continue though there will be no mind to know it? To this I reply that, though in no possible state of knowledge can any number be great enough to express the relation between the amount of what rests unknown to the amount of the known, yet it is unphilosophical to suppose that, with regard to any given question (which has any clear meaning), investigation would not bring forth a solution of it, if it were carried far enough. Who

would have said, a few years ago, that we could ever know of what substances stars are made whose light may have been longer in reaching us than the human race has existed? Who can be sure of what we shall not know in a few hundred years? Who can guess what would be the result of continuing the pursuit of science for ten thousand years, with the activity of the last hundred? And if it were to go on for a million, or a billion, or any number of years you please, how is it possible to say that there is any question which might not ultimately be solved?

But it may be objected, "Why make so much of these remote considerations, especially when it is your principle that only practical distinctions have a meaning?" Well, I must confess that it makes very little difference whether we say that a stone on the bottom of the ocean, in complete darkness, is brilliant or not — that is to say, that it *probably* makes no difference, remembering always that that stone *may* be fished up tomorrow. But that there are gems at the bottom of the sea, flowers in the untraveled desert, etc., are propositions which, like that about a diamond being hard when it is not pressed, concern much more the arrangement of our language than they do the meaning of our ideas.

410. It seems to me, however, that we have, by the application of our rule, reached so clear an apprehension of what we mean by reality, and of the fact which the idea rests on, that we should not, perhaps, be making a pretension so presumptuous as it would be singular, if we were to offer a metaphysical theory of existence for universal acceptance among those who employ the scientific method of fixing belief. However, as metaphysics is a subject much more curious than useful, the knowledge of which, like that of a sunken reef, serves chiefly to enable us to keep clear of it, I will not trouble the reader with any more Ontology at this moment. I have already been led much further into that path than I should have desired; and I have given the reader such a dose of mathematics, psychology, and all that is most abstruse, that I fear he may already have left me, and that what I am now writing is for the compositor and proof-reader exclusively. I trusted to the importance of the subject. There is no royal road to logic, and really valuable ideas can only be had at the price of close attention. But I

know that in the matter of ideas the public prefer the cheap and nasty; and in my next paper* I am going to return to the easily intelligible, and not wander from it again. The reader who has been at the pains of wading through this paper, shall be rewarded in the next one by seeing how beautifully what has been developed in this tedious way can be applied to the ascertainment of the rules of scientific reasoning.

We have, hitherto, not crossed the threshold of scientific logic. It is certainly important to know how to make our ideas clear, but they may be ever so clear without being true. How to make them so, we have next to study. How to give birth to those vital and procreative ideas which multiply into a thousand forms and diffuse themselves everywhere, advancing civilization and making the dignity of man, is an art not yet reduced to rules, but of the secret of which the history of science affords some hints.

* See vol. 2, bk. III, ch. 6.

VI

WHAT PRAGMATISM IS*

§1. THE EXPERIMENTALISTS' VIEW OF ASSERTION^E

411. The writer of this article has been led by much experience to believe that every physicist, and every chemist, and, in short, every master in any department of experimental science, has had his mind moulded by his life in the laboratory to a degree that is little suspected. The experimentalist himself can hardly be fully aware of it, for the reason that the men whose intellects he really knows about are much like himself in this respect. With intellects of widely different training from his own, whose education has largely been a thing learned out of books, he will never become inwardly intimate, be he on ever so familiar terms with them; for he and they are as oil and water, and though they be shaken up together, it is remarkable how quickly they will go their several mental ways, without having gained more than a faint flavor from the association. Were those other men only to take skillful soundings of the experimentalist's mind — which is just what they are unqualified to do, for the most part — they would soon discover that, excepting perhaps upon topics where his mind is trammelled by personal feeling or by his bringing up, his disposition is to think of everything just as everything is thought of in the laboratory, that is, as a question of experimentation. Of course, no living man possesses in their fullness all the attributes characteristic of his type: it is not the typical doctor whom you will see every day driven in buggy or coupé, nor is it the typical pedagogue that will be met with in the first schoolroom you enter. But when you have found, or ideally constructed upon a basis of observation, the typical experimentalist, you will find that whatever assertion you may make

* *The Monist*, vol. 15, pp. 161–181 (1905). The first of three articles. The second article follows this while the third appears as ch. 6 of bk. II, vol. 4.

to him, he will either understand as meaning that if a given prescription for an experiment ever can be and ever is carried out in act, an experience of a given description will result, or else he will see no sense at all in what you say. If you talk to him as Mr. Balfour talked not long ago to the British Association* saying that "the physicist . . . seeks for something deeper than the laws connecting possible objects of experience," that "his object is physical reality" unrevealed in experiments, and that the existence of such non-experiential reality "is the unalterable faith of science," to all such ontological meaning you will find the experimentalist mind to be color-blind. What adds to that confidence in this, which the writer owes to his conversations with experimentalists, is that he himself may almost be said to have inhabited a laboratory from the age of six until long past maturity; and having all his life associated mostly with experimentalists, it has always been with a confident sense of understanding them and of being understood by them.

412. That laboratory life did not prevent the writer (who here and in what follows simply exemplifies the experimentalist type) from becoming interested in methods of thinking; and when he came to read metaphysics, although much of it seemed to him loosely reasoned and determined by accidental prepossessions, yet in the writings of some philosophers, especially Kant, Berkeley, and Spinoza, he sometimes came upon strains of thought that recalled the ways of thinking of the laboratory, so that he felt he might trust to them; all of which has been true of other laboratory-men.

Endeavoring, as a man of that type naturally would, to formulate what he so approved, he framed the theory that a *conception*, that is, the rational purport of a word or other expression, lies exclusively in its conceivable bearing upon the conduct of life; so that, since obviously nothing that might not result from experiment can have any direct bearing upon conduct, if one can define accurately all the conceivable experimental phenomena which the affirmation or denial of a concept could imply, one will have therein a complete definition of the concept, and *there is absolutely nothing more in it*. For this

* *Reflections Suggested by the New Theory of Matter*; Presidential Address, British Association for the Advancement of Science, August 17, 1904.

doctrine he invented the name *pragmatism*. Some of his friends wished him to call it *practicism* or *practicalism* (perhaps on the ground that *πρακτικός* is better Greek than *πραγματικός*). But for one who had learned philosophy out of Kant, as the writer, along with nineteen out of every twenty experimentalists who have turned to philosophy, had done, and who still thought in Kantian terms most readily, *praktisch* and *pragmatisch* were as far apart as the two poles, the former belonging in a region of thought where no mind of the experimentalist type can ever make sure of solid ground under his feet, the latter expressing relation to some definite human purpose. Now quite the most striking feature of the new theory was its recognition of an inseparable connection between rational cognition and rational purpose; and that consideration it was which determined the preference for the name *pragmatism*.

§2. PHILOSOPHICAL NOMENCLATURE*^E

413. Concerning the matter of philosophical nomenclature, there are a few plain considerations, which the writer has for many years longed to submit to the deliberate judgment of those few fellow-students of philosophy, who deplore the present state of that study, and who are intent upon rescuing it therefrom and bringing it to a condition like that of the natural sciences, where investigators, instead of contemning each the work of most of the others as misdirected from beginning to end, coöperate, stand upon one another's shoulders, and multiply incontestible results; where every observation is repeated, and isolated observations go for little; where every hypothesis that merits attention is subjected to severe but fair examination, and only after the predictions to which it leads have been remarkably borne out by experience is trusted at all, and even then only provisionally; where a radically false step is rarely taken, even the most faulty of those theories which gain wide credence being true in their main experiential predictions. To those students, it is submitted that no study can become scientific in the sense described, until it provides itself with a suitable technical nomenclature, whose every term has a single definite meaning universally accepted among students of the

* Cf. Appendix, §4; vol. 2, bk. II, ch. 1.

subject, and whose vocables have no such sweetness or charms as might tempt loose writers to abuse them — which is a virtue of scientific nomenclature too little appreciated. It is submitted that the experience of those sciences which have conquered the greatest difficulties of terminology, which are unquestionably the taxonomic sciences, chemistry, mineralogy, botany, zoölogy, has conclusively shown that the one only way in which the requisite unanimity and requisite ruptures with individual habits and preferences can be brought about is so to shape the canons of terminology that they shall gain the support of *moral principle* and of every man's sense of decency; and that, in particular (under defined restrictions), the general feeling shall be that he who introduces a new conception into philosophy is under an obligation to invent acceptable terms to express it, and that when he has done so, the duty of his fellow-students is to accept those terms, and to resent any wresting of them from their original meanings, as not only a gross discourtesy to him to whom philosophy was indebted for each conception, but also as an injury to philosophy itself; and furthermore, that once a conception has been supplied with suitable and sufficient words for its expression, no other *technical* terms denoting the same things, considered in the same relations, should be countenanced. Should this suggestion find favor, it might be deemed needful that the philosophers in congress assembled should adopt, after due deliberation, convenient canons to limit the application of the principle. Thus, just as is done in chemistry, it might be wise to assign fixed meanings to certain prefixes and suffixes. For example, it might be agreed, perhaps, that the prefix *prope-* should mark a broad and rather indefinite extension of the meaning of the term to which it was prefixed; the name of a doctrine would naturally end in *-ism*, while *-icism* might mark a more strictly defined acception of that doctrine, etc. Then again, just as in biology no account is taken of terms antedating Linnæus, so in philosophy it might be found best not to go back of the scholastic terminology. To illustrate another sort of limitation, it has probably never happened that any philosopher has attempted to give a general name to his own doctrine without that name's soon acquiring in common philosophical usage, a signification much broader than was originally intended. Thus,

special systems go by the names Kantianism, Benthamism, Comteanism, Spencerianism, etc., while transcendentalism, utilitarianism, positivism, evolutionism, synthetic philosophy, etc., have irrevocably and very conveniently been elevated to broader governments.

§3. PRAGMATICISM^E

414. After awaiting in vain, for a good many years, some particularly opportune conjuncture of circumstances that might serve to recommend his notions of the ethics of terminology, the writer has now, at last, dragged them in over head and shoulders, on an occasion when he has no specific proposal to offer nor any feeling but satisfaction at the course usage has run without any canons or resolutions of a congress. His word "pragmatism" has gained general recognition in a generalized sense that seems to argue power of growth and vitality. The famed psychologist, James, first took it up,* seeing that his "radical empiricism" substantially answered to the writer's definition of pragmatism, albeit with a certain difference in the point of view. Next, the admirably clear and brilliant thinker, Mr. Ferdinand C. S. Schiller, casting about for a more attractive name for the "anthropomorphism" of his *Riddle of the Sphinx*, lit, in that most remarkable paper of his on *Axioms as Postulates*,† upon the same designation "pragmatism," which in its original sense was in generic agreement with his own doctrine, for which he has since found the more appropriate specification "humanism," while he still retains "pragmatism" in a somewhat wider sense. So far all went happily. But at present, the word begins to be met with occasionally in the literary journals, where it gets abused in the merciless way that words have to expect when they fall into literary clutches. Sometimes the manners of the British have effloresced in scolding at the word as ill-chosen — ill-chosen, that is, to express some meaning that it was rather designed to exclude. So then, the writer, finding his bantling "pragmatism" so promoted, feels that it is time to kiss his child good-by and relinquish it to its higher destiny; while to serve the precise purpose of expressing the original definition, he begs to announce the birth of the

* See his *Pragmatism*, p. 47.

† In *Personal Idealism*, ed. by H. Sturt, p. 63 (1902).

word "pragmatism," which is ugly enough to be safe from kidnapers.¹

415. Much as the writer has gained from the perusal of what other pragmatists have written, he still thinks there is a decisive advantage in his original conception of the doctrine. From this original form every truth that follows from any of the other forms can be deduced, while some errors can be avoided into which other pragmatists have fallen. The original view appears, too, to be a more compact and unitary conception than the others. But its capital merit, in the writer's eyes, is that it more readily connects itself with a critical proof of its truth. Quite in accord with the logical order of investigation, it usually happens that one first forms an hypothesis that seems more and more reasonable the further one examines into it, but that only a good deal later gets crowned with an adequate proof. The present writer having had the pragmatist theory under consideration for many years longer than most of its adherents, would naturally have given more attention to the proof of it. At any rate, in endeavoring to explain pragmatism, he may be excused for confining himself to that form of it that he knows best. In the present article there will be space only to explain just what this doctrine (which, in such hands as it has now fallen into, may probably play a pretty prominent part in the philosophical discussions of the next coming years), really consists in. Should the exposition be found to interest readers of *The Monist*, they would certainly be much more interested in a second article which would give some samples of the manifold applications of pragmatism (assuming it to be true) to the solution of problems of different kinds. After that, readers might be prepared to take an interest in a proof that the doctrine is true — a proof which seems to the writer to leave no reasonable doubt on the subject, and to be the one contribution of value that he has to make to

¹ To show how recent the general use of the word "pragmatism" is, the writer may mention that, to the best of his belief, he never used it in copy for the press before today, except by particular request, in *Baldwin's Dictionary*. [See 1-4.] Toward the end of 1890, when this part of the *Century Dictionary* appeared, he did not deem that the word had sufficient status to appear in that work. [But see 13n.] But he has used it continually in philosophical conversation since, perhaps, the mid-seventies.

philosophy. For it would essentially involve the establishment of the truth of synechism.*

416. The bare definition of pragmaticism could convey no satisfactory comprehension of it to the most apprehensive of minds, but requires the commentary to be given below. Moreover, this definition takes no notice of one or two other doctrines without the previous acceptance (or virtual acceptance) of which pragmaticism itself would be a nullity. They are included as a part of the pragmatism of Schiller, but the present writer prefers not to mingle different propositions. The preliminary propositions had better be stated forthwith.

The difficulty in doing this is that no formal list of them has ever been made. They might all be included under the vague maxim, "Dismiss make-believes." Philosophers of very diverse stripes propose that philosophy shall take its start from one or another state of mind in which no man, least of all a beginner in philosophy, actually is. One proposes that you shall begin by doubting everything, and says that there is only one thing that you cannot doubt, as if doubting were "as easy as lying." Another proposes that we should begin by observing "the first impressions of sense," forgetting that our very percepts are the results of cognitive elaboration. But in truth, there is but one state of mind from which you can "set out," namely, the very state of mind in which you actually find yourself at the time you do "set out" — a state in which you are laden with an immense mass of cognition already formed, of which you cannot divest yourself if you would; and who knows whether, if you could, you would not have made all knowledge impossible to yourself? Do you call it *doubting* to write down on a piece of paper that you doubt? If so, doubt has nothing to do with any serious business. But do not make believe; if pedantry has not eaten all the reality out of you, recognize, as you must, that there is much that you do not doubt, in the least. Now that which you do not at all doubt, you must and do regard as infallible, absolute truth. Here breaks in Mr. Make Believe: "What! Do you mean to say that one is to believe what is not true, or that what a man does not doubt is *ipso facto* true?" No, but unless he can make a thing white and black at once, *he* has to regard what he does not doubt as

* See vol. 6, bk. I, B.

absolutely true. Now you, *per hypothesiu*, are that man. "But you tell me there are scores of things I do not doubt. I really cannot persuade myself that there is not some one of them about which I am mistaken." You are adducing one of your make-believe facts, which, even if it were established, would only go to show that doubt has a *limen*, that is, is only called into being by a certain finite stimulus. You only puzzle yourself by talking of this metaphysical "truth" and metaphysical "falsity," that you know nothing about. All you have any dealings with are your doubts and beliefs,¹ with the course of life that forces new beliefs upon you and gives you power to doubt old beliefs. If your terms "truth" and "falsity" are taken in such senses as to be definable in terms of doubt and belief and the course of experience (as for example they would be, if you were to define the "truth" as that to a belief in which belief would tend if it were to tend indefinitely toward absolute fixity), well and good: in that case, you are only talking about doubt and belief. But if by truth and falsity you mean something not definable in terms of doubt and belief in any way, then you are talking of entities of whose existence you can know nothing, and which Ockham's razor would clean shave off. Your problems would be greatly simplified, if, instead of saying that you want to know the "Truth," you were simply to say that you want to attain a state of belief unassailable by doubt.

417. Belief is not a momentary mode of consciousness; it is a habit of mind essentially enduring for some time, and mostly (at least) unconscious; and like other habits, it is (until it meets with some surprise that begins its dissolution) perfectly self-satisfied. Doubt is of an altogether contrary genus. It is not a habit, but the privation of a habit. Now a privation of a habit, in order to be anything at all, must be a condition of erratic activity that in some way must get superseded by a habit.

418. Among the things which the reader, as a rational person, does not doubt, is that he not merely has habits, but also can exert a measure of self-control over his future actions;

¹ It is necessary to say that "belief" is throughout used merely as the name of the contrary to doubt, without regard to grades of certainty nor to the nature of the proposition held for true, i.e., "believed."

which means, however, *not* that he can impart to them any arbitrarily assignable character, but, on the contrary, that a process of self-preparation will tend to impart to action (when the occasion for it shall arise), one fixed character, which is indicated and perhaps roughly measured by the absence (or slightness) of the feeling of self-reproach, which subsequent reflection will induce. Now, this subsequent reflection is part of the self-preparation for action on the next occasion. Consequently, there is a tendency, as action is repeated again and again, for the action to approximate indefinitely toward the perfection of that fixed character, which would be marked by entire absence of self-reproach. The more closely this is approached, the less room for self-control there will be; and where no self-control is possible there will be no self-reproach.

419. These phenomena seem to be the fundamental characteristics which distinguish a rational being. Blame, in every case, appears to be a modification, often accomplished by a transference, or "projection," of the primary feeling of self-reproach. Accordingly, we never blame anybody for what had been beyond his power of previous self-control. Now, thinking is a species of conduct which is largely subject to self-control. In all their features (which there is no room to describe here), logical self-control is a perfect mirror of ethical self-control — unless it be rather a species under that genus.* In accordance with this, what you cannot in the least help believing is not, justly speaking, wrong belief. In other words, for you it is the absolute truth. True, it is conceivable that what you cannot help believing today, you might find you thoroughly disbelieve tomorrow. But then there is a certain distinction between things you "cannot" do, merely in the sense that nothing stimulates you to the great effort and endeavors that would be required, and things you cannot do because in their own nature they are insusceptible of being put into practice. In every stage of your excogitations, there is something of which you can only say, "I cannot think otherwise," and your experientially based hypothesis is that the impossibility is of the second kind.

420. There is no reason why "thought," in what has just been said, should be taken in that narrow sense in which silence and darkness are favorable to thought. It should rather be

* Cf. 440; 1.606f.

understood as covering all rational life, so that an experiment shall be an operation of thought. Of course, that ultimate state of habit to which the action of self-control ultimately tends, where no room is left for further self-control, is, in the case of thought, the state of fixed belief, or perfect knowledge.

421. Two things here are all-important to assure oneself of and to remember. The first is that a person is not absolutely an individual. His thoughts are what he is "saying to himself," that is, is saying to that other self that is just coming into life in the flow of time. When one reasons, it is that critical self that one is trying to persuade; and all thought whatsoever is a sign, and is mostly of the nature of language. The second thing to remember is that the man's circle of society (however widely or narrowly this phrase may be understood), is a sort of loosely compacted person, in some respects of higher rank than the person of an individual organism. It is these two things alone that render it possible for you — but only in the abstract, and in a Pickwickian sense — to distinguish between absolute truth and what you do not doubt.

422. Let us now hasten to the exposition of pragmatism itself. Here it will be convenient to imagine that somebody to whom the doctrine is new, but of rather preternatural perspicacity, asks questions of a pragmatist. Everything that might give a dramatic illusion must be stripped off, so that the result will be a sort of cross between a dialogue and a catechism, but a good deal liker the latter — something rather painfully reminiscent of Mangnall's *Historical Questions*.

Questioner: I am astounded at your definition of your pragmatism, because only last year I was assured by a person above all suspicion of warping the truth — himself a pragmatist — that your doctrine precisely was "that a conception is to be tested by its practical effects." You must surely, then, have entirely changed your definition very recently.

Pragmatist: If you will turn to Vols. VI and VII of the *Revue Philosophique*, or to the *Popular Science Monthly* for November 1877 and January 1878 [Papers No. IV and V], you will be able to judge for yourself whether the interpretation you mention was not then clearly excluded. The exact wording of the English enunciation, (changing only the first person into the second), was: "Consider what effects that might conceiv-

ably have practical bearing you conceive the object of your conception to have. Then your conception of those effects is the WHOLE of your conception of the object.”*

Questioner: Well, what reason have you for asserting that this is so?

Pragmatist: That is what I specially desire to tell you. But the question had better be postponed until you clearly understand what those reasons profess to prove.

423. *Questioner:* What, then, is the *raison d'être* of the doctrine? What advantage is expected from it?

Pragmatist: It will serve to show that almost every proposition of ontological metaphysics is either meaningless gibberish — one word being defined by other words, and they by still others, without any real conception ever being reached — or else is downright absurd; so that all such rubbish being swept away, what will remain of philosophy will be a series of problems capable of investigation by the observational methods of the true sciences — the truth about which can be reached without those interminable misunderstandings and disputes which have made the highest of the positive sciences a mere amusement for idle intellects, a sort of chess — idle pleasure its purpose, and reading out of a book its method. In this regard, pragmaticism is a species of prope-positivism. But what distinguishes it from other species is, first, its retention of a purified philosophy; secondly, its full acceptance of the main body of our instinctive beliefs; and thirdly, its strenuous insistence upon the truth of scholastic realism (or a close approximation to that, well-stated by the late Dr. Francis Ellingwood Abbot in the Introduction to his *Scientific Theism*). So, instead of merely jeering at metaphysics, like other prope-positivists, whether by long drawn-out parodies or otherwise, the pragmaticist extracts from it a precious essence, which will serve to give life and light to cosmology and physics. At the same time, the moral applications of the doctrine are positive and potent; and there are many other uses of it not easily classed. On another occasion, instances may be given to show that it really has these effects.

424. *Questioner:* I hardly need to be convinced that your doctrine would wipe out metaphysics. Is it not as obvious that

* See 402.

it must wipe out every proposition of science and everything that bears on the conduct of life? For you say that the only meaning that, for you, any assertion bears is that a certain experiment has resulted in a certain way: Nothing else but an experiment enters into the meaning. Tell me, then, how can an experiment, in itself, reveal anything more than that something once happened to an individual object and that subsequently some other individual event occurred?

Pragmatist: That question is, indeed, to the purpose — the purpose being to correct any misapprehensions of pragmatism. You speak of an experiment in itself, emphasising “*in itself.*” You evidently think of each experiment as isolated from every other. It has not, for example, occurred to you, one might venture to surmise, that every connected series of experiments constitutes a single collective experiment. What are the essential ingredients of an experiment? First, of course, an experimenter of flesh and blood. Secondly, a verifiable hypothesis. This is a proposition¹ relating to the universe environing the experimenter, or to some well-known part of it and affirming or denying of this only some experimental possibility or impossibility. The third indispensable ingredient is a sincere doubt in the experimenter’s mind as to the truth of that hypothesis.

Passing over several ingredients on which we need not dwell, the purpose, the plan, and the resolve, we come to the act of choice by which the experimenter singles out certain identifiable objects to be operated upon. The next is the external (or quasi-external) ACT by which he modifies those objects. Next, comes the subsequent *reaction* of the world upon the experimenter in a perception; and finally, his recognition of the teaching of the experiment. While the two chief parts of the event itself are the action and the reaction, yet the unity of essence of the experiment lies in its purpose and plan, the ingredients passed over in the enumeration.

¹ The writer, like most English logicians, invariably uses the word *proposition* not as the Germans define their equivalent, *Satz*, as the language-expression of a judgment (*Urtheil*), but as that which is related to any assertion, whether mental and self-addressed or outwardly expressed, just as any possibility is related to its actualisation. The difficulty of the, at best, difficult problem of the essential nature of a Proposition has been increased, for the Germans, by their *Urtheil*, confounding, under one designation, the mental *assertion* with the *assertible* [cf. 2.315].

425. Another thing: in representing the pragmaticist as making rational meaning to consist in an experiment (which you speak of as an event in the past), you strikingly fail to catch his attitude of mind. Indeed, it is not in an experiment, but in *experimental phenomena*, that rational meaning is said to consist. When an experimentalist speaks of a *phenomenon*, such as "Hall's phenomenon," "Zeemann's phenomenon" and its modification, "Michelson's phenomenon," or "the chess-board phenomenon," he does not mean any particular event that did happen to somebody in the dead past, but what *surely will* happen to everybody in the living future who shall fulfill certain conditions. The phenomenon consists in the fact that when an experimentalist shall come to *act* according to a certain scheme that he has in mind, then will something else happen, and shatter the doubts of sceptics, like the celestial fire upon the altar of Elijah.

426. And do not overlook the fact that the pragmaticist maxim says nothing of single experiments or of single experimental phenomena (for what is conditionally true *in futuro* can hardly be singular), but only speaks of *general kinds* of experimental phenomena. Its adherent does not shrink from speaking of general objects as real, since whatever is true represents a real. Now the laws of nature are true.

427. The rational meaning of every proposition lies in the future. How so? The meaning of a proposition is itself a proposition. Indeed, it is no other than the very proposition of which it is the meaning: it is a translation of it. But of the myriads of forms into which a proposition may be translated, what is that one which is to be called its very meaning? It is, according to the pragmaticist, that form in which the proposition becomes applicable to human conduct, not in these or those special circumstances, nor when one entertains this or that special design, but that form which is most directly applicable to self-control under every situation, and to every purpose. This is why he locates the meaning in future time; for future conduct is the only conduct that is subject to self-control. But in order that that form of the proposition which is to be taken as its meaning should be applicable to every situation and to every purpose upon which the proposition has any bearing, it must be simply the general description of

all the experimental phenomena which the assertion of the proposition virtually predicts. For an experimental phenomenon is the fact asserted by the proposition that action of a certain description will have a certain kind of experimental result; and experimental results are the only results that can affect human conduct. No doubt, some unchanging idea may come to influence a man more than it had done; but only because some experience equivalent to an experiment has brought its truth home to him more intimately than before. Whenever a man acts purposively, he acts under a belief in some experimental phenomenon. Consequently, the sum of the experimental phenomena that a proposition implies makes up its entire bearing upon human conduct. Your question, then, of how a pragmatist can attribute any meaning to any assertion other than that of a single occurrence is substantially answered.

428. *Questioner*: I see that pragmatism is a thorough-going phenomenalism. Only why should you limit yourself to the phenomena of experimental science rather than embrace all observational science? Experiment, after all, is an uncommunicative informant. It never expiates*: it only answers "yes" or "no"; or rather it usually snaps out "No!" or, at best only utters an inarticulate grunt for the negation of its "no." The typical experimentalist is not much of an observer. It is the student of natural history to whom nature opens the treasury of her confidence, while she treats the cross-examining experimentalist with the reserve he merits. Why should your phenomenalism sound the meagre jews-harp of experiment rather than the glorious organ of observation?

Pragmaticist: Because pragmatism is not definable as "thorough-going phenomenalism," although the latter doctrine may be a kind of pragmatism. The *richness* of phenomena lies in their sensuous quality. Pragmatism does not intend to define the phenomenal equivalents of words and general ideas, but, on the contrary, eliminates their sential element, and endeavors to define the rational purport, and this it finds in the purposive bearing of the word or proposition in question.

429. *Questioner*: Well, if you choose so to make Doing the Be-all and the End-all of human life, why do you not make meaning to consist simply in doing? Doing has to be done at a

* Apparently a misprint for "expatiates."

certain time upon a certain object. Individual objects and single events cover all reality, as everybody knows, and as a practicalist ought to be the first to insist. Yet, your meaning, as you have described it, is *general*. Thus, it is of the nature of a mere word and not a reality. You say yourself that your meaning of a proposition is only the same proposition in another dress. But a practical man's meaning is the very thing he means. What do you make to be the meaning of "George Washington"?

Pragmaticist: Forcibly put! A good half dozen of your points must certainly be admitted. It must be admitted, in the first place, that if pragmaticism really made Doing to be the Be-all and the End-all of life, that would be its death. For to say that we live for the mere sake of action, as action, regardless of the thought it carries out, would be to say that there is no such thing as rational purport.* Secondly, it must be admitted that every proposition professes to be true of a certain real individual object, often the environing universe. Thirdly, it must be admitted that pragmaticism fails to furnish any translation or meaning of a proper name, or other designation of an individual object. Fourthly, the pragmaticistic meaning is undoubtedly general; and it is equally indisputable that the general is of the nature of a word or sign. Fifthly, it must be admitted that individuals alone exist; and sixthly, it may be admitted that the very meaning of a word or significant object ought to be the very essence of reality of what it signifies. But when those admissions have been unreservedly made, you find the pragmaticist still constrained most earnestly to deny the force of your objection, you ought to infer that there is some consideration that has escaped you. Putting the admissions together, you will perceive that the pragmaticist grants that a proper name (although it is not customary to say that it has a *meaning*), has a certain denotative function peculiar, in each case, to that name and its equivalents; and that he grants that every assertion contains such a denotative or pointing-out function. In its peculiar individuality, the pragmaticist excludes this from the rational purport of the assertion, although *the like* of it, being common to all assertions, and so, being general and not individual, may enter into the prag-

* See 3, 402³.

maticistic purport. Whatever exists, *ex-sists*, that is, really acts upon other existents, so obtains a self-identity, and is definitely individual. As to the general, it will be a help to thought to notice that there are two ways of being general. A statue of a soldier on some village monument, in his overcoat and with his musket, is for each of a hundred families the image of its uncle, its sacrifice to the Union. That statue, then, though it is itself single, represents any one man of whom a certain predicate may be true. It is *objectively* general. The word "soldier," whether spoken or written, is general in the same way; while the name, "George Washington," is not so. But each of these two terms remains one and the same noun, whether it be spoken or written, and whenever and wherever it be spoken or written. This noun is not an existent thing: it is a *type*,* or *form*, to which objects, both those that are externally existent and those which are imagined, may *conform*, but which none of them can exactly be. This is subjective generality. The pragmaticistic purport is general in both ways.

430. As to reality, one finds it defined in various ways; but if that principle of terminological ethics that was proposed be accepted, the equivocal language will soon disappear. For *realis* and *realitas* are not ancient words. They were invented to be terms of philosophy in the thirteenth century,† and the meaning they were intended to express is perfectly clear. That is *real* which has such and such characters, whether anybody thinks it to have those characters or not. At any rate, that is the sense in which the pragmaticist uses the word. Now, just as conduct controlled by ethical reason tends toward fixing certain habits of conduct, the nature of which (as to illustrate the meaning, peaceable habits and not quarrelsome habits) does not depend upon any accidental circumstances, and *in that sense* may be said to be *destined*; so, thought, controlled by a rational experimental logic, tends to the fixation of certain opinions, equally destined, the nature of which will be the same in the end, however the perversity of thought of whole generations may cause the postponement of the ultimate fixation. If this be so, as every man of us virtually assumes that it is, in regard to each matter the truth of which he seriously dis-

* See 4.537.

† See Prantl, *Geschichte der Logik*, III, 91, Anm. 362.

cusses, then, according to the adopted definition of "real," the state of things which will be believed in that ultimate opinion is real. But, for the most part, such opinions will be general. Consequently, *some* general objects are real. (Of course, nobody ever thought that *all* generals were real; but the scholastics used to assume that generals were real when they had hardly any, or quite no, experiential evidence to support their assumption; and their fault lay just there, and not in holding that generals could be real.) One is struck with the inexactitude of thought even of analysts of power, when they touch upon modes of being. One will meet, for example, the virtual assumption that what is relative to thought cannot be real. But why not, exactly? *Red* is relative to sight, but the fact that this or that is in that relation to vision that we call being red is not *itself* relative to sight; it is a real fact.

431. Not only may generals be real, but they may also be *physically efficient*, not in every metaphysical sense, but in the common-sense acceptance in which human purposes are physically efficient.* Aside from metaphysical nonsense, no sane man doubts that if I feel the air in my study to be stuffy, that thought may cause the window to be opened. My thought, be it granted, was an individual event. But what determined it to take the particular determination it did, was in part the general fact that stuffy air is unwholesome, and in part other *Forms*, concerning which Dr. Carus† has caused so many men to reflect to advantage — or rather, *by* which, and the general truth concerning which Dr. Carus's mind was determined to the forcible enunciation of so much truth. For truths, on the average, have a greater tendency to get believed than falsities have. Were it otherwise, considering that there are myriads of false hypotheses to account for any given phenomenon, against one sole true one (or if you will have it so, against every true one), the first step toward genuine knowledge must have been next door to a miracle. So, then, when my window was opened, because of the truth that stuffy air is malsain, a physical effort was brought into existence by the efficiency of a general and non-existent truth. This has a droll sound because it is unfamiliar; but exact analysis is with it and not against it;

* Cf. 1.213, 2.149.

† "The Foundations of Geometry," by Paul Carus, *The Monist*, XIII, p. 370.

and it has besides, the immense advantage of not blinding us to great facts — such as that the ideas “justice” and “truth” are, notwithstanding the iniquity of the world, the mightiest of the forces that move it. Generality is, indeed, an indispensable ingredient of reality; for mere individual existence or actuality without any regularity whatever is a nullity. Chaos is pure nothing.

432. That which any true proposition asserts is *real*, in the sense of being as it is regardless of what you or I may think about it. Let this proposition be a general conditional proposition as to the future, and it is a real general such as is calculated really to influence human conduct; and such the pragmatist holds to be the rational purport of every concept.

433. Accordingly, the pragmatist does not make the *summum bonum* to consist in action, but makes it to consist in that process of evolution whereby the existent comes more and more to embody those generals which were just now said to be *destined*, which is what we strive to express in calling them *reasonable*. In its higher stages, evolution takes place more and more largely through self-control, and this gives the pragmatist a sort of justification for making the rational purport to be general.

434. There is much more in elucidation of pragmatism that might be said to advantage, were it not for the dread of fatiguing the reader. It might, for example, have been well to show clearly that the pragmatist does not attribute any different essential mode of being to an event in the future from that which he would attribute to a similar event in the past, but only that the practical attitude of the thinker toward the two is different.* It would also have been well to show that the pragmatist does not make Forms to be the *only* realities in the world,† any more than he makes the reasonable purport of a word to be the only kind of meaning there is.‡ These things are, however, implicitly involved in what has been said. There is only one remark concerning the pragmatist’s conception of the relation of his formula to the first principles of logic which need detain the reader.

* See 458ff.

† See 429, 436.

‡ See 475, 4.536ff.

435. Aristotle's definition of universal predication,* which is usually designated (like a papal bull or writ of court, from its opening words), as the *Dictum de omni*, may be translated as follows: "We call a predication (be it affirmative or negative), *universal*, when, and only when, there is nothing among the existent individuals to which the subject affirmatively belongs, but to which the predicate will not likewise be referred (affirmatively or negatively, according as the universal predication is affirmative or negative)." The Greek is: λέγομεν δὲ τὸ κατὰ παντὸς κατηγορεῖσθαι ὅταν μηδὲν ἢ λαβεῖν τῶν τοῦ ὑποκειμένου καθ' οὗ θάτερον οὐ λεχθήσεται· καὶ τὸ κατὰ μηδενὸς ὡσαύτως. The important words "existent individuals" have been introduced into the translation (which English idiom would not here permit to be literal); but it is plain that existent individuals were what Aristotle meant. The other departures from literalness only serve to give modern English forms of expression. Now, it is well known that propositions in formal logic go in pairs, the two of one pair being convertible into another by the interchange of the ideas of antecedent and consequent, subject and predicate, etc.† The parallelism extends so far that it is often assumed to be perfect; but it is not quite so. The proper mate of this sort to the *Dictum de omni* is the following definition of affirmative predication: We call a predication *affirmative* (be it universal or particular) when, and only when, there is nothing among the sensational effects that belong universally to the predicate which will not be (universally or particularly, according as the affirmative predication is universal or particular), said to belong to the subject. Now, this is substantially the essential proposition of pragmatism. Of course, its parallelism to the *Dictum de omni* will only be admitted by a person who admits the truth of pragmatism.

§4. PRAGMATICISM AND HEGELIAN ABSOLUTE IDEALISM^E

436. Suffer me to add one word more on this point. For if one cares at all to know what the pragmatist theory consists

* *Prior Analytics*, 24b, 28-30.

† See 3.203, 3.493.

in, one must understand that there is no other part of it to which the pragmaticist attaches quite as much importance as he does to the recognition in his doctrine of the utter inadequacy of action or volition or even of resolve or actual purpose, as materials out of which to construct a conditional purpose or the concept of conditional purpose. Had a purposed article concerning the principle of continuity and synthetising the ideas of the other articles of a series* in the early volumes of *The Monist* ever been written,† it would have appeared how, with thorough consistency, that theory involved the recognition that continuity is an indispensable element of reality, and that continuity is simply what generality becomes in the logic of relatives, and thus, like generality, and more than generality, is an affair of thought, and is the essence of thought. Yet even in its truncated condition, an extra-intelligent reader might discern that the theory of those cosmological articles made reality to consist in something more than feeling and action could supply, inasmuch as the primeval chaos, where those two elements were present, was explicitly shown to be pure nothing. Now, the motive for alluding to that theory just here is, that in this way one can put in a strong light a position which the pragmaticist holds and must hold, whether that cosmological theory be ultimately sustained or exploded, namely, that the third category — the category of thought, representation, triadic relation, mediation, genuine thirdness, thirdness as such — is an essential ingredient of reality, yet does not by itself constitute reality, since this category (which in that cosmology appears as the element of habit) can have no concrete being without action, as a separate object on which to work its government, just as action cannot exist without the immediate being of feeling on which to act. The truth is that pragmatism is closely allied to the Hegelian absolute idealism, from which, however, it is sundered by its vigorous denial that the third category (which Hegel degrades to a mere stage of thinking) suffices to make the world, or is even so much as self-sufficient. Had Hegel, instead of regarding the first two stages with his smile of contempt, held on to them as independent or distinct elements of the triune Reality,

* See vol. 6, bk. I.

† See letters to Judge Russell in vol. 9.

pragmaticists might have looked up to him as the great vindicator of their truth. (Of course, the external trappings of his doctrine are only here and there of much significance.) For pragmatism belongs essentially to the triadic class of philosophical doctrines, and is much more essentially so than Hegelianism is.* (Indeed, in one passage, at least, Hegel alludes to the triadic form of his exposition as to a mere fashion of dress.)

MILFORD, PA., September, 1904.

437. POSTSCRIPT. During the last five months, I have met with references to several objections to the above opinions, but not having been able to obtain the text of these objections, I do not think I ought to attempt to answer them. If gentlemen who attack either pragmatism in general or the variety of it which I entertain would only send me copies of what they write, more important readers they could easily find, but they could find none who would examine their arguments with a more grateful avidity for truth not yet apprehended, nor any who would be more sensible of their courtesy.

February 9, 1905.

* Cf. 77ff.

VII

ISSUES OF PRAGMATISM*

§1. SIX CHARACTERS OF CRITICAL COMMON-SENSISM^E

438. Pragmatism was originally enounced¹ in the form of a maxim, as follows: Consider what effects that might *conceivably* have practical bearings you *conceive* the objects of your *conception* to have. Then, your *conception* of those effects is the whole of your *conception* of the object.

I will restate this in other words, since oftentimes one can thus eliminate some unsuspected source of perplexity to the reader. This time it shall be in the indicative mood, as follows: The entire intellectual purport of any symbol consists in the total of all general modes of rational conduct which, conditionally upon all the possible different circumstances and desires, would ensue upon the acceptance of the symbol.

439. Two doctrines that were defended by the writer about nine years before the formulation of pragmatism may be treated as consequences of the latter belief. One of these may be called Critical Common-sensism. It is a variety of the Philosophy of Common Sense, but is marked by six distinctive characters, which had better be enumerated at once.

440. *Character I.* Critical Common-sensism admits that there not only are indubitable propositions but also that there are indubitable inferences. In one sense, anything evident is indubitable; but the propositions and inferences which Critical Common-sensism holds to be original, in the sense one cannot "go behind" them (as the lawyers say), are indubitable in the sense of being acritical. The term "reasoning" ought to be confined to such fixation of one belief by another as is reason-

* *The Monist*, vol. 15, pp. 481-499 (1905). The second article of the series of which the preceding paper is the first.

¹ *Popular Science Monthly*, XII, p. 293; for January 1878. [See 402.] An introductory article opens the volume, in the number for November 1877. [See paper No. IV.]

able, deliberate, self-controlled. A reasoning must be conscious; and this consciousness is not mere "immediate consciousness," which (as I argued in 1868)* is simple Feeling viewed from another side, but is in its ultimate nature (meaning in that characteristic element of it that is not reducible to anything simpler), a sense of taking a habit, or disposition to respond to a given kind of stimulus in a given kind of way. As to the nature of that, some *éclaircissements* will appear below and again in my third paper, on the Basis of Pragmatism.† But the secret of rational consciousness is not so much to be sought in the study of this one peculiar nucleolus, as in the review of the process of self-control in its entirety. The machinery of logical self-control works on the same plan as does moral self-control, in multifarious detail. The greatest difference, perhaps, is that the latter serves to inhibit mad puttings forth of energy, while the former most characteristically insures us against the quandary of Buridan's ass. The formation of habits under imaginary action (see the paper of January, 1878‡) is one of the most essential ingredients of both; but in the logical process the imagination takes far wider flights, proportioned to the generality of the field of inquiry, being bounded in pure mathematics solely by the limits of its own powers, while in the moral process we consider only situations that may be apprehended or anticipated. For in moral life we are chiefly solicitous about our conduct and its inner springs, and the approval of conscience, while in intellectual life there is a tendency to value existence as the vehicle of forms. Certain obvious features of the phenomena of self-control (and especially of habit) can be expressed compactly and without any hypothetical addition, except what we distinctly rate as imagery, by saying that we have an occult nature of which and of its contents we can only judge by the conduct that it determines, and by phenomena of that conduct. All will assent to that (or all but the extreme nominalist), but anti-synechistic thinkers wind themselves up in a factitious snarl by falsifying the phenomena in representing consciousness to be, as it were,

* See 289.

† The third *published* paper was the "Prolegomena to an Apology for Pragmatism," vol. 4, bk. II, ch. 6; but see 448n and §1, ch. 5 of bk. III.

‡ See 394.

a skin, a separate tissue, overlying an unconscious region of the occult nature, mind, soul, or physiological basis. It appears to me that in the present state of our knowledge a sound methodic prescribes that, in adhesion to the appearances, the difference is only relative and the demarcation not precise.

441. According to the maxim of Pragmaticism, to say that determination affects our occult nature is to say that it is capable of affecting deliberate conduct; and since we are conscious of what we do deliberately, we are conscious *habitualiter* of whatever hides in the depths of our nature; and it is presumable (and *only* presumable,¹ although curious instances are on record), that a sufficiently energetic effort of attention would bring it out. Consequently, to say that an operation of the mind is controlled is to say that it is, in a special sense, a conscious operation; and this no doubt is the consciousness of reasoning. For this theory requires that in reasoning we should be conscious, not only of the conclusion, and of our deliberate approval of it, but also of its being the result of the premiss from which it does result, and furthermore that the inference is one of a possible class of inferences which conform to one guiding principle.* Now in fact we find a well-marked class of mental operations, clearly of a different nature from any others which do possess just these properties. They alone deserve to be called *reasonings*; and if the reasoner is conscious, even vaguely, of what his guiding principle is, his reasoning should be called a *logical argumentation*. There are, however, cases in which we are conscious that a belief has been determined by another given belief, but are not conscious that it proceeds on any general principle. Such is St. Augustine's "*cogito, ergo sum.*" Such a process should be called, not a reasoning, but an *acritical inference*. Again, there are cases in which one belief is determined by another, without our being at all aware of it. These should be called *associational suggestions of belief*.

442. Now the theory of Pragmaticism was originally based, as anybody will see who examines the papers of November 1877 and January 1878, upon a study of that experience

¹ But see the experiments of J. Jastrow and me "On Slight Differences of Sensation" in the *Memoirs of the National Academy of Sciences*, vol. III [1884, pp. 1-11; see vol. 8].

* See 2.182ff.

of the phenomena of self-control which is common to all grown men and women; and it seems evident that to some extent, at least, it must always be so based. For it is to conceptions of deliberate conduct that Pragmaticism would trace the intellectual purport of symbols; and deliberate conduct is self-controlled conduct. Now control may itself be controlled, criticism itself subjected to criticism; and ideally there is no obvious definite limit to the sequence. But if one seriously inquires whether it is possible that a completed series of actual efforts should have been endless or beginningless (I will spare the reader the discussion), I think he can only conclude that (with some vagueness as to what constitutes an effort) this must be regarded as impossible.* It will be found to follow that there are, besides perceptual judgments, original (i.e., indubitable because uncriticized) beliefs of a general and recurrent kind, as well as indubitable acritical inferences.

443. It is important for the reader to satisfy himself that genuine doubt always has an external origin, usually from surprise; and that it is as impossible for a man to create in himself a genuine doubt by such an act of the will as would suffice to imagine the condition of a mathematical theorem, as it would be for him to give himself a genuine surprise by a simple act of the will.

I beg my reader also to believe that it would be impossible for me to put into these articles over two per cent of the pertinent thought which would be necessary in order to present the subject as I have worked it out. I can only make a small selection of what it seems most desirable to submit to his judgment. Not only must all steps be omitted which he can be expected to supply for himself, but unfortunately much more that may cause him difficulty.

444. *Character II*. I do not remember that any of the old Scotch philosophers ever undertook to draw up a complete list of the original beliefs, but they certainly thought it a feasible thing, and that the list would hold good for the minds of all men from Adam down. For in those days Adam was an undoubted historical personage. Before any waft of the air of evolution had reached those coasts how could they think otherwise? When I first wrote, we were hardly orientated in the new

* Cf. 194, 263.

ideas, and my impression was that the indubitable propositions changed with a thinking man from year to year. I made some studies preparatory to an investigation of the rapidity of these changes, but the matter was neglected, and it has been only during the last two years that I have completed a provisional inquiry which shows me that the changes are so slight from generation to generation, though not imperceptible even in that short period, that I thought to own my adhesion, under inevitable modification, to the opinion of that subtle but well-balanced intellect, Thomas Reid, in the matter of Common Sense (as well as in regard to immediate perception, along with Kant).¹

445. *Character III.* The Scotch philosophers recognized that the original beliefs, and the same thing is at least equally true of the acritical inferences, were of the general nature of instincts. But little as we know about instincts, even now, we are much better acquainted with them than were the men of the eighteenth century. We know, for example, that they can be somewhat modified in a very short time. The great facts have always been known; such as that instinct seldom errs, while reason goes wrong nearly half the time, if not more frequently. But one thing the Scotch failed to recognize is that the original beliefs only remain indubitable in their application to affairs that resemble those of a primitive mode of life. It is, for example, quite open to reasonable doubt whether the motions of electrons are confined to three dimensions, although it is good methodeutic to presume that they are until some evidence to the contrary is forthcoming. On the other hand, as soon as we find that a belief shows symptoms of being instinctive, although it may seem to be dubitable, we must suspect that experiment would show that it is not really so; for in our artificial life, especially in that of a student, no mistake is more likely than that of taking a paper-doubt for the genuine metal. Take, for example, the belief in the criminality of incest. Biology will doubtless testify that the practice is inadvisable;

¹ I wish I might hope, after finishing some more difficult work, to be able to resume this study and to go to the bottom of the subject, which needs the qualities of age and does not call upon the powers of youth. A great range of reading is necessary; for it is the belief men *betray* and not that which they *parade* which has to be studied. [No such study has been found.]

but surely nothing that it has to say could warrant the intensity of our sentiment about it. When, however, we consider the thrill of horror which the idea excites in us, we find reason in that to consider it to be an instinct; and from that we may infer that if some rationalistic brother and sister were to marry, they would find that the conviction of horrible guilt could not be shaken off.

In contrast to this may be placed the belief that suicide is to be classed as murder. There are two pretty sure signs that this is not an instinctive belief. One is that it is substantially confined to the Christian world. The other is that when it comes to the point of actual self-debate, this belief seems to be completely expunged and ex-sponged from the mind. In reply to these powerful arguments, the main points urged are the authority of the fathers of the church and the undoubtedly intense instinctive clinging to life. The latter phenomenon is, however, entirely irrelevant. For though it is a wrench to part with life, which has its charms at the very worst, just as it is to part with a tooth, yet there is no *moral* element in it whatever. As to the Christian tradition, it may be explained by the circumstances of the early Church. For Christianity, the most terribly earnest and most intolerant of religions (see *The Book of Revelations of St. John the Divine*) — and it remained so until diluted with civilization — recognized no morality as worthy of an instant's consideration except Christian morality. Now the early Church had need of martyrs, i.e., witnesses, and if any man had done with life, it was abominable infidelity to leave it otherwise than as a witness to its power. This belief, then, should be set down as dubitable; and it will no sooner have been pronounced dubitable, than Reason will stamp it as false.

The Scotch School appears to have no such distinction concerning the limitations of indubitability and the consequent limitations of the jurisdiction of original belief.

446. *Character IV.* By all odds, the most distinctive character of the Critical Common-sensist, in contrast to the old Scotch philosopher, lies in his insistence that the acritically indubitable is invariably vague.

Logicians have been at fault in giving Vagueness the go-by, so far as not even to analyze it. The present writer has done

his best to work out the Stechiology (or Stoicheiology), Critic, and Methodeutic* of the subject, but can here only give a definition or two with some proposals respecting terminology.

447. Accurate writers have apparently made a distinction between the *definite* and the *determinate*. A subject is *determinate* in respect to any character which inheres in it or is (universally and affirmatively) predicated of it, as well as in respect to the negative of such character, these being the very same respect. In all other respects it is *indeterminate*. The *definite* shall be defined presently. A sign (under which designation I place every kind of thought, and not alone external signs), that is in any respect objectively indeterminate (i.e., whose object is undetermined by the sign itself) is objectively *general* in so far as it extends to the interpreter the privilege of carrying its determination further.¹ *Example*: "Man is mortal." To the question, What man? the reply is that the proposition explicitly leaves it to you to apply its assertion to what man or men you will.† A sign that is objectively indeterminate in any respect is objectively *vague* in so far as it reserves further determination to be made in some other conceivable sign, or at least does not appoint the interpreter as its deputy in this office.‡ *Example*: "A man whom I could mention seems to be a little conceited." The *suggestion* here is that the man in view is the person addressed; but the utterer does not authorize such an interpretation or *any* other application of what she says. She can still say, if she likes, that she does *not* mean the person addressed. Every utterance naturally leaves the right of further exposition in the utterer; and therefore, in so far as a

* On these terms see 1.191, 2.93, 2.229, 3.430, 4.9.

¹ Hamilton and a few other logicians understood the subject of a universal proposition in the collective sense; but every person who is well-read in logic is familiar with many passages in which the leading logicians explain with an iteration that would be superfluous if all readers were intelligent, that such a subject is distributively not collectively general. A term denoting a collection is singular, and such a term is an "abstraction" or product of the operation of hypostatic abstraction as truly as is the name of the essence. "Mankind" is quite as much an abstraction and *ens rationis* as is "humanity." Indeed, every object of a conception is either a signate individual or some kind of indeterminate individual. Nouns in the plural are usually distributive and general; common nouns in the singular are usually indefinite.

† See 2.357.

‡ Cf. 2.357.

sign is indeterminate, it is vague, unless it is expressly or by a well-understood convention rendered general. Usually, an affirmative predication covers *generally* every essential character of the predicate, while a negative predication *vaguely* denies some essential character. In another sense, honest people, when not joking, intend to make the meaning of their words determinate, so that there shall be no latitude of interpretation at all. That is to say, the character of their meaning consists in the implications and non-implications of their words; and they intend to fix what is implied and what is not implied. They believe that they succeed in doing so, and if their chat is about the theory of numbers, perhaps they may. But the further their topics are from such precisiss, or "abstract," subjects, the less possibility is there of such precision of speech. In so far as the implication is not determinate, it is usually left vague; but there are cases where an unwillingness to dwell on disagreeable subjects causes the utterer to leave the determination of the implication to the interpreter; as if one says, "That creature is filthy, in every sense of the term."

448. Perhaps a more scientific pair of definitions would be that anything is *general* in so far as the principle of excluded middle does not apply to it and is *vague* in so far as the principle of contradiction does not apply to it.* Thus, although it is true that "Any proposition you please, *once you have determined its identity*, is either true or false"; yet *so long as it remains indeterminate and so without identity*, it need neither be true that any proposition you please is true, nor that any proposition you please is false. So likewise, while it is false that "A proposition *whose identity I have determined* is both true and false," yet until it is determinate, it may be true that a proposition is true and that a proposition is false.¹

* Cf. 505f.

¹ These remarks require supplementation. Determination, in general, is not defined at all; and the attempt at defining the determination of a subject with respect to a character only covers (or seems only to cover) explicit propositional determination. The incidental remark [447] to the effect that words whose meaning should be determinate would leave "no latitude of interpretation" is more satisfactory, since the context makes it plain that there must be no such latitude either for the interpreter or for the utterer. The explicitness of the words would leave the utterer no room for explanations of his meaning. This definition has the advantage of being applicable to a command, to a pur-

449. In those respects in which a sign is not vague, it is said to be *definite*, and also with a slightly different mode of application, to be *precise*, a meaning probably due to *præcisus* pose, to a medieval substantial form; in short to anything capable of indeterminacy. (That everything indeterminate is of the nature of a sign can be proved inductively by imagining and analyzing instances of the surdest description. Thus, the indetermination of an event which should happen by pure chance without cause, *sua sponte*, as the Romans mythologically said, *spontanément* in French (as if what was done of one's own motion were sure to be irrational), does not belong to the event — say, an explosion — *per se*, or as explosion. Neither is it by virtue of any real relation: it is by virtue of a relation of reason. Now what is true by virtue of a relation of reason is representative, that is, is of the nature of a sign. A similar consideration applies to the indiscriminate shots and blows of a Kentucky free fight.) Even a future event can only be determinate in so far as it is a consequent. Now the concept of a consequent is a logical concept. It is derived from the concept of the conclusion of an argument. But an argument is a sign of the truth of its conclusion; its conclusion is the rational *interpretation* of the sign. This is in the spirit of the Kantian doctrine that metaphysical concepts are logical concepts applied somewhat differently from their logical application. The difference, however, is not really as great as Kant represents it to be, and as he was obliged to represent it to be, owing to his mistaking the logical and metaphysical correspondents in almost every case.

Another advantage of this definition is that it saves us from the blunder of thinking that a sign is indeterminate simply because there is much to which it makes no reference; that, for example, to say, "C. S. Peirce wrote this article," is indeterminate because it does not say what the color of the ink used was, who made the ink, how old the father of the ink-maker [was] when his son was born, nor what the aspect of the planets was when that father was born. By making the definition turn upon the interpretation, all that is cut off. [Cf. 3.93.]

At the same time, it is tolerably evident that the definition, as it stands, is not sufficiently explicit, and further, that at the present stage of our inquiry cannot be made altogether satisfactory. For what is the interpretation alluded to? To answer that convincingly would be either to establish or to refute the doctrine of pragmatism. Still some explanations may be made. Every sign has a single object, though this single object may be a single set or a single continuum of objects. No general description can identify an object. But the common sense of the interpreter of the sign will assure him that the object must be one of a limited collection of objects. Suppose, for example, two Englishmen to meet in a continental railway carriage. The total number of subjects of which there is any appreciable probability that one will speak to the other perhaps does not exceed a million; and each will have perhaps half that million not far below the surface of consciousness, so that each unit of it is ready to suggest itself. If one mentions Charles the Second, the other need not consider what possible Charles the Second is meant. It is no doubt the English Charles Second. Charles the Second of England was quite a different man on different days; and it might be said that without further specification the subject is not identified. But the two Englishmen have no purpose of splitting hairs in their talk; and the latitude

having been applied to curt denials and refusals.* It has been the well-established, ordinary sense of *precise* since the Plantag- of interpretation which constitutes the indeterminacy of a sign must be understood as a latitude which might affect the achievement of a purpose. For two signs whose meanings are for all possible purposes equivalent are absolutely equivalent. This, to be sure, is rank pragmatism; for a purpose is an affection of action.

What has been said of subjects is as true of predicates. Suppose the chat of our pair of Englishmen had fallen upon the color of Charles II's hair. Now that colors are seen quite differently by different retinas is known. That the chromatic sense is much more varied than it is positively known to be is quite likely. It is very unlikely that either of the travelers is trained to observe colors or is a master of their nomenclature. But if one says that Charles II had dark auburn hair, the other will understand him quite precisely enough for all their possible purposes; and it will be a determinate predication.

The October remarks [i.e. those in the above paper] made the proper distinction between the two kinds of indeterminacy, viz.: indefiniteness and generality, of which the former consists in the sign's not sufficiently expressing itself to allow of an indubitable determinate interpretation, while the [latter] turns over to the interpreter the right to complete the determination as he please. It seems a strange thing, when one comes to ponder over it, that a sign should leave its interpreter to supply a part of its meaning; but the explanation of the phenomenon lies in the fact that the entire universe — not merely the universe of existents, but all that wider universe, embracing the universe of existents as a part, the universe which we are all accustomed to refer to as "the truth" — that all this universe is perfused with signs, if it is not composed exclusively of signs. Let us note this in passing as having a bearing upon the question of pragmatism. [Cf. 4.539.]

The October remarks, with a view to brevity, omitted to mention that both indefiniteness and generality **might** primarily affect either the logical breadth or the logical depth of the sign to which it belongs. It now becomes pertinent to notice this. When we speak of the depth, or signification, of a sign we are resorting to hypostatic abstraction, that process whereby we regard a thought as a thing, make an interpretant sign the object of a sign. It has been a butt of ridicule since Molière's dying week, and the depth of a writer on philosophy can conveniently be sounded by his disposition to make fun of the basis of voluntary inhibition, which is the chief characteristic of mankind. For cautious thinkers will not be in haste to deride a kind of thinking that is evidently founded upon observation — namely, upon observation of a sign. At any rate, whenever we speak of a predicate we are representing a thought as a thing, as a *substantia*, since the concepts of *substance* and *subject* are one, its concomitants only being different in the two cases. It is needful to remark this in the present connexion, because, were it not for hypostatic abstraction, there could be no generality of a predicate, since a sign which should make its interpreter its deputy to determine its signification at his pleasure would not signify anything, unless *nothing* be its significate.—From "Basis of Pragmatism," 1906, following somewhat after 554.

* Cf. 1.549, 2.428.

enets; and it were much to be desired that this word, with its derivatives *precision*, *precisive*, etc., should, in the dialect of philosophy, be restricted to this sense. To express the act of *rendering precise* (though usually only in reference to numbers, dates, and the like), the French have the verb *préciser*, which, after the analogy of *décider*, should have been *précider*. Would it not be a useful addition to our English terminology of logic, to adopt the verb *to precide*, to express the general sense, to render precise? Our older logicians with salutary boldness seem to have created for their service the verb *to prescind*, the corresponding Latin word meaning only to "cut off at the end," while the English word means to suppose without supposing some more or less determinately indicated accompaniment. In geometry, for example, we "prescind" shape from color, which is precisely the same thing as to "abstract" color from shape, although very many writers employ the verb "to abstract" so as to make it the equivalent of "prescind." But whether it was the invention or the courage of our philosophical ancestors which exhausted itself in the manufacture of the verb "prescind," the curious fact is that instead of forming from it the noun *prescission*, they took pattern from the French logicians in putting the word *precision* to this second use. About the same time¹ (see Watts, *Logick*, 1725, I, vi, 9 *ad fin.*) the adjective *precisive* was introduced to signify what *prescissive* would have more unmistakably conveyed. If we desire to rescue the good ship Philosophy for the service of Science from the hands of lawless rovers of the sea of literature, we shall do well to keep *prescind*, *presciss*, *prescission*, and *prescissive* on the one hand, to refer to dissection in hypothesis, while *precide*, *precise*, *precision*, and *precisive* are used so as to refer exclusively to an expression of determination which is made either full or free for the interpreter. We shall thus do much to relieve the stem "abstract" from staggering under the double burden of conveying the idea of *prescission* as well as the unrelated and very important idea of the creation of *ens rationis* out of an ἔπος πτερόεν — to filch the phrase to furnish a name for an expression of non-substantive thought —

¹ But unfortunately it has not been in the writer's power to consult the *Oxford Dictionary* concerning these words; so that probably some of the statements in the text might be corrected with the aid of that work.

an operation that has been treated as a subject of ridicule — this hypostatic abstraction — but which gives mathematics half its power.

450. The purely formal conception that the three affections of terms, *determination*, *generality*, and *vagueness*, form a group dividing a category of what Kant calls “functions of judgment” will be passed by as unimportant by those who have yet to learn how important a part purely formal conceptions may play in philosophy. Without stopping to discuss this, it may be pointed out that the “quantity” of propositions in logic, that is, the distribution of the *first* subject,¹ is either *singular* (that is, determinate, which renders it substantially negligible in formal logic), or *universal* (that is, general), or *particular* (as the mediæval logicians say, that is, vague or *indefinite*).* It is a curious fact that in the logic of relations it is the first and last quantifiers of a proposition that are of chief importance. To affirm of anything that it is a horse is to yield to it *every* essential character of a horse; to deny of anything that it is a horse is vaguely to refuse to it *some* one or more of those essential characters of the horse. There are, however, predicates that are unanalyzable in a given state of intelligence and experience. These are, therefore, determinately affirmed or denied. Thus, this same group of concepts reappears. Affirmation and denial are in themselves unaffected by these concepts, but it is to be remarked that there are cases in which we can have an apparently definite idea of a border line between affirmation and negation. Thus, a point of a surface may be in a region of that surface, or out of it, or on its boundary. This gives us an indirect and vague conception of an intermediary between affirmation and denial in general, and consequently of an intermediate, or nascent state, between determination and indetermination. There must be a similar intermediacy between generality and vagueness. Indeed, in an article in the

¹ Thus returning to the writer's original nomenclature, in despite of *Monist* VII, [3.532] where an obviously defective argument was regarded as sufficient to determine a mere matter of terminology. But the Quality of propositions is there regarded from a point of view which seems extrinsic. I have not had time, however, to re-explore all the ramifications of this difficult question by the aid of existential graphs, and the statement in the text about the last quantifier may need modification. [See 4.552n.]

* See 2.324.

seventh volume of *The Monist** there lies just beneath the surface of what is explicitly said, the idea of an endless series of such *intermediacies*. We shall find below some application for these reflections.

451. *Character V*. The Critical Common-sensist will be further distinguished from the old Scotch philosopher by the great value he attaches to doubt, provided only that it be the weighty and noble metal itself, and no counterfeit nor paper substitute. He is not content to ask himself whether he does doubt, but he invents a plan for attaining to doubt, elaborates it in detail, and then puts it into practice, although this may involve a solid month of hard work; and it is only after having gone through such an examination that he will pronounce a belief to be indubitable. Moreover, he fully acknowledges that even then it may be that some of his indubitable beliefs may be proved false.

The Critical Common-sensist holds that there is less danger to heurctic science in believing too little than in believing too much. Yet for all that, the consequences to heuristics of believing too little may be no less than disaster.

452. *Character VI*. Critical Common-sensism may fairly lay claim to this title for two sorts of reasons; namely, that on the one hand it subjects four opinions to rigid criticism: its own; that of the Scotch school; that of those who would base logic or metaphysics on psychology or any other special science, the least tenable of all the philosophical opinions that have any vogue; and that of Kant; while on the other hand it has besides some claim to be called Critical from the fact that it is but a modification of Kantism. The present writer was a pure Kantist until he was forced by successive steps into Pragmatism. The Kantist has only to abjure from the bottom of his heart the proposition that a thing-in-itself can, however indirectly, be conceived; and then correct the details of Kant's doctrine accordingly, and he will find himself to have become a Critical Common-sensist.

§2. SUBJECTIVE AND OBJECTIVE MODALITY^E

453. Another doctrine which is involved in Pragmatism as an essential consequence of it, but which the writer defended [306 *ad fin*] and *North American Review*, Vol. CXIII, pp. 449-

* 3.527ff.

472, 1871), [Vol. 9] before he had formulated, even in his own mind, the principle of pragmaticism, is the scholastic doctrine of realism. This is usually defined as the opinion that there are real objects that are general, among the number being the modes of determination of existent singulars, if, indeed, these be not the only such objects. But the belief in this can hardly escape being accompanied by the acknowledgment that there are, besides, real *vagues*, and especially real possibilities. For possibility being the denial of a necessity, which is a kind of generality, is vague like any other contradiction of a general. Indeed, it is the reality of some possibilities that pragmaticism is most concerned to insist upon. The article of January 1878* endeavored to gloze over this point as unsuited to the exoteric public addressed; or perhaps the writer wavered in his own mind. He said that if a diamond were to be formed in a bed of cotton-wool, and were to be consumed there without ever having been pressed upon by any hard edge or point, it would be merely a question of nomenclature whether that diamond should be said to have been hard or not. No doubt this is true, except for the abominable falsehood in the word MERELY, implying that symbols are unreal. Nomenclature involves classification; and classification is true or false, and the generals to which it refers are either reals in the one case, or figments in the other. For if the reader will turn to the original maxim of pragmaticism at the beginning of this article, he will see that the question is, not what *did* happen, but whether it would have been well to engage in any line of conduct whose successful issue depended upon whether that diamond *would* resist an attempt to scratch it, or whether all other logical means of determining how it ought to be classed *would* lead to the conclusion which, to quote the very words of that article, would be "the belief which alone could be the result of investigation carried *sufficiently far*."† Pragmaticism makes the ultimate intellectual purport of what you please to consist in conceived conditional resolutions,‡ or their substance; and therefore, the conditional propositions, with their hypothetical antecedents, in which such resolutions consist, being of the ultimate nature

* See 403.

† See 408.

‡ See 517n.

of meaning, must be capable of being true, that is, of expressing whatever there be which is such as the proposition expresses, independently of being thought to be so in any judgment, or being represented to be so in any other symbol of any man or men. But that amounts to saying that possibility is sometimes of a real kind.

454. Fully to understand this, it will be needful to analyze modality, and ascertain in what it consists.* In the simplest case, the most subjective meaning, if a person does not know that a proposition is false, he calls it *possible*. If, however, he knows that it is *true*, it is much more than possible. Restricting the word to its characteristic applicability, a state of things has the Modality of the possible — that is, of the merely possible — only in case the contradictory state of things is likewise possible, which proves possibility to be the vague modality. One who knows that Harvard University has an office in State Street, Boston, and has impression that it is at No. 30, but yet suspects that 50 is the number, would say “I think it is at No. 30, but it *may be* at No. 50,” or “it *is possibly* at No. 50.” Thereupon, another, who does not doubt his recollection, might chime in, “It *actually is* at No. 50,” or simply “it *is* at No. 50,” or “it *is* at No. 50, *de inesse*.” Thereupon, the person who had first asked, what the number was might say, “Since you are so positive, it *must be* at No. 50,” for “I know the first figure is 5. So, since you are both certain the second is a 0, why 50 it *necessarily is*.” That is to say, in this most subjective kind of Modality, that which is known by direct recollection is in the Mode of *Actuality*, the determinate mode. But when knowledge is indeterminate among alternatives, either there is one state of things which alone accords with them all, when this is in the Mode of *Necessity*, or there is more than one state of things that no knowledge excludes, when each of these is in the Mode of *Possibility*.

455. Other kinds of subjective Modality refer to a Sign or Representamen which is assumed to be true, but which does not include the Utterer's (i.e. the speaker's, writer's, thinker's or other symbolizer's) total knowledge, the different Modes being distinguished very much as above. There are other cases, however, in which, justifiably or not, we certainly think of

* Cf. 526ff, 2.382ff, 3.527ff, 4.65ff, 4.573ff.

Modality as objective. A man says, "I *can* go to the seashore if I like." Here is implied, to be sure, his ignorance of how he will decide to act. But this is not the point of the assertion. It is that the complete determination of conduct in the *act* not yet having taken place, the further determination of it belongs to the subject of the action regardless of external circumstances. If he had said, "I *must* go where my employers may send me," it would imply that the function of such further determination lay elsewhere. In "You *may* do so and so," and "You *must* do so," the "may" has the same force as "can," except that in the one case freedom from particular circumstances is in question, and in the other freedom from a law or edict. Hence the phrase, "You *may* if you *can*." I must say that it is difficult for me to preserve my respect for the competence of a philosopher whose dull logic, not penetrating beneath the surface, leaves him to regard such phrases as misrepresentations of the truth. So an act of hypostatic abstraction which in itself is no violation of logic, however it may lend itself to a dress of superstition, may regard the collective tendencies to variableness in the world, under the name of Chance, as at one time having their way, and at another time overcome by the element of order; so that, for example, a superstitious cashier, impressed by a bad dream, may say to himself of a Monday morning, "*May be*, the bank has been robbed." No doubt, he recognizes his total ignorance in the matter. But besides that, he has in mind the absence of any particular cause which should protect his bank more than others that are robbed from time to time. He thinks of the variety in the universe as vaguely analogous to the indecision of a person, and borrows from that analogy the garb of his thought. At the other extreme stand those who declare as inspired (for they have no rational proof of what they allege), that an actuary's advice to an insurance company is based on nothing at all but ignorance.

456. There is another example of objective possibility: "A pair of intersecting rays, i.e., unlimited straight lines conceived as movable objects, *can* (or *may*) move, without ceasing to intersect, so that one and the same hyperboloid shall be completely covered by the track of each of them." How shall we interpret this, remembering that the object spoken of, the

pair of rays, is a pure creation of the Utterer's imagination, although it is required (and, indeed, forced) to conform to the laws of space? Some minds will be better satisfied with a more subjective, or nominalistic, others with a more objective, realistic interpretation. But it must be confessed on all hands that whatever degree or kind of reality belongs to pure space belongs to the substance of that proposition, which merely expresses a property of space.

457. Let us now take up the case of that diamond which, having been crystallized upon a cushion of jeweler's cotton, was accidentally consumed by fire before the crystal of corundum that had been sent for had had time to arrive, and indeed without being subjected to any other pressure than that of the atmosphere and its own weight. The question is, was that diamond *really* hard? It is certain that no discernible *actual* fact determined it to be so. But is its hardness not, nevertheless, a *real* fact? To say, as the article of January 1878 seems to intend, that it is just as an arbitrary "usage of speech" chooses to arrange its thoughts, is as much as to decide against the reality of the property, since the real is that which is such as it is regardless of how it is, at any time, thought to be. Remember that this diamond's condition is not an isolated fact. There is no such thing; and an isolated fact could hardly be real. It is an unsevered, though presciss part of the unitary fact of nature. Being a diamond, it was a mass of pure carbon, in the form of a more or less transparent crystal (brittle, and of facile octahedral cleavage, unless it was of an unheard-of variety), which, if not trimmed after one of the fashions in which diamonds may be trimmed, took the shape of an octahedron, apparently regular (I need not go into minutiae), with grooved edges, and probably with some curved faces. Without being subjected to any considerable pressure, it could be found to be insoluble, very highly refractive, showing under radium rays (and perhaps under "dark light" and X-rays) a peculiar bluish phosphorescence, having as high a specific gravity as realgar or orpiment, and giving off during its combustion less heat than any other form of carbon would have done. From some of these properties hardness is believed to be inseparable. For like it they bespeak the high polemerization of the molecule. But however this may be, how can the

hardness of all other diamonds fail to bespeak *some* real relation among the diamonds without which a piece of carbon would not be a diamond? Is it not a monstrous perversion of the word and concept *real* to say that the accident of the non-arrival of the corundum prevented the hardness of the diamond from having the *reality* which it otherwise, with little doubt, would have had?

At the same time, we must dismiss the idea that the occult state of things (be it a relation among atoms or something else), which constitutes the reality of a diamond's hardness can possibly consist in anything but in the truth of a general conditional proposition. For to what else does the entire teaching of chemistry relate except to the "behavior" of different possible kinds of material substance? And in what does that behavior consist except that if a substance of a certain kind should be exposed to an agency of a certain kind, a certain kind of sensible result *would* ensue, according to our experiences hitherto. As for the pragmaticist, it is precisely his position that nothing else than this can be so much as *meant* by saying that an object possesses a character. He is therefore obliged to subscribe to the doctrine of a real Modality, including real Necessity and real Possibility.

458. A good question, for the purpose of illustrating the nature of Pragmaticism, is, What is Time? It is not proposed to attack those most difficult problems connected with the psychology, the epistemology, or the metaphysics of Time, although it will be taken for granted, as it must be according to what has been said, that Time is real.* The reader is only invited to the humbler question of what we mean by Time, and not of every kind of meaning attached to Past, Present, and Future either. Certain peculiar feelings are associated with the three general determinations of Time; but those are to be sedulously put out of view. That the reference of events to Time is irresistible will be recognized; but as to how it may differ from other kinds of irresistibility is a question not here to be considered. The question to be considered is simply, What is the intellectual purport of the Past, Present, and Future? It can only be treated with the utmost brevity.

459. That Time is a particular variety of objective

* Cf. 1.488ff.

Modality is too obvious for argumentation. The Past consists of the sum of *faits accomplis*, and this Accomplishment is the Existential Mode of Time. For the Past really acts upon us, and *that* it does, not at all in the way in which a Law or Principle influences us, but precisely as an Existent object acts. For instance, when a *Nova Stella* bursts out in the heavens, it acts upon one's eyes just as a light struck in the dark by one's own hands would; and yet it is an event which happened before the Pyramids were built. A neophyte may remark that its reaching the eyes, which is all we know, happens but a fraction of a second before we know it. But a moment's consideration will show him that he is losing sight of the question, which is not whether the distant Past can act upon us *immediately*, but whether it acts upon us just as any Existent does. The instance adduced (certainly a commonplace enough fact), proves conclusively that the mode of the Past is that of Actuality. Nothing of the sort is true of the Future, to compass the understanding of which it is indispensable that the reader should divest himself of his Necessitarianism — at best, but a scientific theory — and return to the Common-sense State of Nature. Do you never say to yourself, "I *can* do this or that as well tomorrow as today"? Your Necessitarianism is a theoretical pseudo-belief — a make-believe belief — that such a sentence does not express the real truth. That is only to stick to proclaiming the unreality of that Time, of which you are invited, be it reality or figment, to consider the meaning. You need not fear to compromise your darling theory by looking out at its windows. Be it true in theory or not, the unsophisticated conception is that everything in the Future is either *destined*, i. e., necessitated already, or is *undecided*, the contingent future of Aristotle. In other words, it is not Actual, since it does not act except through the idea of it, that is, as a law acts; but is either Necessary or Possible, which are of the same mode since (as remarked above*) Negation being outside the category of modality cannot produce a variation in Modality. As for the Present instant, it is so inscrutable that I wonder whether no sceptic has ever attacked its reality. I can fancy one of them dipping his pen in his blackest ink to commence the assault, and then suddenly

* In 450.

reflecting that his entire life is in the Present — the “living present,” as we say, this instant when all hopes and fears concerning it come to their end, this Living Death in which we are born anew. It is plainly that Nascent State between the Determinate and the Indeterminate that was noticed above.*

460. Pragmaticism consists in holding that the purport of any concept is its conceived bearing upon our conduct. How, then, does the Past bear upon conduct? The answer is self-evident: whenever we set out to do anything, we “go upon,” we base our conduct on facts already known, and for these we can only draw upon our memory. It is true that we may institute a new investigation for the purpose; but its discoveries will only become applicable to conduct after they have been made and reduced to a memorial maxim. In short, the Past is the storehouse of all our knowledge.

When we say that we know that some state of things exists, we mean that it used to exist, whether just long enough for the news to reach the brain and be retransmitted to tongue or pen, or longer ago. Thus, from whatever point of view we contemplate the Past, it appears as the Existential Mode of Time.

461. How does the Future bear upon conduct? The answer is that future facts are the only facts that we can, in a measure, control; and whatever there may be in the Future that is not amenable to control are the things that we *shall* be able to infer, or *should* be able to infer under favorable circumstances. There may be questions concerning which the pendulum of opinion never would cease to oscillate, however favorable circumstances may be. But if so, those questions are *ipso facto* not *real* questions, that is to say, are questions to which there is no true answer to be given. It is natural to use the future tense (and the conditional mood is but a mollified future) in drawing a conclusion or in stating a consequence. “If two unlimited straight lines in one plane and crossed by a third making the sum . . . then these straight lines *will* meet on the side, etc.” It cannot be denied that acritical inferences may refer to the Past in its capacity as past; but according to Pragmaticism, the conclusion of a Reasoning power must refer to the Future. For its meaning refers to conduct, and since it is a reasoned conclusion must refer to deliberate conduct,

* See 450.

which is controllable conduct. But the only controllable conduct is Future conduct. As for that part of the Past that lies beyond memory, the Pragmatist doctrine is that the meaning of its being believed to be in connection with the Past consists in the acceptance as truth of the conception that we ought to conduct ourselves according to it (like the meaning of any other belief). Thus, a belief that Christopher Columbus discovered America really refers to the future. It is more difficult, it must be confessed, to account for beliefs that rest upon the double evidence of feeble but direct memory and upon rational inference. The difficulty does not seem insuperable; but it must be passed by.

462. What is the bearing of the Present instant upon conduct?

Introspection is wholly a matter of inference.* One is immediately conscious of his Feelings, no doubt; but not that they are feelings of an *ego*. The *self* is only inferred. There is no time in the Present for any inference at all, least of all for inference concerning that very instant. Consequently the present object must be an external object, if there be any objective reference in it. The attitude of the Present is either conative or perceptive. Supposing it to be perceptive, the perception must be immediately known as external — not indeed in the sense in which a hallucination is *not* external, but in the sense of being present regardless of the perceiver's will or wish. Now this kind of externality is conative externality. Consequently, the attitude of the present instant (according to the testimony of Common Sense, which is plainly adopted throughout) can only be a Conative attitude. The consciousness of the present is then that of a struggle over what shall be; and thus we emerge from the study with a confirmed belief that it is the Nascent State of the Actual.

463. But how is Temporal Modality distinguished from other Objective Modality? Not by any general character since Time is unique and *sui generis*. In other words there is only one Time. Sufficient attention has hardly been called to the surpassing truth of this for Time as compared with its truth for Space. Time, therefore, can only be identified by brute compulsion. But we must not go further.

* See 244ff.

BOOK III
UNPUBLISHED PAPERS

CHAPTER 1

A SURVEY OF PRAGMATISM*

§1. THE KERNEL OF PRAGMATISM

464. It is now high time to explain what pragmatism is. I must, however, preface the explanation by a statement of what it is not, since many writers, especially of the starry host of Kant's progeny, in spite of pragmatists' declarations, unanimous, reiterated, and most explicit, still remain unable to "catch on" to what we are driving at, and persist in twisting our purpose and purport all awry. I was long enough, myself, within the Kantian fold to comprehend their difficulty; but let it go. Suffice it to say once more that pragmatism is, in itself, no doctrine of metaphysics, no attempt to determine any truth of things. It is merely a method of ascertaining the meanings of hard words and of abstract concepts. All pragmatists of whatsoever stripe will cordially assent to that statement. As to the ulterior and indirect effects of practising the pragmatic method, that is quite another affair.

465. All pragmatists will further agree that their method of ascertaining the meanings of words and concepts is no other than that experimental method by which all the successful sciences (in which number nobody in his senses would include metaphysics) have reached the degrees of certainty that are severally proper to them today; this experimental method being itself nothing but a particular application of an older logical rule, "By their fruits ye shall know them."

466. Beyond these two propositions to which pragmatists assent *nem. con.*, we find such slight discrepancies between the views of one and another declared adherent as are to be found in every healthy and vigorous school of thought in every department of inquiry. The most prominent of all our school and the most respected, William James, defines pragmatism as the doctrine that the whole "meaning" of a concept expresses itself either in the shape of conduct to be recommended or of

* From "Pragmatism (Editor [3])" continuing 13.

experience to be expected.* Between this definition and mine there certainly appears to be no slight theoretical divergence, which, for the most part, becomes evanescent in practice; and though we may differ on important questions of philosophy — especially as regards the infinite and the absolute — I am inclined to think that the discrepancies reside in other than the pragmatistic ingredients of our thought. If pragmatism had never been heard of, I believe the opinion of James on one side, of me on the other would have developed substantially as they have; notwithstanding our respective connecting them at present with our conception of that method. The brilliant and marvellously human thinker, Mr. F. C. S. Schiller, who extends to the philosophic world a cup of nectar stimulant in his beautiful *Humanism*, seems to occupy ground of his own, intermediate, as to this question, between those of James and mine.

467. I understand pragmatism to be a method of ascertaining the meanings, not of all ideas, but only of what I call “intellectual concepts,” that is to say, of those upon the structure of which, arguments concerning objective fact may hinge. Had the light which, as things are, excites in us the sensation of blue, always excited the sensation of red, and *vice versa*, however great a difference that might have made in our feelings, it could have made none in the force of any argument. In this respect, the qualities of hard and soft strikingly contrast with those of red and blue; because while red and blue name mere subjective feelings only, hard and soft express the factual behaviour of the thing under the pressure of a knife-edge. (I use the word “hard” in its strict mineralogical sense, “would resist a knife-edge.”) My pragmatism, having nothing to do with qualities of feeling, permits me to hold that the predication of such a quality is just what it seems, and has nothing to do with anything else. Hence, could two qualities of feeling everywhere be interchanged, nothing but feelings could be affected. Those qualities have no intrinsic significations beyond themselves. Intellectual concepts, however — the only sign-burdens that are properly denominated “concepts” — essentially carry some implication concerning the general behaviour either of some conscious being or of some inanimate object, and so convey more, not merely than any

* See 2.

feeling, but more, too, than any existential fact, namely, the “would-acts,” “would-dos” of habitual behaviour; and no agglomeration of actual happenings can ever completely fill up the meaning of a “would-be.” But [Pragmatism asserts], that the *total* meaning of the predication of an intellectual concept is contained in an affirmation that, under all conceivable circumstances of a given kind (or under this or that more or less indefinite part of the cases of their fulfillment, should the predication be modal) the subject of the predication would behave in a certain general way — that is, it would be true under given experiential circumstances (or under a more or less definitely stated proportion of them, *taken as they would occur*, that is in the same order of succession, *in experience*).¹

¹ It is in this phrase that I find my sole opportunity of calling attention to the fact that the ratio of frequency with which members of one denumeral collection are found among members of another denumeral, and therefore equal, collection depends upon the order of succession of the members of the latter collection. In order to afford matter for your rumination, my reader, I set down the first members of two endless series, each embracing all integers, and nothing else. The order of succession of the numbers of the first series is that of their occurrence in counting, or (what is the same thing) that of the multitudes they represent. The second series is derived by dividing each member of the first series, first, by 2, and then the final quotient by 3, as often as possible without remainder, and then remultiplying the ultimate quotient by 2 as many times as were the divisions by 3, and the product by 3 as many times as the divisions by 2, and setting down the ultimate product in that place in the second series which in the first series had been occupied by the number originally taken. The consequence will be that the number which, in either series, occupies the $(2^M \cdot 3^N \cdot Q)$ th place will in the other series occupy, and occupy none other than the $(2^N \cdot 3^M \cdot Q)$ th place. Here are the first members:

1 . 2 . 3 . 4 . 5 . 6 . 7 . 8 . 9 . 10 . 11 . 12 . 13 . 14 . 15 . 16 . 17 . 18 . 19 . 20 . 21 . 22 .
23 . 24 . 25 . 26 . 27 . 28 . 29 . 30 . 31 . 32 . 33 . 34 . 35 . 36 . 37 . 38 . 39 . 40 . etc.

1 . 3 . 2 . 9 . 5 . 6 . 7 . 27 . 4 . 15 . 11 . 18 . 13 . 21 . 10 . 81 . 17 . 12 . 19 . 45 . 14 . 33 .
23 . 54 . 25 . 39 . 8 . 63 . 29 . 30 . 31 . 243 . 22 . 51 . 35 . 36 . 37 . 57 . 26 . 135 . etc.

In the upper series every other number is even; in the lower, only every third. In the upper every third number is divisible by 3; in the lower every second is so. It is obvious that the principle involved must overthrow certain arguments about probabilities. Thus, a quarter of a century ago, a London professor put forth the argument (accompanied by the arrogant references then usual, but now disused from obvious motives, toward an American opponent who did not then think it worthwhile to reply, nor would now, but for the illustration of how the general principle is applicable to Probabilities), that because for every form of question to which the true answer is “Yes,” another form of the same question is possible to which the true answer is “No,” and conversely; therefore, there is an *a priori* probability equal to $\frac{1}{2}$ that any given proposition is true.

468. A most pregnant principle, quite undeniably, will this "kernel of pragmatism" prove to be, that the *whole* meaning of an intellectual predicate is that certain kinds of events would happen, once in so often, in the course of experience, under certain kinds of existential conditions — provided it can be proved to be true. But how is this to be done in the teeth of Messrs. Bradley, Taylor, and other high metaphysicians, on the one hand, and of the entire nominalistic nation, with its Wundts, its Haeckels, its Karl Pearsons, and many other regiments, in their divers uniforms, on the other?

At this difficulty I have halted for weeks and weeks. It has not been that I could not furnish forth an ample supply of seductive persuasions to pragmatism, or even two or three scientific proofs of its truth. Without a recognition of the chief moments, or points, of these latter it is quite impossible that the power and heart's blood of any variety of doctrine or tendency that ought to be classed among the different species of pragmatism should be really comprehended. A man may very well feel advantages in applications of pragmatism without anything of that. He may even make new applications of the method, himself — with much risk of blundering, however; but it appears very plain, both to reason and to observation of experience, that he cannot know in what interior eye, what pineal gland its soul and power reside, unless he clearly understands the chief conditions of its truth. Unfortunately, however, all the real proofs of pragmatism that I know — and, I hardly doubt, all there are to be known — require just as close and laborious exertion of attention as any but the very most difficult of mathematical theorems, while they add to that all those difficulties of logical analysis which force the mathematician to creep with exceeding caution, if not timorously. But mature consideration has brought me to see that, while those

He forgot that, in order to make this out, he would have to show that one form of the question occurred just as often as the other, *in the course of experience*. Whether the fact be so or not is open to doubt. One circumstance that seems to point toward its falsity is that there is, in the English language, no word equivalent to the French "oui," — as opposed to "si" — as an answer to the negative form of the question. But, however the fact may be, certain it is that no practical underwriter or actuary would, or ought to, allow an argument based on a form of words to make a dollar's difference in the premium to be paid for a policy

circumstances would render a task quite hopeless that I had never dreamed of undertaking, that of convincing the readers of a literary journal* by any honest argument, of the truth of pragmatism, and consequently must prevent communicating to them quite the idea of this method that an accomplished pragmatist has, yet an idea perfectly fulfilling the reader's desire, that of enabling him to place pragmatism and its concepts in the area of his own thought, and of showing roughly how its concepts are related to familiar concepts [may be given].

§2. THE VALENCY OF CONCEPTS†

469. I begin, then, with the first idea that it seems desirable to call to your attention. Everybody is familiar with the useful, though fluctuating and relative distinction of matter and form; and it is strikingly true that distinctions and classifications founded upon form are, with very rare exceptions, more important to the scientific comprehension of the behaviour of things than distinctions and classifications founded upon matter. Mendeléeff's classification of the chemical elements, with which all educated men are, by this time, familiar, affords neat illustrations of this, since the distinctions between what he calls "groups," that is to say, the different vertical columns of his table, consists in the elements of one such "group" entering into different forms of combination with hydrogen and with oxygen from those of another group; or as we usually say, their *valencies* differ; while the distinctions between what he calls the "series," that is, the different horizontal rows of the table, consist in the less formal, more material circumstance that their atoms have, the elements of one "series," greater masses than those of the other. Now everybody who has the least acquaintance with chemistry knows that, while elements in different horizontal rows but the same vertical column always exhibit certain marked physical differences, their chemical behaviours at corresponding temperatures are quite similar; and all the major distinctions of chemical behaviour between different elements are due to their belonging to different vertical columns of the table.

This illustration has much more pertinence to pragmatism

* *The Nation?*

† Cf. 1.288ff, 3.469ff.

than appears at first sight; since my researches into the logic of relatives have shown beyond all sane doubt that in one respect combinations of concepts exhibit a remarkable analogy with chemical combinations; every concept having a strict valency. (This must be taken to mean that of several forms of expression that are logically equivalent, that one or ones whose analytical accuracy is least open to question, owing to the introduction of the relation of joint identity, follows the law of valency.) Thus, the predicate "is blue" is univalent, the predicate "kills" is bivalent (for the direct and indirect objects are, grammar aside, as much subjects as is the subject nominative); the predicate "gives" is trivalent, since A gives B to C, etc. Just as the valency of chemistry is an atomic character, so indecomposable concepts may be bivalent or trivalent. Indeed, definitions being scrupulously observed, it will be seen to be a truism to assert that no compound of univalent and bivalent concepts alone can be trivalent, although a compound of any concept with a trivalent concept can have at pleasure, a valency higher or lower by one than that of the former concept. Less obvious, yet demonstrable, is the fact that no indecomposable concept has a higher valency. Among my papers are actual analyses of a number greater than I care to state.* They are mostly more complex than would be supposed. Thus, the relation between the four bonds of an unsymmetrical carbon atom consists of twenty-four triadic relations. Careful analysis shows that to the three grades of valency of indecomposable concepts correspond three classes of characters or predicates. Firstly come "firstnesses," or positive internal characters of the subject in itself; secondly come "secondnesses," or brute actions of one subject or substance on another, regardless of law or of any third subject; thirdly comes "thirdnesses," or the mental or quasi-mental influence of one subject on another relatively to a third. Since the demonstration of this proposition is too stiff for the infantile logic of our time (which is rapidly awakening, however). I have preferred to state it problematically, as a surmise to be verified by observation. The little that I have contributed to pragmatism (or, for that matter, to any other department of philosophy), has been entirely the fruit of this outgrowth from formal logic, and is

* See 4.309.

worth much more than the small sum total of the rest of my work, as time will show.

§3. LOGICAL INTERPRETANTS

470. The next moment of the argument for pragmatism is the view that every thought is a sign. This is the doctrine of Leibniz, Berkeley, and the thinkers of the years about 1700. They were all extreme nominalists; but it is a great mistake to suppose that this doctrine is peculiarly nominalistic. I am myself a scholastic realist of a somewhat extreme stripe. Every realist must, as such, admit that a general is a term and therefore a sign. If, in addition, he holds that it is an absolute exemplar, this Platonism passes quite beyond the question of nominalism and realism; and indeed the doctrine of Platonic ideas has been held by the extremest nominalists. There is some reason to suspect that it was shared by Roscellinus himself.

471. The next point is still less novel; for not to mention references to it by the Greek commentators upon Aristotle, it was between six and seven centuries ago that John of Salisbury spoke of it as "fere in omnium ore celebre."* It is the distinction, to use that author's phrases, between that which a term *nominat* — its logical breadth — and that which it *significat* — its logical depth.† In the case of a proposition, it is the distinction between that which its subject denotes and that which its predicate asserts. In the case of an argument, it is the distinction between the state of things in which its premisses are true and the state of things which is defined by the truth of its conclusion.

472. The action of a sign calls for a little closer attention. Let me remind you of the distinction referred to above between dynamical, or dyadic, action; and intelligent, or triadic action. An event, A, may, by brute force, produce an event, B; and then the event, B, may in its turn produce a third event, C. The fact that the event, C, is about to be produced by B has no influence at all upon the production of B by A. It is impossible that it should, since the action of B in producing C is a contingent future event at the time B is produced. Such is dyadic

* *Metalogicus* II, XX.

† See 2.394ff.

action, which is so called because each step of it concerns a pair of objects.

473. But now when a microscopist is in doubt whether a motion of an animalcule is guided by intelligence, of however low an order, the test he always used to apply when I went to school, and I suppose he does so still, is to ascertain whether event, A, produces a second event, B, *as a means* to the production of a third event, C, or not. That is, he asks whether B will be produced if it will produce or is likely to produce C in its turn, but will not be produced if it will not produce C in its turn nor is likely to do so. Suppose, for example, an officer of a squad or company of infantry gives the word of command, "Ground arms!" This order is, of course, a sign. That thing which causes a sign as such is called the *object* (according to the usage of speech, the "real," but more accurately, the *existent* object) represented by the sign: the sign is determined to some species of correspondence with that object. In the present case, the object the command represents is the will of the officer that the butts of the muskets be brought down to the ground. Nevertheless, the action of his will upon the sign is not simply dyadic; for if he thought the soldiers were deaf mutes, or did not know a word of English, or were raw recruits utterly undrilled, or were indisposed to obedience, his will probably would not produce the word of command. However, although this condition is most usually fulfilled, it is not essential to the action of a sign. For the acceleration of the pulse is a probable *symptom* of fever and the rise of the mercury in an ordinary thermometer or the bending of the double strip of metal in a metallic thermometer is an indication, or, to use the technical term, is an *index*, of an increase of atmospheric temperature, which, nevertheless, acts upon it in a purely brute and dyadic way. In these cases, however, a mental representation of the index is produced, which mental representation is called the *immediate object* of the sign; and this object does triadically produce the intended, or proper, effect of the sign strictly by means of another mental sign; and that this triadic character of the action is regarded as essential is shown by the fact that if the thermometer is dynamically connected with the heating and cooling apparatus, so as to check either effect, we do not, in ordinary parlance speak of there being any

semeiosis, or action of a sign, but, on the contrary, say that there is an "automatic regulation," an idea opposed, in our minds, to that of *semeiosis*. For the proper significate outcome of a sign, I propose the name, the *interpretant* of the sign. The example of the imperative command shows that it need not be of a mental mode of being. Whether the interpretant be necessarily a triadic result is a question of words, that is, of how we limit the extension of the term "sign"; but it seems to me convenient to make the triadic production of the interpretant essential to a "sign," calling the wider concept like a Jacquard loom, for example, a "quasi-sign." On these terms, it is very easy (not descending to niceties with which I will not annoy your readers) to see what the interpretant of a sign is: it is all that is explicit in the sign itself apart from its context and circumstances of utterance. Still, there is a possible doubt as to where the line should be drawn between the interpretant and the object. It will be convenient to give the mere glance, which is all that can be afforded, to this question as it applies to propositions. The interpretant of a proposition is its predicate; its object is the things denoted by its subject or subjects (including its grammatical objects, direct and indirect, etc.). Take the proposition "Burnt child shuns fire." Its predicate might be regarded as all that is expressed, or as "has either not been burned or shuns fire," or "has not been burned," or "shuns fire," or "shuns," or "is true"; nor is this enumeration exhaustive. But where shall the line be most truly drawn? I reply that the purpose of this sentence being understood to be to communicate information, anything belongs to the interpretant that describes the quality or character of the fact, anything to the object that, without doing that, distinguishes this fact from others like it; while a third part of the proposition, *perhaps*, must be appropriated to information about the manner in which the assertion is made, what warrant is offered for its truth, etc. But I rather incline to think that all this goes to the subject. On this view, the predicate is, "is either not a child or has not been burned, or has no opportunity of shunning fire or does shun fire"; while the subject is "any individual object the interpreter may select from the universe of ordinary everyday experience."

474. I omit all I possibly can; but there is one fact ex-

tremely familiar in itself, that needs to be mentioned as being an indispensable point in the argument. It is that every man inhabits two worlds. These are directly distinguishable by their different appearances. But the greatest difference between them, by far, is that one of these two worlds, the Inner World, exerts a comparatively slight compulsion upon us, though we can by direct efforts so slight as to be hardly noticeable, change it greatly, creating and destroying existent objects in it; while the other world, the Outer World, is full of irresistible compulsions for us, and we cannot modify it in the least, except by one peculiar kind of effort, muscular effort, and but very slightly even in that way.

475.* Now the problem of what the "meaning" of an intellectual concept is can only be solved by the study of the interpretants, or proper significate effects, of signs. These we find to be of three general classes with some important subdivisions. The first proper significate effect of a sign is a feeling produced by it. There is almost always a feeling which we come to interpret as evidence that we comprehend the proper effect of the sign, although the foundation of truth in this is frequently very slight. This "emotional interpretant," as I call it, may amount to much more than that feeling of recognition; and in some cases, it is the only proper significate effect that the sign produces. Thus, the performance of a piece of concerted music is a sign. It conveys, and is intended to convey, the composer's musical ideas; but these usually consist merely in a series of feelings. If a sign produces any further proper significate effect, it will do so through the mediation of the emotional interpretant, and such further effect will always involve an effort. I call it the energetic interpretant. The effort may be a muscular one, as it is in the case of the command to ground arms; but it is much more usually an exertion upon the Inner World, a mental effort. It never can be the meaning of an intellectual concept, since it is a single act, [while] such a concept is of a general nature. But what further kind of effect can there be?

476. In advance of ascertaining the nature of this effect, it will be convenient to adopt a designation for it, and I will call it the *logical interpretant*, without as yet determining whether

* Cf. 4.536, 4.572.

this term shall extend to anything beside the meaning of a general concept, though certainly closely related to that, or not. Shall we say that this effect may be a thought, that is to say, a mental sign? No doubt, it may be so; only, if this sign be of an intellectual kind — as it would have to be — it must itself have a logical interpretant; so that it cannot be the *ultimate* logical interpretant of the concept. It can be proved that the only mental effect that can be so produced and that is not a sign but is of a general application is a *habit-change*; meaning by a habit-change a modification of a person's tendencies toward action, resulting from previous experiences or from previous exertions of his will or acts, or from a complexus of both kinds of cause. It excludes natural dispositions, as the term "habit" does, when it is accurately used; but it includes beside associations, what may be called "transsociations," or alterations of association, and even includes *dissociation*, which has usually been looked upon by psychologists (I believe mistakenly), as of deeply contrary nature to association.

477. Habits have grades of strength varying from complete dissociation to inseparable association. These grades are mixtures of promptitude of action, say excitability and other ingredients not calling for separate examination here. The habit-change often consists in raising or lowering the strength of a habit. Habits also differ in their endurance (which is likewise a composite quality). But generally speaking, it may be said that the effects of habit-change last until time or some more definite cause produces new habit-changes. It naturally follows that repetitions of the actions that produce the changes increase the changes. [It] is noticeable that the iteration of the action is often said to be indispensable to the formation of a habit; but a very moderate exercise of observation suffices to refute this error. A single reading yesterday of a casual statement that the "shtar chindis" means in Romany "four shillings," though it is unlikely to receive any reinforcement beyond the recalling of it, at this moment, is likely to produce the habit of thinking that "four" in the Gypsy tongue is "shtar," that will last for months, if not for years, though I should never call it to mind in the interval. To be sure, there has been some iteration just now, while I dwelt on the matter long enough to write these sentences; but I do not believe any

reminiscence like this was needed to create the habit; for such instances have been extremely numerous in acquiring different languages. There are, of course, other means than repetition of intensifying habit-changes. In particular, there is a peculiar kind of effort, which may be likened to an imperative command addressed to the future self. I suppose the psychologists would call it an act of auto-suggestion.

478. We may distinguish three classes of events causative of habit-change. Such events may, in the first place, not be acts of the mind in which the habit-change is brought about, but experiences forced upon [it]. Thus, surprise is very efficient in breaking up associations of ideas. On the other hand, each new instance that is brought to the experience that supports an induction goes to strengthen that association of ideas — that inward habit — in which the tendency to believe in the inductive conclusion consists. But careful examination has pretty thoroughly satisfied me that no new association, no entirely new habit, can be created by involuntary experiences.

479. In the second place, the event that causes a habit-change may be a muscular effort, apparently. If I wish to acquire the habit of speaking of "speaking, writing, thinking," etc., instead of "speakin', writin', thinkin'," as I suspect I now do (though I am not sure) — all I have to do is to make the desired enunciations a good many times; and to do this as thoughtlessly as possible, since it is an inattentive habit that I am trying to create. Everybody knows the facility with which habits may thus be acquired, even quite unintentionally. But I am persuaded that nothing like a concept can be acquired by muscular practice alone. When we seem to do that, it is not the muscular action but the accompanying inward efforts, the acts of imagination, that produce the habit. If a person who has never tried such a thing before undertakes to stand on one foot and to move the other round a horizontal circle, say, as being the easier way, clockwise if he is standing on the left foot, or counter-clockwise if he is standing on the right foot, and at the same time to move the fist of the same side as the moving foot round a horizontal circle in the opposite direction, that is, clockwise if the foot is moved counter-clockwise, and *vice versa*, he will, at first, find he cannot do it. The difficulty is that he lacks a unitary concept of the series of efforts that

success requires. By practising the different parts of the movement, while attentively observing the kind of effort requisite in each part, he will, in a few minutes, catch the idea, and will then be able to perform the movements with perfect facility. But the proof that it is in no degree the muscular efforts, but only the efforts of the imagination that have been his teachers, is that if he does not perform the actual motions, but only imagines them vividly, he will acquire the same trick with only so much additional practice as is accounted for by the difficulty of imagining all the efforts that will have to be made in a movement one has not actually executed. There is an obvious difficulty of determining just how much allowance should be made for this, in the fact [that] when the feat is learned in either way, it cannot be unlearned, so as to compare that way with the other. The only resort is to learn a considerable number of feats which depend upon acquiring a unitary conception of a series of efforts, learning some with actual muscular exercise and others by unaided imagination, and then forming one's judgment of whether the greater facility afforded by the actual muscular contractions is, or is not, greater than the support this gives the imagination. Saying the verse about "Peter Piper"; spelling without an instant's hesitation, in the old way, the name Aldibirontifoscoforniocrononhotonotologes (that is, thus: *A-l*, al, and here's my *al*; *d-i*, di, and here's my *di*, and here's my *aldi*; *b-i*, bi, and here's my *bi*, and here's my *dibi*, and here's my *aldibi*, etc.); making the pass with one hand upon a pack of cards, playing the thimbles and ball, and other turns of legerdemain all largely depend for their success upon a unitary conception of all that has to be done and just when it must be done. It is from such experiments that I have been led to estimate as nil the power of mere muscular effort in contributing to the acquisition of ideas.¹

¹ I must correct a false impression that the above might produce by declaring plainly that I am no conjurer, and am the reverse of adroit. But I have studied a few tricks, and have received minute instructions about others; and know that many things that are supposed to depend upon difficult manipulations performed with a speed that in reality no human being could approach, really require no extraordinary deftness and are done without hurry. Good conjuring is based on keen practical psychology. The legerdemain, the mechanical devices, etc., merely furnish occasion for the real art, which tells just when the current of thought that, pursued, would lead to discovery, can be turned, and how.

480. Every concept, doubtless, first arises when upon a strong, but more or less vague, sense of need is superinduced some involuntary experience of a suggestive nature; that being suggestive which has a certain occult relation to the build of the mind. We may assume that it is the same with the instinctive ideas of animals; and man's ideas are quite as miraculous as those of the bird, the beaver, and the ant. For a not insignificant percentage of them have turned out to be the keys of great secrets. With beasts, however, conditions are comparatively unchanging, and there is no further progress. With man these first concepts (first in the order of development, but emerging at all stages of mental life) take the form of conjectures, though they are by no means always recognized as such. Every concept, every general proposition of the great edifice of science, first came to us as a conjecture. These ideas are the *first logical interpretants* of the phenomena that suggest them, and which, as suggesting them, are signs, of which they are the (really conjectural) interpretants. But that they are no more than that is evidently an after-thought, the dash of cold doubt that awakens the sane judgment of the muser. Meantime, do not forget that every conjecture is equivalent to, or is expressive of, such a habit that having a certain desire one might accomplish it if one could perform a certain act. Thus, the primitive man must have been sometimes asked by his son whether the sun that rose in the morning was the same as the one that set the previous evening; and he may have replied, "I do not know, my boy; but I think that if I could put my brand on the evening sun, I should be able to see it on the morning sun again; and I once knew an old man who could look at the sun though he could hardly see anything else; and he told me that he had once seen a peculiarly shaped spot on the sun; and that it was to be recognized quite unmistakably for several days." [Readiness] to act in a certain way under given circumstances and when actuated by a given motive is a habit; and a deliberate, or self-controlled, habit is precisely a belief.

481. In the next step of thought, those first logical interpretants stimulate us to various voluntary performances in the inner world. We imagine ourselves in various situations and animated by various motives; and we proceed to trace out the alternative lines of conduct which the conjectures would leave

open to us. We are, moreover, led, by the same inward activity, to remark different ways in which our conjectures could be slightly modified. The logical interpretant must, therefore, be in a relatively future tense.

482. To this may be added the consideration that it is not all signs that have logical interpretants, but only intellectual concepts and the like; and these are all either general or intimately connected with generals, as it seems to me. This shows that the species of future tense of the logical interpretant is that of the conditional mood, the "*would-be*."

483. At the time I was originally puzzling over the enigma of the nature of the logical interpretant, and had reached about the stage where the discussion now is, being in a quandary, it occurred to me that if I only could find a moderate number of concepts which should be at once highly abstract and abstruse, and yet the whole nature of whose meanings should be quite unquestionable, a study of them would go far toward showing me how and why the logical interpretant should in all cases be a conditional future. I had no sooner framed a definite wish for such concepts, than I perceived that in mathematics they are as plenty as blackberries. I at once began running through the explications of them, which I found all took the following form: Proceed according to such and such a general rule. Then, if such and such a concept is applicable to such and such an object, the operation will have such and such a general result; and conversely. Thus, to take an extremely simple case, if two geometrical figures of dimensionality N should be equal in all their parts, an easy rule of construction would determine, in a space of dimensionality N containing both figures, an axis of rotation, such that a rigid body that should fill not only that space but also a space of dimensionality $N + 1$, containing the former space, turning about that axis, and carrying one of the figures along with it while the other figure remained at rest, the rotation would bring the movable figure back into its original space of dimensionality, N , and when that event occurred, the movable figure would be in exact coincidence with the unmoved one, in all its parts; while if the two figures were not so equal, this would never happen.

Here was certainly a stride toward the solution of the enigma.

For the treatment of a score of intellectual concepts on that model, only a few of them being mathematical, seemed to me to be so refulgently successful as fully to convince me that to predicate any such concept of a real or imaginary object is equivalent to declaring that a certain operation, corresponding to the concept, if performed upon that object, would (certainly, or probably, or possibly, according to the mode of predication), be followed by a result of a definite general description.

484. Yet this does not quite tell us just what the nature is of the essential effect upon the interpreter, brought about by the *sēmīō' sis* of the sign, which constitutes the logical interpretant. (It is important to understand what I mean by *semiosis*. All dynamical action, or action of brute force, physical or psychical, either takes place between two subjects [whether they react equally upon each other, or one is agent and the other patient, entirely or partially] or at any rate is a resultant of such actions between pairs. But by "semiosis" I mean, on the contrary, an action, or influence, which is, or involves, a coöperation of *three* subjects, such as a sign, its object, and its interpretant, this tri-relative influence not being in any way resolvable into actions between pairs. *σημείωσις* in Greek of the Roman period, as early as Cicero's time, if I remember rightly, meant the action of almost any kind of sign; and my definition confers on anything that so acts the title of a "sign.")

485. Although the definition does not require the logical interpretant (or, for that matter, either of the other two interpretants) to be a modification of consciousness, yet our lack of experience of any semiosis in which this is not the case, leaves us no alternative to beginning our inquiry into its general nature with a provisional assumption that the interpretant is, at least, in all cases, a sufficiently close analogue of a modification of consciousness to keep our conclusion pretty near to the general truth. We can only hope that, once that conclusion is reached, it may be susceptible of such a generalization as will eliminate any possible error due to the falsity of that assumption. The reader may well wonder why I do not simply confine my inquiry to psychical semiosis, since no other seems to be of much importance. My reason is that the too frequent practice, by those logicians who do not go to work [with] any method at all [or who follow] the method of basing propositions

in the science of logic upon results of the science of psychology — as contradistinguished from common-sense observations concerning the workings of the mind, observations well-known even if little noticed, to all grown men and women, that are of sound minds — that practice is to my apprehension as unsound and insecure as was that bridge in the novel of “Kenilworth” that, being utterly without any sort of support, sent the poor Countess Amy to her destruction; seeing that, for the firm establishment of the truths of the science of psychology, almost incessant appeals to the results of the science of logic — as contradistinguished from natural perceptions that one relation evidently involves another — are peculiarly indispensable. Those logicians continually confound *psychical* truths with *psychological* truths, although the distinction between them is of that kind that takes precedence over all others as calling for the respect of anyone who would tread the strait and narrow road that leadeth unto exact truth.

486. Making that provisional assumption, then, I ask myself, since we have already seen that the logical interpretant is general in its possibilities of reference (i.e., refers or is related to whatever there may be of a certain description), what categories of mental facts there be that are of general reference. I can find only these four: conceptions, desires (including hopes, fears, etc.), expectations, and habits. I trust I have made no important omission. Now it is no explanation of the nature of the logical interpretant (which, we already know, is a concept) to say that it is a concept. This objection applies also to desire and expectation, as explanations of the same interpretant; since neither of these is general otherwise than through connection with a concept. Besides, as to desire, it would be easy to show (were it worth the space), that the logical interpretant is an effect of the energetic interpretant, in the sense in which the latter is an effect of the emotional interpretant. Desire, however, is cause, not effect, of effort.* As to expectation, it is excluded by the fact that it is not conditional. For that which might be mistaken for a conditional expectation is nothing but a judgment that, under certain conditions, there would be an expectation: there is no conditionality in the expectation itself, such as there is in the logical interpretant after it is actually

* Cf. 1.341.

produced. Therefore, there remains only habit, as the essence of the logical interpretant.

487. Let us see, then, just how, according to the rule derived from mathematical concepts (and confirmed by others), this habit is produced; and what sort of a habit it is. In order that this deduction may be rightly made, the following remark will be needed. It is not a result of scientific psychology, but is simply a bit of the catholic and undeniable common sense of mankind, with no other modification than a slight accentuation of certain features.

Every sane person lives in a double world, the outer and the inner world, the world of percepts and the world of fancies. What chiefly keeps these from being mixed up together is (besides certain marks they bear) everybody's well knowing that fancies can be greatly modified by a certain non-muscular effort, while it is muscular effort alone (whether this be "voluntary," that is, pre-intended, or whether all the intended endeavour is to inhibit muscular action, as when one blushes, or when peristaltic action is set up on experience of danger to one's person) that can to any noticeable degree modify percepts. A man can be durably affected by his percepts and by his fancies. The way in which they affect him will be apt to depend upon his personal inborn disposition and upon his habits. Habits differ from dispositions in having been acquired as consequences of the principle, virtually well-known even to those whose powers of reflexion are insufficient to its formulation, that multiple reiterated behaviour of the same kind, under similar combinations of percepts and fancies, produces a tendency — the *habit* — actually to behave in a similar way under similar circumstances in the future. Moreover — *here is the point* — every man exercises more or less control over himself by means of modifying his own habits; and the way in which he goes to work to bring this effect about in those cases in which circumstances will not permit him to practice reiterations of the desired kind of conduct in the outer world shows that he is virtually well-acquainted with the important principle that *reiterations in the inner world — fancied reiterations — if well-intensified by direct effort, produce habits, just as do reiterations in the outer world; and these habits will have power to influence actual behaviour in the outer world; especially, if each*

reiteration be accompanied by a peculiar strong effort that is usually likened to issuing a command to one's future self.¹

488. I here owe my patient reader a confession. It is that when I said that those signs that have a logical interpretant are either general or closely connected with generals, this was not a scientific result, but only a strong impression due to a life-long study of the nature of signs. My excuse for not answering the question scientifically is that I am, as far as I know, a pioneer, or rather a backwoodsman, in the work of clearing and opening up what I call *semiotic*, that is, the doctrine of the essential nature and fundamental varieties of possible semiosis; and I find the field too vast, the labor too great, for a first-comer. I am, accordingly, obliged to confine myself to the most important questions. The questions of the same particular type as the one I answer on the basis of an impression, which are of about the same importance, exceed four hundred in number; and they are all delicate and difficult, each requiring much search and much caution. At the same time, they are very far from being among the most important of the questions of semiotic. Even if my answer is not exactly correct, it can lead to no great misconception as to the nature of the logical interpretant. There is my apology, such as it may be deemed.

489. It is not to be supposed that upon every presentation of a sign capable of producing a logical interpretant, such interpretant is actually produced. The occasion may either be too early or too late. If it is too early, the semiosis will not be carried so far, the other interpretants sufficing for the rude functions for which the sign is used. On the other hand, the occasion will come too late if the interpreter be already familiar with the logical interpretant, since then it will be recalled to his mind by a process which affords no hint of how it was originally produced. Moreover, the great majority of instances

¹ I well remember when I was a boy, and my brother Herbert, now our minister at Christiania, was scarce more than a child, one day, as the whole family were at table, some spirit from a "blazer," or "chafing-dish," dropped on the muslin dress of one of the ladies and was kindled; and how instantaneously he jumped up, and did the right thing, and how skillfully each motion was adapted to the purpose. I asked him afterward about it; and he told me that since Mrs. Longfellow's death, it was that he had often run over in imagination all the details of what ought to be done in such an emergency. It was a striking example of a real habit produced by exercises in the imagination. [Cf. 538.]

in which formations of logical interpretants do take place are very unsuitable to serve as illustrations of the process, because in them the essentials of this semiosis are buried in masses of accidental and hardly relevant semioses that are mixed with the former. The best way that I have been able to hit upon for simplifying the illustrative example which is to serve as our matter upon which to experiment and observe is to suppose a man already skillful in handling a given sign (that has a logical interpretant) to begin now before our inner gaze for the first time, seriously to inquire what that interpretant is. It will be necessary to amplify this hypothesis by a specification of what his *interest* in the question is supposed to be. In doing this, I, by no means, follow Mr. Schiller's brilliant and seductive humanistic logic, according to which it is proper to take account of the whole personal situation in logical inquiries.* For I hold it to be very evil and harmful procedure to introduce into scientific investigation an unfounded hypothesis, without any definite prospect of its hastening our discovery of the truth. Now such a hypothesis Mr. Schiller's rule seems to me, with my present lights, to be. He has given a number of reasons for it; but, to my estimate, they seem to be of that quality that is well calculated to give rise to interesting discussions, and is consequently to be recommended to those who intend to pursue the study of philosophy as an entertaining exercise of the intellect, but is negligible [to] one whose earnest purpose is to do what in him lies toward bringing about a metamorphosis of philosophy into a genuine science. I cannot turn aside into Mr. Schiller's charming lane. When I ask what the interest is in seeking to discover a logical interpretant, it is not my fondness for strolling in paths where I can study the varieties of humanity that moves me, but the definite reflection that unless our hypothesis be rendered specific as to that interest, it will be impossible to trace out its logical consequences, since the way the interpreter will conduct the inquiry will greatly depend upon the nature of his interest in it.

490. I shall suppose, then, that the interpreter is not particularly interested in the theory of logic, which he may judge by examples to be profitless; but I shall suppose that he has embarked a great part of the treasures of his life in the enterprise of perfecting a certain invention; and that, for this end,

* See *Proceedings of the Aristotelian Society, 1905-6; Studies in Humanism*, ch. III, 1907.

it seems to him extremely desirable that he should acquire a demonstrative knowledge of the solution of a certain problem of reasoning. As to this problem itself, I shall suppose that it does not fall within any class for which any general method of handling is known, and that indeed it is indefinite in every respect which might afford any familiar kind of handle by which any image fairly representing it could be held firmly before the mind and examined; so that, in short, it seems to elude reason's application or to slip from its grasp.

Various problems answering this description might be instanced; but to fix our ideas, I will specify one of them, and will suppose that this is the very one which our imaginary inventor wishes to solve. It shall be the following "map-coloring problem": Let a globular body be bored through in two wide holes; and, though it is unnecessary, the edge at each end of each tunnel shall be smoothly rounded off. Then the problem is, supposing its utterer is free to divide the whole surface of this body — including the surfaces of the bores — into regions in any way he likes (no region consisting of separated pieces), and supposing that it will then fall to the interpreter to color the whole area of each region in one color, but never giving to two regions that abut along a common boundary-line the same color; required to ascertain what will be the least number of different colors that will always suffice, no matter how the surface may have been divided.

Under the high stimulus of his interest in this problem, and with that practical knack that we have supposed him to possess in coloring maps without too frequently being obliged to go back and alter the colors he had assigned to given regions, we need not doubt that our inquirer will be thrown into a state of high activity in the world of fancies, in experimenting upon coloring maps, while trying to make out what subconscious rule guides him, and renders him as successful as he usually is; and in trying, too, to discover what rule he had violated in each case where his first coloration has to be changed. This activity is, logically, an energetic interpretant of the interrogatory he puts to himself. Should he in this way succeed in working out a determinate rule for coloring every map on the two-tunnelled (or, what is the same thing, the two-bridged) everywhere unbounded surface with the fewest pos-

sible colors, there will be good hope that a demonstration may tread upon the heels of that rule, in which case, the problem will be solved in the most convenient form.

But while he may very likely manage to formulate his own usually successful way of coloring the regions, it is very unlikely that he will obtain an unailing rule for doing so. For after some of the first mathematicians in Europe had found themselves baffled by the far simpler problem, to prove that every map upon an ordinary sheet can be colored with four colors, one of the very first logico-mathematicians of our age, Mr. Alfred B. Kempe,* proposed a proof of it, somewhat, though not exactly, of the kind we are supposing our imaginary inventor to be aiming at. Yet I am informed that many years later a fatal flaw was discovered in Mr. Kempe's proof. I do not remember that I ever knew what the fallacy was. We may assume with confidence, then, that our imaginary interpreter will, at length, come to despair of solving the problem in that way. What way shall I imagine him to try next?

It will be very natural for him to pass from endeavouring to define a uniformly successful rule of procedure, to endeavouring either; first, to define the topical conditions under which two different regions must be colored alike, if the colors are not to exceed a given number, whence he will deduce the conditions under which two regions that do not abut must be colored differently; or else, first to define the conditions under which two regions cannot, by being stretched out, be brought into abuttal along a boundary, and thence to define the conditions under which two regions must be colored alike. Either of these methods is more promising than the one with which he began; and yet were either capable of being perfected without some very peculiar *aperçu*, the easier task of demonstrating that four colors suffice for every map on an ordinary limited sheet or globular surface must long ago have been brought to completion, which never has been accomplished, I believe, in print. We may assume, then, that he will, at length, come to abandon every such method. Meantime, he cannot fail to have noticed several obvious propositions that will be useful in his further inquiries. One of these will be that by minute alterations of the

* "On the Geographical Problem of the Four Colors," *American Journal of Mathematics*, vol. 2, p. 193 (1879).

boundaries between regions, which alterations can neither diminish nor increase the number of colors that will in all cases just suffice, he can get rid of all points where four or more regions concur, and thus render the number of points of concurrence two-thirds as many as the number of boundaries, so that the latter number will be divisible by three, and the former by two, unless fewer colors are required than are generally necessary. He will also have remarked that there must for each color be at least one region of that color which abuts upon regions of all the other colors, that for each of these other colors there must be at least one region that besides abutting upon the first region abuts upon regions of all the remaining colors, etc.

I shall suppose that it now occurs to him that it not only makes no difference what the proportionate dimensions either of the whole surface or of any of the regions are, but that it is equally indifferent whether any part of the whole surface be flat, convex, concave, curved, or broken by angles, or whether any boundaries are straight, curved, or broken by angles, and are convex or concave to either of the regions it bounds; whence it will follow that the problem belongs neither to Metrical, nor to Graphical (or Projective) Geometry, but to Topical Geometry, or Geometrical Topics. This is the most fundamental, and no doubt, in its own nature, much the easiest of the three departments of geometry. For just as Cayley showed,* metrics is but a special problem in the easier graphics; so quite obviously graphics is a special problem in the easier topics. For there is no other possible way of defining unbounded planes and rays, than by the topical statement (which does not fully define them) that the unbounded planes are a family of surfaces in 3-dimensional space of which any two contain one common line, only, which is a ray, and of which any three that do not all contain one common ray, have one point and only one in common; and further, any two points are both contained in one and in only one ray, while any three points not all in one ray are contained in one and only one unbounded plane.¹

* "Sixth Memoir on Quantics," *Philosophical Transactions of the Royal Society*, par. 230, v. CXLIX (1859).

¹ This supposes the unbounded 3-dimensional space to have a peculiar shape. For if it had the simplest shape possible or what seems to me such, and what

But though Topics must be the easiest kind of geometry, yet geometers were so accustomed to rely on considerations of measure and of flatness, that when they were deprived of these, they did not know how to handle problems; so that, apart from mere enumerations of forms, such as knots, we are still in possession of only one general theorem of Topics, Listing's census-theorem.* Consequently, our imagined investigator, as soon as he remarks that he has a problem in topical geometry before him, will infer that he must utilize that sole known theorem of topics; albeit it is sufficiently obvious that that theorem of itself is not adequate to furnishing a solution of his problem. I will state the census-theorem of Listing with some sacrifice of exactitude to perspicuity, insofar as it applies to the map-coloring problem. The surface which is divided into regions may be bounded by a line or unbounded. If it be unbounded and separates [a] solid into two parts, I call it *artiad*; if it does not, I call it *perissid*. The *Cyclosy*, or ringiness, of the surface of a body unpierced by any tunnel (i.e., not bridged over by an unbounded bridge), is *zero*; and every tunnel through the body adds *two* to the cyclosy of its surface. The cyclosy of the simplest perissid surface, such as an unbounded plane, is *one*, and every tunnel connecting two parts of it in an additional way (or every cylindrical bridge, which will be a tunnel on the other side of the surface) adds *two* to the cyclosy. A region, or an uninterrupted boundary that does not return into itself (as I will assume is the case with all regions and boundaries between two regions), has *zero* cyclosy. I will further assume that there is more than one region on the surface. Under these circumstances, the Census theorem takes this form, supposing all points of concurrence of regions are points where three regions and no more run together; one third of the number of boundaries from one point of concurrence to the next diminished by the number of regions is equal to one less than the cyclosy of the whole surface, if this be bounded, Listing assumed to be the real shape of space, every unbounded surface in it would separate it into two parts, and the unbounded line common to two surfaces would cut any third unbounded surface in an even number of points, since this line would pass alternately from one to the other of the two parts into which the first surface had cut the unbounded solid space. The peculiar shape of the solid space is that of "projective space."

* *Abhandlungen der Königlichen Gesellschaft der W. z. Göttingen*, Band X, §44 (1861-2).

or to two less than the cyclosy, if the surface be unbounded. In the case of the surface of the body pierced by two tunnels, the surface is unbounded, and its cyclosy is 4. The investigator will see at once that the number of colors must be at least 7, and is likely to be more. For were the body pierced by but one tunnel, let the number of regions each abutting upon all the rest be x . Then, the number of boundaries would be $\frac{1}{2}x(x-1)$; and the census-theorem applied to this case would be $\frac{1}{6}x(x-1) - x = 2 - 2$. That is $x^2 - 7x = 0$, or $x = 7$. Since, then, even with but one tunnel seven colors might be required, at least that number will be required for the case of two tunnels. On the other hand, were 2 tunnels made in a projective plane, where the cyclosy would be 5, instead of 4, only 9 regions could touch one another; so that it is likely that for a surface of cyclosy 4, the requisite number of colors is less than 9. The investigator will, therefore, only have to ascertain whether 8, and if so whether 9, colors can be required. He is still not very near his solution, but he is not hopelessly removed from it.

491. In every case, after some preliminaries, the activity takes the form of experimentation in the inner world; and the conclusion (if it comes to a definite conclusion), is that under given conditions, the interpreter will have formed the habit of acting in a given way whenever he may desire a given kind of result. The real and living logical conclusion *is* that habit; the verbal formulation merely expresses it. I do not deny that a concept, proposition, or argument may be a logical interpretant. I only insist that it cannot be the final logical interpretant, for the reason that it is itself a sign of that very kind that has itself a logical interpretant. The habit alone, which though it may be a sign in some other way, is not a sign in that way in which that sign of which it is the logical interpretant is the sign. The habit conjoined with the motive and the conditions has the action for its energetic interpretant; but action cannot be a logical interpretant, because it lacks generality. The concept which is a logical interpretant is only imperfectly so. It somewhat partakes of the nature of a verbal definition, and is as inferior to the habit, and much in the same way, as a verbal definition is inferior to the real definition. The deliberately formed, self-analyzing habit — self-analyzing because formed by the aid of analysis of the exercises that nourished it — is the

living definition, the veritable and final logical interpretant. Consequently, the most perfect account of a concept that words can convey will consist in a description of the habit which that concept is calculated to produce. But how otherwise can a habit be described than by a description of the kind of action to which it gives rise, with the specification of the conditions and of the motive?

492. If we now revert to the psychological assumption originally made, we shall see that it is already largely eliminated by the consideration that habit is by no means exclusively a mental fact. Empirically, we find that some plants take habits. The stream of water that wears a bed for itself is forming a habit. Every ditcher so thinks of it. Turning to the rational side of the question, the excellent current definition of habit, due, I suppose, to some physiologist (if I can remember my bye-reading for nearly half a century unglanced at, Brown-Sequard* much insisted on it in his book on the spinal cord), says not one word about the mind. Why should it, when habits in themselves are entirely unconscious, though feelings may be symptoms of them, and when consciousness alone — i.e., feeling — is the only distinctive attribute of mind?

What further is needed to clear the sign of its mental associations is furnished by generalizations too facile to arrest attention here, since nothing but feeling is exclusively mental.

493. But while I say this, it must not be inferred that I regard consciousness as a mere "epiphenomenon"; though I heartily grant that the hypothesis that it is so has done good service to science. To my apprehension, consciousness may be defined as that congeries of non-relative predicates, varying greatly in quality and in intensity, which are symptomatic of the interaction of the outer world — the world of those causes that are exceedingly compulsive upon the modes of consciousness, with general disturbance sometimes amounting to shock, and are acted upon only slightly, and only by a special kind of effort, muscular effort — and of the inner world, apparently derived from the outer, and amenable to direct effort of various kinds with feeble reactions; the interaction of these two worlds chiefly consisting of a direct action of the outer world upon the

* *Course of Lectures on the Physiology and Pathology of the Central Nervous System* (1860).

inner and an indirect action of the inner world upon the outer through the operation of habits. If this be a correct account of consciousness, i.e., of the congeries of feelings, it seems to me that it exercises a real function in self-control, since without it, or at least without that of which it is symptomatic, the resolves and exercises of the inner world could not affect the real determinations and habits of the outer world. I say that these belong to the outer world because they are not mere fantasies but are real agencies.

§4. OTHER VIEWS OF PRAGMATISM

494. I have now outlined my own form of pragmatism; but there are other slightly different ways of regarding what is practically the same method of attaining vitally distinct conceptions, from which I should protest from the depths of my soul against being separated. In the first place, there is the pragmatism of James, whose definition* differs from mine only in that he does not restrict the "meaning," that is, the ultimate logical interpretant, as I do, to a habit, but allows percepts, that is, complex feelings endowed with compulsiveness, to be such. If he is willing to do this, I do not quite see how he need give any room at all to habit. But practically, his view and mine must, I think, coincide, except where he allows considerations not at all pragmatic to have weight. Then there is Schiller, who offers no less than seven alternative definitions of pragmatism.† The first is that pragmatism is the Doctrine that "truths are logical values." At first blush, this seems far too broad; for who, be he pragmatist or absolutist, can fail to prefer truth to fiction? But no doubt what is meant is that the objectivity of truth really consists in the fact that, in the end, every sincere inquirer will be led to embrace it — and if he be not sincere, the irresistible effect of inquiry in the light of experience will be to make him so. This doctrine appears to me, after one subtraction, to be a corollary of pragmatism. I set it in a strong light in my original presentation of the method.‡ I call my form of it "conditional idealism." That is to say, I hold that truth's independence of individual opinions

* *Pragmatism*, p. 47f.

† *Studies in Humanism*, pp. 7-12 (1906).

‡ See 405f.

is due (so far as there is any "truth") to its being the predestined result to which sufficient inquiry *would* ultimately lead. I only object that, as Mr. Schiller himself seems sometimes to say, there is not the smallest scintilla of logical justification for any assertion that a given sort of result will, as a matter of fact, either *always* or *never* come to pass; and consequently we cannot know that there *is* any truth concerning any given question; and this, I believe, agrees with the opinion of M. Henri Poincaré,* except that he seems to insist upon the non-existence of any absolute truth for *all* questions, which is simply to fall into the very same error on the opposite side. But practically, we know that questions do generally get settled in time, when they come to be scientifically investigated; and that is practically and pragmatically enough. Mr. Schiller's second definition is Captain Bunsby's that "the 'truth' of an assertion depends on its application," which seems to me the result of a weak analysis. His third definition is that pragmatism is the doctrine that "the meaning of a rule lies in its application," which would make the "meaning" consist in the energetic interpretant and would ignore the logical interpretant; another feeble analysis. His fourth definition is that pragmatism is the doctrine that "all meaning depends on purpose." I think there is much to be said in favor of this, which would, however, make pragmatists of many thinkers who do not consider themselves as belonging to our school of thought. Their affiliations with us are, however, undeniable. His fifth definition is that pragmatism is the doctrine that "all mental life is purposive." His sixth definition is that pragmatism is "a systematic protest against all ignoring of the purposiveness of actual knowing." Mr. Schiller seems habitually to use the word "actual" in some peculiar sense. His seventh definition is that pragmatism is "a conscious application to epistemology (or logic) of a teleological psychology, which implies, ultimately, a voluntaristic metaphysics." Supposing by "psychology" he means *not* the science so called, but a critical acceptance of a sifted common-sense of mankind regarding mental phenomena, I might subscribe to this. I have myself called pragmatism "critical common-sensism"; but, of course, I do not mean this for a strict definition.

495. Signor Giovanni Papini goes a step beyond Mr.

* See *Electricité et Optique*, Introduction, Paris (1890).

Schiller in maintaining [that] pragmatism is indefinable.* But that seems to me to be a literary phrase. In the main, I much admire Papini's presentation of the subject.

496. There are certain questions commonly reckoned as metaphysical, and which certainly are so, if by metaphysics we mean ontology, which as soon as pragmatism is once sincerely accepted, cannot logically resist settlement. These are for example, What is reality? Are necessity and contingency real modes of being? Are the laws of nature real? Can they be assumed to be immutable or are they presumably results of evolution? Is there any real chance, or departure from real law? But on examination, if by metaphysics we mean the broadest positive truths of the psycho-physical universe — positive in the sense of not being reducible to logical formulæ — then the very fact that these problems can be solved by a logical maxim is proof enough that they do not belong to metaphysics but to "epistemology," an atrocious translation of *Erkenntnislehre*. When we pass to consider the nature of Time, it seems that pragmatism is of aid, but does not of itself yield a solution. When we go on to the nature of Space, I boldly declare that Newton's view that it is a real entity is alone logically tenable; and that leaves such further questions as, Why should Space have three dimensions? quite unanswerable for the present. This, however, is a purely speculative question without much human interest. (It would, of course, be absurd to say that tridimensionality is without practical consequences.) For those metaphysical questions that have such interest, the question of a future life and especially that of One Incomprehensible but Personal God, not immanent in but creating the universe, I, for one, heartily admit that a Humanism, that does not pretend to be a science but only an instinct, like a bird's power of flight, but purified by meditation, is the most precious contribution that has been made to philosophy for ages.

* Cf. "What Pragmatism is like," *Popular Science Monthly*, p. 351, vol. 71 (1907).

CHAPTER 2

PRAGMATICISM AND CRITICAL COMMON-SENSISM*

497. *Jules*.¹ Your Pragmaticism, then, seems to be simply the theory that a portion of the "meaning" of thought, that is, I suppose, the substance of thought, which portion you term its "intellectual purport," lies in its reference to conditional resolves. But I fail to see what your vague Common-Sense has to do with it. For your Pragmaticism is too definite to fall under that head. Your doctrine of Common-Sense cannot be proved from your Pragmatism, either, since that certain given propositions are absolutely indubitable must itself be an indemonstrable axiom or must be false. So I don't see what relevancy to Pragmaticism, even if to any conditional resolve, there was supposed to be in your discourse about this critical acceptance of uncriticizable propositions.

The Respondent. The Common-Sensism now so widely accepted is not critical of the substantial truth of uncriticizable propositions, but only as to whether a given proposition is of the number.

498. *Jules*. It seems to me they are the same, at any rate according to your style of dealing with such questions. For I can almost hear you argue that you must either believe a proposition or doubt or disbelieve it. If you believe it, you do not doubt it and cannot criticize it; if you doubt it, it cannot be indubitable.

Respondent. Just at this moment the question is whether those two propositions really are the same or distinct, and not what my general style of argumentation is; and I am happy to think that you do not yourself sincerely judge all the sages of human nature to have been conscious liars who from time

* "The Basis of Pragmaticism" (short ms.), c. 1905.

¹ I write in the form of a dialogue because it is in that form that my thoughts come to me; and I call my critic Jules in the endeavour to give his objections the solidity equal to those of a subtle Italian opponent of Pragmatism who writes under the *nom de guerre* of Giuliano il Sofista [Giuseppe Prezzolini].

immemorial have testified to their conviction that man possess no infallible introspective power into the secrets of his own heart, to know just what he believes and what he doubts. The denial of such a power is one of the clauses of critical common-sensism. The others are that there are indubitable beliefs which vary a little and but a little under varying circumstances and in distant ages; that they partake of the nature of instincts, this word being taken in a broad sense; that they concern matters within the purview of the primitive man; that they are very vague indeed (such as, that fire burns) without being perfectly so; that while it may be disastrous to science for those who pursue it to think they doubt what they really believe, and still more so really to doubt what they ought to believe, yet, on the whole, neither of these is so unfavorable to science as for men of science to believe what they ought to doubt, nor even for them to think they believe what they really doubt; that a philosopher ought not to regard an important proposition as indubitable without a systematic and arduous endeavour to attain to a doubt of it, remembering that genuine doubt cannot be created by a mere effort of will, but must be compassed through experience; that while it is possible that propositions that really are indubitable, for the time being, should nevertheless be false, yet in so far as we do not doubt a proposition we cannot but regard it as perfectly true and perfectly certain; that while holding certain propositions to be each individually perfectly certain, we may and ought to think it likely that some one of them, if not more, is false.¹

499. This is the doctrine of Critical Common-sensism, and the present pertinency of it is that a pragmatist, to be consistent, is obliged to embrace it. . . . For brevity's sake, I shall confine myself to the easiest stated but far from the best of several reasons. Because the pragmatist, then, recognizes that the substance of what he thinks lies in a conditional resolve, he cannot fail also to recognize that to learn the very truth is the way to satisfy the wishes of his heart. For this reason he will be of all men the man whose mind is most open to conviction, and will be keen up the scent of whatever can go toward teaching him to distinguish accurately between

¹ This is a striking instance of the vague's emancipation from the principle of contradiction.

truth and falsity, probability and improbability. This will suffice to make the pragmatist attentive to all those matters of every-day facts which critical common-sensism takes into account. It remains to say why he, more than another man, should be inclined to draw these inferences from those facts. His doctrine essentially insists upon the close affinity between thinking in particular and endeavour in general. Since, therefore, action in general is largely a matter of instinct, he will be pretty sure to ask himself whether it be not the same with belief. That this question once asked admits of but one answer is shown by the fact that even John Locke was obliged to fall into line here, notwithstanding the nominalistic metaphysics, the most blinding of all systems, as metaphysics generally is the most powerful of all causes of mental cecity, because it deprives the mind of the power to ask itself certain questions, as the habit of wearing a confining dress deprives one's joints of their suppleness. Now Locke was a man of strong prejudices, while the pragmatist — it cannot be said too often — will be the most open-minded of all men. But once it is settled that belief may be a matter of instinct and of desire, the inquiry [will arise] whether almost every man will not have his quite irresistible beliefs spring up ineluctably, together with the question whether these will not be pretty uniform. Now irresistible instinctive desires are such familiar and such almost invariable phenomena — so few men, let us say, are able to hold their breath for five minutes, even among strong thinkers who are apt to be great breath-holders — that there can be no doubt how this will get answered. . . . You see for yourself that pragmatism will be sure to carry critical common-sensism in its arms, do you not?

500. *Jules*. Perhaps so, but how do you know that your pragmatistic doctrine is true?

Respondent. Why just place the two doctrines — pragmatism and its alternative — side by side in your mind.

Jules. Gracious! Have the gracious gods confined us to two alternatives? I don't know what power of two would suffice to count up the varieties of pragmatism itself.

Respondent. Yes; but the choice between *them* shall be considered later. Without disrespect to those who only differ from me about the mint and cummin of the law, I may speak of the

traditional logic as the principal alternative, as presenting itself at the first and only great parting of the ways. For the old logicians, thought has no meaning except itself, any more than a fugue of Bach has. If you start with any concept, any twig of the tree of Porphyry, say *canary-birds*, and wish to include the similar Palestine bird, you can think of a *serin-finch*. To be sure, this includes a dozen other species; but that cannot be helped; it is the nearest concept there is. Suppose you wish to include sparrows besides. Then the only distinct concept there is, is coracomorphs (or crow-like birds) which, in the hazy light of the non-ornithological mind, would be pretty much the same as "*ordinary birds*." Rising through *birds*, *vertebrates*, *animals*, *living creatures*, *natural objects*, *things*, we come, in the ninth remove from *canary-birds*, to *substances*. Now that substance is a category is the general opinion of all schools of logicians — indeed, it is, with the unbroken agreement of all, except some who really do thinking on their own account, an irregular pluralism of functions.

Jules. Say, with the exception of one curious specimen, the *Axi-vectis persicus*.¹

501. *Respondent.* There have been a number of different lists of categories; but all the logicians, to whom I have been referring, agree that the concepts, which are categories, are all simple and are the only simple concepts. That means that while something may be true of one category that is not true of another, yet such differences are not such as to constitute the characters of the concepts. Each is other than each of the rest but this difference is unspecifiable and thus indefinite. At the same time there is nothing indefinite in the concepts themselves. It sounds paradoxical, yet it is precisely like what is to be remarked about different qualities of feeling. The perfume of the orange flower is perfectly definite and no complexity is to be detected in it. The same thing is true of the rose, of peppermint, and of sandal-wood. They are all very different — and one can predicate various qualities of them.* The odour of sandalwood is heavy, orange flower is cool, rose has an exquisite purity, peppermint has a clean smell; but these qualities do not

¹ The generic substantive has been invented, as is the usual custom. The thing is called simply *vectis* by George Agricola and by J. A. Comenius.

* Cf. 1.312f.

at all constitute the odors, nor are they any part of the smells themselves. Of their relations it is inconceivable that anything should ever be predicate except that each is other than each. Those relations therefore are as indefinite as they possibly could be while there is not the slightest indefiniteness [in the feelings related]. Indeed I am prepared to assert that the big-wigs of logic make concepts to be nothing else than another kind of qualities of feeling. Inquire of one of these gentlemen whether or not concepts are qualities of feeling. "Oh mi!" he will reply, "nothing could be more different." But ask him what the difference is, and pursue the inquiry sharply, and it will turn out that it is impossible to say what it is. He will begin by saying that concepts are general, feelings not so. But that position cannot be maintained for thirty seconds. They are different no doubt; but the difference is altogether indefinite. It is precisely like the difference between smells and colours. It must be so, because at the very outset they defined concepts as qualities of feeling, not in these very words, of course, but in the very meaning of these words, when they said that concepts possess, as immediate objects, all the characters¹ that they possess at all, each in itself, regardless of anything else.

Jules. Yes, you have asserted that with admirable distinctness. Now I invite you to prove it.

¹ Such is the circumlocution to which we are driven in consequence of the perversion of the meaning of "objective" characters.

CHAPTER 3

CONSEQUENCES OF CRITICAL COMMON-SENSISM*

§1. INDIVIDUALISM

502. *Doctor X.* The best of your screed in the April *Monist* was about the singleness of symbols.† It is in truth bad morals to use words in other than their original senses. But apply this rule to your own use of the verb "is." When the child first uses this verb, he applies it to some *sensory* reality. How, then, in the face of your code of terminological ethics, do you ever dare to use the verb "to be" for indicating anything not sensory? I, for my part, stick to the *one* meaning of "is" rigidly. When you talk of "general objects being real," and the like, you seem not to be aware that the verbs "to be," "to be real," and "to exist" have *ever* precisely one and the same significance.

Pragmaticist. My statements today are not designed to answer objections, but merely to correct misapprehensions. However, as your objection seems motivated by a grave misapprehension, I had better set *that* right. Only in order to guard against my misapprehending *you* in my turn, let me ask you whether you mean to say that throughout that vast philosophical "treatise" of yours, the signification of the verb "is" *is* really and truly in every instance the same.

Doctor X. It is.

Pragmaticist. And everywhere that meaning is "is real"?

Doctor X. Yes.

Pragmaticist. Thanks. Then the misapprehension that motives your objection is that you understand me to be more of a scholastic realist than you are, while in fact it is the other way. For this signification of "is," which occurs in hundreds of instances in your book, and is everywhere one and the same, by virtue of that fact satisfies the definition of a general, or, as

* "Pragmatism, Prag. [4]" c. 1905. The first page of the ms. is missing.

† See 413.

the scholastics more accurately said, of a universal: and you tell me that when you say that that universal "is" is always the same, you mean that it "is real" everywhere, as well as the same. So that makes you a scholastic realist. But you go much further than that; for when you say that the signification is the same, you of course make this signification the subject of the verb "is," which according to your statement is equivalent to a declaration that this signification which is one and the same in so many places of your book is a *sensory* object. Not Bernardus Carnotensis himself, who seems like you to have combined scholastic realism with individualism, went to the length of making any general a sensory object.

Doctor X. Now you are quibbling, you know.

503. *Pragmaticist.* Do not answer me, I beg. For remember that you, Doctor X, like Y, Z, and W are not an existent individual, even if you are a sensory object, but only a general type — unless indeed you are a mere man of straw. A reply could only vindicate you by showing that you were not a real type, when you would prove yourself to be a man of straw; in which case I might be provoked into the personality of burning you up, in our good old mediaeval fashion; though I believe you limit yourself to roasting your antagonists. For my part, I have found the combustion of a man of straw one of the best means of stopping my logical chimney from smoking; while your doctrine would seem to debar you from the employment of that useful device. It is perhaps true that the sectators of individualism, the essence of whose doctrine is that reality and existence are coextensive, i. e., are either alike true or alike false of every subject, must, to be logical, go along with you in holding that "real" and "existent" have the same meaning, or *Inhalt*. But many a logician, as soon as he is convinced that that party is under that obligation (individualism furnishing the principle of the consequence as well as furnishing the antecedent) would regard that circumstance as creating a *reductio ad absurdum* of individualism, inasmuch as *reality* means a certain kind of non-dependence upon thought, and so is a cognitive character, while *existence* means reaction with the environment, and so is a dynamic character; and accordingly the two meanings, he would say, are clearly *not* the same. Individualists are apt to fall into the almost incredible misunder-

standing that all other men are individualists, too — even the scholastic realists, who, they suppose, thought that “universals exist.” It is true that there are indications of there having been some who thought so in that greater darkness before the dawn of Aristotle’s *Analytics* and *Topics*, when such grotesque weldings of doctrine as that of nominalistic Platonism are heard of, and when Roscellin may possibly have said that universals were *flatus vocis*. But I ask, can anybody who has seen Westminster Abbey, who had read the Prologue to the *Canterbury Tales*, and who stops to consider that the metaphysics of the Plantagenet age must have more adequately represented the general intellectual standing of that age, when metaphysics absorbed its greatest heuristic minds, than the metaphysics of our day can represent our general intellectual condition, can any such person believe that the great doctors of that time believed that generals *exist*? They certainly did not so opine, but regarded generals as modes of determination of individuals; and such modes were recognized as being of the nature of thought. Now whoever cares to know what pragmatism is should understand that on its metaphysical side it is an attempt to solve the problem: In what way can a general be unaffected by any thought about it? Hence, before we treat of the evidences of pragmatism, it will be needful to weigh the pros and cons of scholastic realism. For pragmatism could hardly have entered a head that was not already convinced that there are real generals.

504. . . . [Sic] Another misapprehension: You seem to imagine that your argument from the talk of the child will be as convincing to me as it is to you. It is not so, because (aside from “is” not being one of the technical terms to which common-sense limited my maxim), I do not think that the import of any word (except perhaps a pronoun) is limited to what is in the utterer’s mind *actualiter*, so that when I mention the Greek language my meaning should be limited to such Greek words as I happen to be thinking of at the moment. It is, on the contrary, according to me, what is in the mind, perhaps not even *habitualiter*, but only *virtualiter*, which constitutes the import.¹

¹ This was said in 1868, before declaring for pragmatism, thus: “No present actual thought (which is mere feeling) has any meaning, any intellectual value; for this lies, not in what is actually thought, but in what the thought may be

To say that I hold that the import, or adequate ultimate interpretation, of a concept is contained, not in any deed or deeds that will ever be done, but in a habit of conduct, or general moral determination of whatever procedure there *may come to be*, is no more than to say that I am a pragmatist. Now every animal must have habits. Consequently, it must have innate habits. In so far as it has cognitive powers, it must have *in posse* innate cognitive habits, which is all that anybody but John Locke ever meant by innate ideas.¹ To say that I hold this for true is implied in my confession of the doctrine of Common-Sense — not quite that of the old Scotch School, but a critical philosophy of common-sense. It is impossible rightly to apprehend the pragmatist's position without fully understanding that nowhere would he be less at home than in the ranks of individualists, whether metaphysical (and so denying scholastic realism), or epistemological (and so denying innate ideas).

§2. CRITICAL PHILOSOPHY AND THE PHILOSOPHY OF COMMON-SENSE

505. *Doctor Y.* Allow me. You speak of holding a *Critical Philosophy of Common-Sense*. What meaning would you have me attach to that phrase, seeing that Critical Philosophy and the Philosophy of Common-Sense, the two rival and opposed ways of answering Hume, are at internecine war, impacificable. The Common-Sense philosopher opines that, be Criticism never so indefatigable, it will have to come to a halt somewhere, and leave some belief uncriticized; namely, wherever no stimulus to doubt has ever been experienced. An uncriticized belief must, says the Common-sensist, *ipso facto* be regarded as the very truth. That sounds conclusive. Yet it does not satisfy any of the Criticists, at all — be they Kantians or be they of one of the modern kinds that do not usually go by the name of Criticists. That a belief should be accepted as the bed-rock of truth simply and solely because it has not been criticized —

connected with in representation by subsequent thoughts; so that the meaning of a thought is altogether something virtual." [289]. This paper in fact expresses a kind of pragmatism not unlike that of Professor James.

¹ How surprisingly, however, Locke grew in philosophical power during the composition of the *Essay concerning Humane Understanding!*

oh, this is to their minds too monstrous! They insist that first principles be scientifically established. To think otherwise, says the great Wundt,* is to ask that philosophy should come into being by *equivocal generation*. He so resuscitates the phrase which, in the days when men believed in armary unguents, in mummial philtres, and in sigillary medicines, denoted the manner in which they thought that Satan's flies and the vilest of crawling things could be produced, in order to hint how much out of good odor common-sense is in his estimation. Of a principle proposed for the foundation of philosophy, think the Criticists, it must either be proved that the very circumstances and form of human knowledge require its acceptance, or better, that scientific psychology should show that its truth is unavoidable, or still better, that physiology should support it as it supports parallelism, or best of all, that histology should almost bring it within the field of the microscope, as caryocinesis is supposed almost to give ocular demonstration of some high proposition. Now, without asking whether it be Common-Sense or one of the Critical methods that is *right*, one cannot help seeing that Criticism and Common-sense are so immiscible that to plunge into either is to lose all touch with the other. The Criticist believes in criticizing first principles, while the Common-sensist thinks such criticism is all nonsense. So I can find no meaning in your straddling phrase.

Pragmaticist. The phrase denotes a particular stripe of Common-sensism, which is separated from the old Scotch kind by four distinguishing marks. The mark that I find it convenient to describe first is that the Critical Common-sensist holds that all the veritably indubitable beliefs are *vague* — often in some directions highly so. Logicians have too much neglected the study of *vagueness*, not suspecting the important part it plays in mathematical thought. It is the antithetical analogue of generality. A sign is objectively *general*, in so far as, leaving its effective interpretation indeterminate, it surrenders to the interpreter the right of completing the determination for himself. "Man is mortal." "What man?" "Any man you like." A sign is objectively *vague*, in so far as, leaving its interpretation more or less indeterminate, it reserves for some other possible sign or experience the function of complet-

* *System der Philosophie*, S. IX (1897).

ing the determination. "This month," says the almanac-oracle, "a great event is to happen." "What event?" "Oh, we shall see. The almanac doesn't tell that."¹ The *general* might be defined as that to which the principle of excluded middle does not apply. A triangle in general is not isosceles nor equilateral; nor is a triangle in general scalene. The *vague* might be defined as that to which the principle of contradiction does not apply. For it is false neither that an animal (in a vague sense) is male, nor that an animal is female. Mr. Kempe's great memoir in the *Philosophical Transactions* for 1886,* the most solid piece of work upon any branch of the stecheology of relations that has ever been done, in addition to its intrinsic value, has that of taking us out of the logician's rut, and showing us how the mathematician conceives of logical objects. Thus, in Section 4, he says that the four angular points of a square "are not distinguishable from" one another. On first reading this, a person [Peirce] who was preoccupied with conceptions derived from logicians, was moved to write to the author and ask whether he did not mean "do not differ" from one another. For if the angles are undistinguished, how do we know there are more than one of them? But though some suggestions of the letter were adopted in a supplement to the memoir, Mr. Kempe stood to "undistinguished" and "undistinguishable";† and in Section 29 he is more explicit, saying of the units of a singulary² system of units (i.e., a system all whose units are undistinguished from one another), "that no definition can be given of, or remark made about, one which is not equally applicable to each of the others." In Section 73, he goes further in using the expression "undistinguished in dress or other circumstance," showing that he means to exclude distinction by means of relations. All this is utterly paradoxical to the logician, who will say that two vertices of a square are dis-

¹ This is illustrated in our use of the phrase "a *certain* man," which means that the determination which is left *uncertain* to the reader or auditor is, nevertheless, or once was, *certain* either to the utterer or to some other person. [Cf. 3.94.]

* "A Memoir on the Theory of Mathematical Forms," *Philosophical Transactions of the Royal Society*, vol. 177, pp. 1-70 (1886). See 3.423f.

† See *Proceedings of the Royal Society*, vol. XLII, pp. 193-196 (1887).

² Kempe's word is "single"; but I prefer "singulary," from Latin *singularis*, not from *singularis*. His Section 127 throws further light on his meaning of "undistinguished."

tinguished from each other in not being opposite the same vertex, and in various other ways. But the difficulty disappears as soon as he recognizes that Kempe's units are not supposed to be real objects, but are only *vague* ideas, to which nobody ever supposed the principle of contradiction to apply.

506. Notwithstanding their contrariety, generality and vagueness are, from a formal point of view, seen to be on a par. Evidently no sign can be at once vague and general in the same respect, since insofar as the right of determination is not distinctly extended to the interpreter it remains the right of the utterer. Hence also, a sign can only escape from being either vague or general by not being indeterminate. But that no sign can be absolutely and completely indeterminate* is proved in 3.93 where Plutarch's anecdote about appealing from Phillip drunk to Phillip sober is put to use. Yet every proposition actually asserted must refer to some non-general subject; for the doctrine that a proposition has but a single subject has to be given up in the light of the Logic of Relations. (See *The Open Court*, pp. 3416 et seq.) [3.417ff.] Indeed, all propositions refer to one and the same determinately singular subject, well-understood between all utterers and interpreters; namely, to The Truth, which is the universe of all universes, and is assumed on all hands to be real.† But besides that, there is some lesser environment of the utterer and interpreter of each proposition that actually gets conveyed, to which that proposition more particularly refers and which is not general. The Open Court paper referred to [above] made this plain, but left unnoticed some truths of the first importance about vagueness. No communication of one person to another can be entirely definite, i.e., non-vague. We may reasonably hope that physiologists will some day find some means of comparing the qualities of one person's feelings with those of another, so that it would not be fair to insist upon their present incomparability as an inevitable source of misunderstanding. Besides, it does not affect the intellectual purport of communications. But wherever degree or any other possibility of continuous variation subsists, absolute precision is impossible. Much else must be vague, because no man's interpretation of words is based on exactly the same experience as any other man's. Even in our

* Though the writing is unmistakable this should be "determinate."

† See 4.552n, 4.553n².

most intellectual conceptions, the more we strive to be precise, the more unattainable precision seems. It should never be forgotten that our own thinking is carried on as a dialogue, and though mostly in a lesser degree, is subject to almost every imperfection of language. I have worked out the logic of vagueness with something like completeness,* but need not inflict more of it upon you, at present.

507. That veritably indubitable beliefs are especially vague could be proved *a priori*. But proof not being aimed at today, it will be simpler to say that the Critical Common-sensist's personal experience is that a suitable line of reflexion, accompanied by imaginary experimentation, always excites doubt of any very broad proposition if it be defined with precision. Yet there are beliefs of which such a critical sifting invariably leaves a certain vague residuum unaffected.

508. One ought then to ask oneself, whether, since much of the original belief has disappeared under an attentive dissection, perseverance might not affect the destruction of what remains of it. This question always appears reasonable as long as one stands far enough away from the facts of the case, and views them as one would a painting of Monet.

But the answer that a closer scrutiny dictates in some cases is that it is not because insufficient pains have been taken to precide† the residuum, that it is vague: it is that it is vague intrinsically. Take, for example, our belief in the Order of Nature. The criticisms of it in 342; 6.395ff; 2.749ff; 6.35ff; 6.613, as well as by various other writers, of whom may be mentioned as long antecedent to the writer, Renouvier,‡ Delboeuf,§ Fouillée,¶ Blood,° and James,|| and no doubt there were others, and since that time Dewey** and I know not who else, appear to me to have stripped it of all rational precision. As precisely defined it can hardly be said to be absolutely

* Where?

† See 449.

‡ *Philosophie analytique de l'histoire* (1896); *Histoire et solution des problèmes métaphysiques* (1901).

§ *La matière brute et la matière vivante* (1887).

¶ *La liberté et le déterminisme* (1872).

° *Pluriverse*, (1920).

|| "The Dilemma of Determinism" (1884), reprinted in *The Will to Believe and Other Essays* (1897).

** "The Superstition of Necessity," *The Monist*, vol. 3, pp. 362-379 (1893).

indubitable considering how many thinkers there are who do not believe it. But who can think that there is *no* order in nature?

509. Could I be assured that other men candidly and with sufficient deliberation doubt any proposition which I regard as indubitable, that fact would inevitably cause me to doubt it, too. I ought not, however, lightly to admit that they do so doubt a proposition after the most thorough criticism by myself and anxious consideration of any other criticisms which I have been able to find and understand has left it quite indubitable by me, since there are other states of mind that can easily be mistaken for doubt. If, indeed, the phenomenon in question were at all a common one, instead of being among the rarest of experiences, I should return to a variety of Common-sensism which has always strongly attracted me, namely, that there is no definite and fixed collection of opinions that are indubitable, but that criticism gradually pushes back each individual's indubitables, modifying the list, yet still leaving him beliefs indubitable at the time being. The reason I have of late given up that opinion, attractive as I find it, is that the facts of my experience accord better with the theory of a fixed list, the same for all men. I do not suppose that it is absolutely fixed, (for my synecism would revolt at that) but that it is so nearly so, that for ordinary purposes it may be taken as quite so.

510. Doubt is a state of mind marked by a feeling of uneasiness; but we cannot, from a logical, least of all from a pragmaticistic point of view, regard the doubt as consisting in the feeling. A man in doubt is usually trying to imagine how he shall, or should, act when or if he finds himself in the imagined situation. He supposes himself to have an end in view, and two different and inconsistent lines of action offer themselves. His action is in imagination (or perhaps really) brought to a stop because he does not know whether (so to speak) the right hand road or the left hand road is the one that will bring him to his destination; and (to continue the figure of speech) he waits at the fork for an indication, and kicks his heels. His pent up activity finds vent in feeling, which becomes the more prominent from his attention being no longer absorbed in action. A true doubt is accordingly a doubt which really interferes with the smooth working of the belief-habit.

Every natural or inbred belief manifests itself in natural or inbred ways of acting, which in fact constitute it a belief-habit. (I need not repeat that I do not say that it is the single deeds that constitute the habit. It is the single "ways," which are conditional propositions, each general). A true doubt of such a belief must interfere with this natural mode of acting. If a philosophist, reflecting upon the belief from an extraneous or unnatural point of view, develops new modes of manifestation of that belief (as, for example, by associating it with certain phrases), these new habits must not be regarded as expressions of the natural belief *simply*; for they inevitably involve something more. Consequently, if subsequent reflexion results in doubt of them, it is not necessarily doubt of the original belief, although it may be mistaken for such doubt.

511. These considerations lead me, quite naturally, to mention another mark of the Critical Common-sensist that separates him from the old school. Namely, he opines that the indubitable beliefs refer to a somewhat primitive mode of life, and that, while they never become dubitable in so far as our mode of life remains that of somewhat primitive man, yet as we develop *degrees of self-control* unknown to that man, occasions of action arise in relation to which the original beliefs, if stretched to cover them, have no sufficient authority. In other words, we outgrow the applicability of instinct — not altogether, by any manner of means, but in our highest activities. The famous Scotch philosophers lived and died out before this could be duly appreciated.

512. *Doctor Y.* What do you mean by "somewhat primitive"? And by what sort of reasoning can a dubitable proposition about experience become indubitable?

Pragmaticist. A searching question, because some of our beliefs, which seem as indubitable as any, are of such a character that they can hardly have entered the minds, say, of Neanderthal men, and in any case, cannot possibly have been transmitted to us from the first conscious animals. Consequently, Common-sensism has to grapple with the difficulty that if there are any indubitable beliefs, these beliefs must have grown up; and during the process, cannot have been indubitable beliefs. Still, I see no reason for thinking that beliefs that were dubitable became indubitable. Every decent house dog has

been taught beliefs that appear to have no application to the wild state of the dog; and yet your trained dog has not, I guess, been observed to have passed through a period of scepticism on the subject. There is every reason to suppose that belief came first, and the power of doubting long after. Doubt, usually, perhaps always, takes its rise from surprise, which supposes previous belief; and surprises come with novel environment. I will only add that though precise reasoning about precise experiential doubt could not entirely destroy doubt, any more than the action of finite conservative forces could leave a body in a continuous state of rest, yet vagueness, which is no more to be done away with in the world of logic than friction in mechanics, can have that effect.

513. As I was saying, a modern recognition of evolution must distinguish the Critical Common-sensist from the old school. Modern science, with its microscopes and telescopes, with its chemistry and electricity, and with its entirely new appliances of life, has put us into quite another world; almost as much so as if it had transported our race to another planet. Some of the old beliefs have no application except in extended senses, and in such extended senses they are sometimes dubitable and subject to just criticism. It is above all the normative sciences, esthetics, ethics, and logic, that men are in dire need of having severely criticized, in their relation to the new world created by science. Unfortunately, this need is as unconscious as it is great. The evils are in some superficial way recognized; but it never occurs to anybody that the study of esthetics, ethics, and logic can be seriously important, because these sciences are conceived by all, but their deepest students, in the old way. It only concerns my present purpose to glance at this state of things. The needed new criticism must know whereon it stands; namely, on the beliefs that remain indubitable; and young Critical Common-sensists of intellectual force who burn for a task in which they can worthily sacrifice their lives without encouragement, reward, recognition, or a hearing (and I trust such young men still live) can find in this field their heart's desire.

514. Yet a third mark of the Critical Common-sensist is that he has a high esteem for doubt. He may almost be said to have a *sacra fames* for it. Only, his hunger is not to be appeased

with paper doubts: he must have the heavy and noble metal, or else belief.

He quite acknowledges that what has been indubitable one day has often been proved on the morrow to be false. He grants the preciss proposition that it may be so with any of the beliefs he holds. He really cannot admit that it may be so with all of them; but here he loses himself in vague unmeaning contradictions.

515. *Doctor Y.* Can indubitable propositions be demonstrable?

Pragmaticist. Indubitable propositions must be ultimate premisses, or at least, must be held without reference to precise proofs. For what one cannot doubt one cannot argue about; and no precise empirical argument can free its conclusion altogether from rational doubt.

516. Yet it is true that whenever one turns a critical glance upon one of our original beliefs — say, the belief in the order of nature — the mind at once seems vaguely to pretend to have reasons for believing it. One dreams of an inductive proof. One surmises that the belief results from something like an inductive proof that has been forgotten. Very likely it did, in a sense of the term “inductive process” that is so generalized as to include uncontrolled thought. But this admission must be accompanied by the emphatic denial that the indubitable belief is inferential, or is “accepted.” It simply remains unshaken as it always was. That does not at all interfere with the theory that in the psychological process of its development, the occurrence of single experiences, such as might have been predictively deduced from it, were an indispensable factor, while an original potentiality of the belief-habit must have been a correlative factor. All this is perfectly consistent, too, with the necessity of criticising the ordinary axioms of reasoning and of morals, as well as ordinarily developed ideals, as soon as they are extended so as to become applicable to the new world created by science.

517. I was saying that the Critical Common-sensist feels that the danger — the scientific danger, at any rate; and Philosophy is a department of pure Heuristic Science even less concerned, for example, about practical religion, if possible, than religion ought to be about it — does not lie in believing too

little but in believing too much. The indolent university student, no matter at what pains his professor of philosophy may be to set him upon his own legs, yet having a well-grounded respect for that professor's superior acquirements and force of intellect, finds it much easier to accept all he says, as true because he says it, than to submit said professor's arguments to searching criticism; and he thus becomes, on the average, quite as much a slave to authority as was the average scholar of the medieval schools. Only, instead of bowing to Aristotle and the universal voice of the church sounding *semper eadem*, he submits to the yoke of some young doctrinaire with whom every other like him disagrees. With such sentiments, the Critical Common-sensist sets himself in serious earnest to the systematic business of endeavoring to bring all his very general first premisses to recognition, and of developing every suspicion of doubt of their truth, by the use of logical analysis, and by experimenting in imagination. If, besides being a Critical Common-sensist, he is also a pragmatist, he will further hold that everything in the substance of his beliefs can be represented in the schemata of his imagination; that is to say, in what may be compared to composite photographs of continuous series of modifications of images; these composites being accompanied by conditional resolutions¹ as to conduct.

These resolutions should cover all classes of circumstances, in the sense that they would produce (or, *perhaps*² more strictly, manifestations of whatever it may be in our occult nature that produces) determinations of habit corresponding

¹ By a *categorical resolution* I mean a representation to oneself that one will behave in a certain general way in a certain expected contingency, this representation being received with satisfaction, being rehearsed with pleasure, and perhaps exciting a special effort to learn it as a lesson. The purpose toward the accomplishment of which the action tends is taken for granted. By a *conditional resolution*, I mean a similar representation except that the purpose or end in view is only arbitrarily supposed to be aimed at and the circumstances under which the action would take place are not generally expected to arise. By a *conditional habit*, I mean a determination of a man's occult nature tending to cause him to act in a certain general way in case certain general circumstances should arise and in case he should be animated by a certain purpose.

² Were it a question of brute force, there were no need of the perhaps. But being a logos-influence, the manifest would promise more efficiency than the occult.

to every possible pragmaticistic application of the propositions believed.

518. Pragmaticism is, of course, in its developed fullness too recent a phenomenon in the history of philosophy to have disclosed anything to direct experience, concerning its tendencies, that is particularly trustworthy. Thus far, however, it would appear that, as a matter of fact, pragmaticists press their peculiar doubts about first principles a good deal further and with a more straightforward earnestness than Kantians do. For when a Kant expresses a doubt, one has still to learn whether it is the substance of the proposition that he doubts or merely its attachment to one faculty or to another. One has even known of a pragmaticist being called by a Kantian "David Hume Redivivus";* but I fancy it was more like the David Hume of some mediumistic *séance*.

519. *Doctor X.* I should think that so passionate a lover of doubt would make a clean sweep of his beliefs.

Pragmaticist. You naturally would, holding the infant's mind to be a *tabula rasa* and the adult's a school slate, on which doubts are written with a soapstone pencil to be cleaned off with the dab of a wet sponge; but if they are marked with talc on man's "glassy essence," they may disappear for a long time only to be revived by a breath.

520. *Doctor X.* Yours seemed marked with **T-A-L-K**. Doubtless your pragmaticist dotes too much on doubt to risk subjecting it to scientific experimentation.

Pragmaticist. Bah! I may as well capitulate first as last. I have been betrayed by that execrable banality, *auri sacra fames*, which is not even good poetry, since it is inaccurate. For what it *expresses* is the hoarding passion of the miser, a sort of collector's rage for gold as gold, while all it *means* in the familiar passages is no more than simple cupidity; and that is what I meant in applying it to the Critical Common-sensist's eager pursuit of doubt. He is none of those overcultivated Oxford dons — I hope their day is over — whom any discovery that brought quietus to a vexed question would evidently vex because it would end the fun of arguing around it and about it and over it. On the contrary what he adores, if he is a good pragmaticist, is *power*; not the sham power of brute

* Peirce was so called by Paul Carus in *The Monist*, vol. 2, p. 561.

force, which, even in its own specialty of spoiling things, secures such slight results; but the creative power of reasonableness, which subdues all other powers, and rules over them with its sceptre, knowledge, and its globe, love. It is as one of the chief lieutenants of reasonableness that he highly esteems doubt, although it is not amiable.

521. As for allaying doubts concerning the first principles of logic and philosophy by means of scientific experiments, he does not attempt that for two reasons, one a fine little reason that insinuates itself between the joints of the Wundtian armour, the other more like wholesome country air.

The small reason is sufficient. It is that any such idioscopic* inquiry must proceed upon the virtual assumption of sundry logical and metaphysical beliefs; and it is rational to settle the validity of those before undertaking an operation that supposes their truth. Now whether the truth of them be explicitly laid down on critical grounds, or the doctrine of Common-Sense prevent our pretending to doubt it, along with all these other sound first principles will be admitted, and so the whole inquiry will be concluded before the first outward experiment is made. But this preliminary inquiry is long and arduous.

522. *Doctor X.* A sort of Panama Commission business, apparently. I should say, Pitch in like Lesseps, unless your second objection is more serious. What is that?

Pragmaticist. There is nothing novel in it. It is that nothing is so unerring as instinct within its proper field, while reason goes wrong about as often as right — perhaps oftener. Now those vague beliefs that appear to be indubitable have the same sort of basis as scientific results have. That is to say, they rest on experience — on the total everyday experience of many generations of multitudinous populations. Such experience is worthless for distinctively scientific purposes, because it does not make the minute distinctions with which science is chiefly concerned; nor does it relate to the recondite subjects of science, although all science, without being aware of it, virtually supposes the truth of the vague results of uncontrolled thought upon such experiences, cannot help doing so, and would have to shut up shop if she should manage to escape accepting them. No “wisdom” could ever have discovered argon; yet

* On this term see 1.242n.

within its proper sphere, which embraces objects of universal concern, the instinctive result of human experience ought to have so vastly more weight than any scientific result, that to make laboratory experiments to ascertain, for example, whether there be any uniformity in nature or no, would vie with adding a teaspoonful of saccharine to the ocean in order to sweeten it.

523. *Doctor Y.* Is there any further peculiarity which distinguishes Critical Common-sensism from that of Reid and Dugald Stewart?

Pragmaticist. Yes; for it criticizes the critical method, follows its footsteps, tracks it to its lair. To the accusation that Common-Sense accepts a proposition as indubitable because it has not been criticized, the answer is that this confounds two uses of the word "because." Neither the philosophy of Common-Sense nor the man who holds it accepts any belief *on the ground* that it has not been criticized. For, as already said, such beliefs are not "accepted." What happens is that one comes to recognize that one has had the belief-habit as long as one can remember; and to say that no doubt of it has ever arisen is only another way of saying the same thing. But it is quite true that the Common-sensist like everybody else, the Criticist included, believes propositions *because* they have not been criticized in the sense that he does not doubt certain propositions that he would have doubted if he had criticized them. For in the first place, to criticize is *ipso facto* to doubt, and in the second place criticism can only attack a proposition after it has given it some precise sense in which it is impossible entirely to remove the doubt. It is probably true, too, that the Common-sensist believes unquestioningly some propositions that might have been criticized and that are not true. We are all liable to do that; but perhaps he is more in danger of it than other men. Still, as a fact, it is difficult to find a Criticist who does not hold to more fundamental beliefs than any Critical Common-sensist does.

524. The Critical Philosopher seems to opine that the fact that he has not hitherto doubted a proposition is no reason why he should not henceforth doubt it. (At which Common-Sense whispers that, whether it be "reason" or no, it will be a well-nigh insuperable *obstacle* to doubt.) Accordingly, he

will not stop to ask whether he actually does doubt it or not, but at once proceeds to examine it. Now if it happens that he *does* actually doubt the proposition, he does quite right in starting a critical inquiry. But in case he *does not* doubt, he virtually falls into the Cartesian error of supposing that one can doubt at will. A proposition that could be doubted at will is certainly not *believed*. For belief, while it lasts, is a strong habit, and as such, forces the man to believe until some surprise breaks up the habit. The breaking of a belief can only be due to some novel experience, whether external or internal. Now experience which could be summoned up at pleasure would not be experience.

525. Kant (whom I *more* than admire) is nothing but a somewhat confused pragmatist. A real is anything that is not affected by men's cognitions *about it*; which is a verbal definition, not a doctrine. An external object is anything that is not affected by any cognitions, whether about it or not, of the man to whom it is external. Exaggerate this, in the usual philosopher fashion, and you have the conception of what is not affected by any cognitions at all. Take the converse of this definition and you have the notion of what does not affect cognition, and in this indirect manner you get a hypostatically abstract notion of what the *Ding an sich* would be. In this sense, we also have a notion of a sky-blue demonstration; but in half a dozen ways the *Ding an sich* has been proved to be nonsensical; and here is another way. It has been shown [3.417ff] that in the formal analysis of a proposition, after all that words can convey has been thrown into the predicate, there remains a subject that is indescribable and that can only be pointed at or otherwise indicated, unless a way, of finding what is referred to, be prescribed. The *Ding an sich*, however, can neither be indicated nor found. Consequently, no proposition can refer to it, and nothing true or false can be predicated of it. Therefore, all references to it must be thrown out as meaningless surplusage. But when that is done, we see clearly that Kant regards Space, Time, and his Categories just as everybody else does, and never doubts or has doubted their objectivity. His limitation of them to possible experience is pragmatism in the general sense; and the pragmatist, as fully as Kant, recognizes the mental ingredient in these concepts. Only (trained by Kant to define), he defines more definitely,

and somewhat otherwise, than Kant did, just how much of this ingredient comes from the mind of the individual in whose experience the cognition occurs. The kind of Common-sensism which thus criticizes the Critical Philosophy and recognizes its own affiliation to Kant has surely a certain claim to call itself Critical Common-sensism.

§3. THE GENERALITY OF THE POSSIBLE

526. *Doctor Z.* You say that no collection of individuals could ever be adequate to the extension of a concept in general, which is, of course, the old peripatetic doctrine. But really I do not quite see how you propose to reconcile that to the proposition that the meaning extends no further than to future embodiments of it.

Pragmaticist. The original paper on pragmatism was completed in September 1877¹ and appeared in *Popular Science Monthly* for January 1878. At that time, modern investigation of the doctrines of multitude had not begun.² Indeed, there are indications in that paper of an endless series not being regarded as a collection.* Yet the philosophical importance of the new studies was fully recognized by the pragmaticist from the first.³

527. In 3.527ff the objectivity of possibility was asserted; and the hypothesis defended in vol. 6, Bk. I, chs. 1 and 2 supposes possibility to be real.† It was, indeed, *implied* in the scholastic realism maintained in the *N. A. Rev.*, Vol. CXIII (pp. 454 *et seq.*) [vol. 9]. But the paper of January 1878 evidently endeavors to avoid asking the reader to admit a real possibility. The theory of modality is far too great a question to be treated

¹ This is fixed in the writer's memory by the fact that it was begun after leaving Hoboken on a steamer and was finished a day or two before reaching Plymouth, nothing remaining to be done except to translate it into English. The *Comptes Rendus* of the Europäischer Gradmessung show that on September 29 he was absorbed in quite another discussion in Stuttgart.

² It was hardly available for philosophists before June 1883; and was not put into shape even then, Cantor being long occupied, apparently, with his great theory of ordinals, which hardly concerns multitude.

* See, e.g., 395.

³ C. S. Peirce's paper *On the Logic of Number*, published in the spring of 1881 [vol. 3, no. VII] contained, though not in a perspicuous form, the leading results of Dedekind's classic of 1887.

† See also 454f.

incidentally to any other.* But the distinct recognition of real possibility is certainly indispensable to pragmatism.

528. The pragmatist has always explicitly stated that the intellectual purport of a concept consists in the truth of certain conditional propositions asserting that if the concept be applicable, and the utterer of the proposition or his fellow have a certain purpose in view, he would act in a certain way. A purpose is essentially general, and so is a way of acting; and a conditional proposition is a proposition about a universe of possibility. At the same time, the conditional proposition refers only to possible individual actions. If there be any paradox here, it is partially resolved in the important paper in *The Monist*, Vol. VII [3.526ff], where it is shown that an endless series of experiences, each entirely consistent with those that precede it, cannot itself be experienced (*as* such endless series), but involves a first dose of ideality, or generality. It is not a perfect general, it is true; but the whole endless series of steps from this to true continuity (which is perfect generality elevated to the mode of conception of the Logic of Relations) are there described. Whoever wishes to complete the theory of modality should set out from the results there demonstrated.

529. The conditional proposition which the pragmatist holds to constitute the purport of a concept is in the article of January 1878 spoken of as expressing a "fact"; and it does indeed express the actual state of mind of a person who has made, or is ready to make, a resolve — not a categorical resolve, but a resolve conditional upon having a certain purpose. But nobody would make any difficulty in admitting that every resolve is limited to future acts, and acts are the most perfectly individual objects there are.

530. I apprehend that I have thus substantially answered your question; but in order to make my answer a little clearer, I will illustrate it by the consideration of the continuity of Space. In this illustration I shall adopt the Leibnizian conception of Space in place of the Newtonian, which I believe to be the true one. In that Leibnizian view, Space is merely a possibility limited by an impossibility; a possibility of no matter what affections of bodies (determining their relative positions), together with the impossibility of those affections

* See 4.65ff, 4.552f, 4.579ff.

being actualized otherwise than under certain limitations, expressed in the postulates of topical, graphical, and metrical geometry. No collection of points, though it be abnumerable to the billionth degree, could fill a line so that there would be room for no more points; and in that respect the line is truly general; no possible multitude of singulars is adequate to it. Space is thus truly general; and yet it is, so to say, nothing but the way in which actual bodies conduct themselves.

531. *Doctor Z.* But the idea of Leibnizian Space, if there were such a thing, would not be a concept. It would be a *Vorstellung*, or composite of images. Kant might perhaps have called it a *Schema*, since he defines a *schema* as a determination of intuition by a concept through the reproductive imagination.* Of course, it would not be one of those *transcendental* schemata, which he talks of in the *Critik*; but it possesses much the same sort of bastard generality.

Pragmaticist. The breakneck hurry in which the *C. d. r. V.* was written is its only defence against a charge of slovenly workmanship. Every detail is left in the rough; and there is no more unfinished apartment in the whole glorious edifice than that devoted to the Schematization of the Categories. Kant says that no image, and consequently we may add, no collection of images, is adequate to representing what a schema represents.† If that be the case, I should like to know how a schema is not as general as a concept. If I ask him, all he seems to answer is that it is the product of a different "faculty."

532. But what you would seem to mean by a concept is the meaning of some general symbol, this meaning being conceived as referring to the symbol. Now it is precisely the pragmatist's contention that symbols, owing their origin (on one side) to human conventions, cannot transcend conceivable human occasions. At any rate, it is plain that no possible collection of single occasions of conduct can be, or adequately represent *all* conceivable occasions. For there is no collection of individuals of any general description which we could not conceive to receive the addition of other individuals of the same description aggregated to it. The generality of the possible, the only true generality, is distributive, not collective. You perhaps do not see how this remark bears upon your question.

* *Kritik der reinen Vernunft*, A140ff, B179ff.

† *Ibid.*, A141; B180.

§4. VALUATION

533. *Doctor W.* I should like to know what the attitude of your pragmatism is to the question of whether or no valuation is a factor of all intellectual meaning.

Pragmaticist. Well, collective and distributive universality can bide their time. Considering how it stood in the mid-channel of pragmatistic thought to join ethics to logic, it seems to me strange that we had to wait until 1903 for any pragmatist to assert that logic ought to be based upon ethics. Perhaps some one of us had said it before; but I only know that it was then said in a course of lectures before the Lowell Institute in Boston,* and was maintained on the ground that reasoning is thought subjected to self-control, and that the whole operation of logical self-control takes precisely the same quite complicated course which everybody ought to acknowledge is that of effective ethical self-control. Mr. Schiller in the same year published an essay entitled "The Ethical Basis of Metaphysics."† The title is promising, but the essay is, for me, reduced to gibberish by the author's talking about the *real*, without the slightest hint of what he means by this word except that it is something the character of which is affected (and it would seem very greatly) by anybody's thinking that it possesses or does not possess that character. In short he treats a verbal definition as a doctrine, and stoutly denying it, leaves the word a mystery. To meet some such fatal blank has more than once been my ill-luck in trying to read Schiller. It is my stupidity no doubt.

To return to self-control, which I can but slightly sketch, at this time, of course there are inhibitions and coördinations that entirely escape consciousness. There are, in the next place, modes of self-control which seem quite instinctive. Next, there is a kind of self-control which results from training. Next, a man can be his own training-master and thus control his self-control. When this point is reached much or all the training may be conducted in imagination. When a man trains himself, thus controlling control, he must have some moral rule in view, however special and irrational it may be. But next he may

* See e.g. 1.191, 1.616ff.

† *The International Journal of Ethics*, July, 1903. This essay is reprinted in his *Humanism, Philosophical Essays* (1903).

undertake to improve this rule; that is, to exercise a control over his control of control. To do this he must have in view something higher than an irrational rule. He must have some sort of moral principle. This, in turn, may be controlled by reference to an esthetic ideal of what is fine. There are certainly more grades than I have enumerated. Perhaps their number is indefinite. The brutes are certainly capable of more than one grade of control; but it seems to me that our superiority to them is more due to our greater number of grades of self-control than it is to our versatility.

534. *Doctor Y.* Is it not due to our faculty of language?

Pragmaticist. To my thinking that faculty is itself a phenomenon of self-control. For thinking is a kind of conduct, and is itself controllable, as everybody knows. Now the intellectual control of thinking takes place by thinking about thought. All thinking is by signs; and the brutes use signs. But they perhaps rarely think of them as signs. To do so is manifestly a second step in the use of language. Brutes use language, and seem to exercise some little control over it. But they certainly do not carry this control to anything like the same grade that we do. They do not criticize their thought logically. One extremely important grade of thinking about thought, which my logical analyses have shown to be one of chief, if not the chief, explanation of the power of mathematical reasoning, is a stock topic of ridicule among the wits. This operation is performed when something, that one has thought about any subject, is itself made a subject of thought. You remember how in the last *Intermède* to the *Malade Imaginaire*, the doctor puts a question to the candidate for the medical degree?

Si mihi licentiam dat Dominus Praeses,
 Et tanti docti Doctores,
 Et assistantes illustres,
 Très sçavanti Bacheliero,
 Quem estimo et honoro,
 Domandabo causam et rationem quare
 Opium facit dormire.

To which the candidate replies,

Mihi a docto Doctore
 Domandatur causam et rationem quare
 Opium facit dormire:
 A quoi respondeo,
 Quia est in eo
 Virtus dormitiva,
 Cujus est natura
 Sensus assoupire.

Whereupon the chorus bursts out,

Bene, bene, bene, bene respondere,
 Dignus, dignus est entrare
 In nostro docto corpore.
 (Bene, bene respondere.)

Even in this burlesque instance, this operation of hypostatic abstraction is not quite utterly futile. For it does say that there is *some* peculiarity in the opium to which the sleep must be due; and this is not suggested in merely saying that opium puts people to sleep. By the way, John Locke's account* of a real function of this sort at Montpellier three years after the play was first performed, with such tragic effect upon Molière, shows that there was more truth than caricature in the *Inter-mède*. In order to get an inkling — though a very slight one — of the importance of this operation in mathematics, it will suffice to remember that a *collection* is an hypostatic abstraction, or *ens rationis*,† that *multitude* is the hypostatic abstraction derived from a predicate of a collection,‡ and that a *cardinal number* is an abstraction attached to a multitude.§ So an *ordinal number* is an abstraction attached to a *place*,¶ which in its turn is a hypostatic abstraction from a relative character of a unit of a *series*, itself an abstraction again. Now, Doctor Z, as well as I can make out, what you mean by a *concept* is a predicate considered by itself, except for its connection with

* *Life of John Locke with Extracts from His Correspondence, etc.*, by Lord King, vol. 1, pp. 118–119 (1830).

† See 4.171.

‡ See 4.175.

§ See 3.43, 3.627f.

¶ See 3.629f.

the word or other symbol expressing it, and now regarded as denotative of the concept. Such a concept is not merely pre-scissively abstracted, but, as being made a subject of thought, is hypostatically abstract. So understood, it is true that it is more removed from the perceptual objects than is the *Vorstellung*, or composite of images. But for all that, its intellectual purport is just the same. It is only the grammatico-logical form that is transmuted.

535. And you, Doctor W., will see that since pragmatism makes the purport to consist in a conditional proposition concerning conduct, a sufficiently deliberate consideration of that purport will reflect that the conditional conduct ought to be regulated by an ethical principle, which by further self-criticism may be made to accord with an esthetical ideal. For I cannot admit that any ideal can be too high for a duly transfigured esthetics. So, although I do not think that an esthetic valuation is essentially involved, *actualiter* (so to speak) in every intellectual purport, I do think that it is a *virtual* factor of a duly rationalized purport. That is to say, it really does belong to the purport, since conduct may depend upon its being appealed to. Yet in ordinary cases, it will not be needful that this should be done. Such seem to me to be the facts, phrase them how you may.

536. *Doctor W.* I am glad to hear you say so. And what do you think of Humanism?

Pragmaticist. Why if you had said *Anthropomorphism*, I should have replied that I heartily embrace most of the clauses of that doctrine, if some right of private interpretation be allowed me. I hold, for instance, that man is so completely hemmed in by the bounds of his possible practical experience, his mind is so restricted to being the instrument of his needs, that he cannot, in the least, *mean* anything that transcends those limits. The strict consequence of this is, that it is all nonsense to tell him that he must not think in this or that way because to do so would be to transcend the limits of a possible experience. For let him try ever so hard to think anything about what is beyond that limit, it simply cannot be done. You might as well pass a law that no man shall jump over the moon; it wouldn't forbid him to jump just as high as he possibly could.

For much the same reason, I do not believe that man can

have the idea of any cause or agency so stupendous that there is any more adequate way of conceiving it than as vaguely like a man. Therefore, whoever cannot look at the starry heaven without thinking that all this universe must have had an adequate cause, can in my opinion not otherwise think of that cause half so justly than by thinking it is God.

537. But when you talk of Humanism, I am utterly perplexed to know what it means. One of its clauses seems borrowed from Hegel, on whom how greatly its author [Schiller] dotes is well known. Namely, he apparently does not wish to have phenomena torn to pieces; or at any rate not if that introduces any falsity; and he does not wish us to devote any attention to the effects of conditions that do not occur, or at any rate not to substitute the solution of such a problem for the true problems of nature. For my part, I think such talk shows great ignorance of the conditions of science. Then again, as I understand it, this Humanism is to be a philosophy not purely intellectual because every department of man's nature must be voiced in it. For my part, I beg to be excused from having any dealings with such a philosophy. I wish philosophy to be a strict science, passionless and severely fair. I know very well that science is not the whole of life, but I believe in the division of labor among intellectual agencies. The apostle of Humanism says that professional philosophers "have rendered philosophy like unto themselves, abstruse, arid, abstract, and abhorrent."* But I conceive that some branches of science are not in a healthy state if they are *not* abstruse, arid, and abstract, in which case, like the Aristotelianism which is this gentleman's particular *bête noire*, it will be as Shakespeare said (*of it, remember*)

"Not harsh and crabbed, as dull fools suppose,
But musical as is Apollo's lute," etc.†

* *Humanism, Philosophical Essays*, XVI (1903).

† This is from Milton's *Comus*.

CHAPTER 4

BELIEF AND JUDGMENT

§1. PRACTICAL AND THEORETICAL BELIEFS*

538. Let us begin by considering practical belief, such as that anthracite is a convenient fuel, leaving purely theoretical belief, such as that the pole of the earth describes an oval of a few rods' diameter, or that there is an imaginary circle which is twice cut by every real circle, for a supplementary study. Let us use the word "habit," throughout this book, not in its narrower, and more proper sense, in which it is opposed to a natural disposition (for the term *acquired habit* will perfectly express that narrower sense), but in its wider and perhaps still more usual sense, in which it denotes such a specialization, original or acquired, of the nature of a man, or an animal, or a vine, or a crystallizable chemical substance, or anything else, that he or it will behave, or always tend to behave, in a way describable in general terms upon every occasion (or upon a considerable proportion of the occasions) that may present itself of a generally describable character. Now to say that a man believes anthracite to be a convenient fuel is to say no more nor less than that if he needs fuel, and no other seems particularly preferable, then, if he acts deliberately, bearing in mind his experiences, considering what he is doing, and exercising self-control, he will often use anthracite. A practical belief may, therefore, be described as a habit of deliberate behavior. The word "deliberate" is hardly completely defined by saying that it implies attention to memories of past experience and to one's present purpose, together with self-control. The acquisition of habits of the nervous system and of the mind is governed by the principle that any special character of a reaction to a given kind of stimulus is (unless fatigue intervenes) more likely to belong to a subsequent reaction to a second stimulus of that kind, than it would be if it had not happened to belong to the former reaction. But habits are some-

* From "Reason's Rules," c. 1902.

times acquired without any previous reactions that are externally manifest. A mere imagination of reacting in a particular way seems to be capable after numerous repetitions of causing the imagined kind of reaction really to take place upon subsequent occurrences of the stimulus. In the formation of habits of deliberate action, we may imagine the occurrence of the stimulus, and think out what the results of different actions will be. One of these will appear particularly satisfactory; and then an action of the soul takes place which is well described by saying that that mode of reaction "receives a deliberate stamp of approval." The result will be that when a similar occasion actually arises for the first time it will be found that the habit of really reacting in that way is already established. I remember that one day at my father's table, my mother spilled some burning spirits on her skirt. Instantly, before the rest of us had had time to think what to do, my brother, Herbert, who was a small boy, had snatched up the rug and smothered the fire. We were astonished at his promptitude, which, as he grew up, proved to be characteristic. I asked him how he came to think of it so quickly. He said, "I had considered on a previous day what I would do in case such an accident should occur."* This act of stamping with approval, "endorsing" as one's own, an imaginary line of conduct so that it shall give a general shape to our actual future conduct is what we call a *resolve*. It is not at all essential to the practical belief, but only a somewhat frequent attachment.

539. Let us now pass to the consideration of purely theoretical belief. If an opinion can eventually go to the determination of a practical belief, it, in so far, becomes itself a practical belief; and every proposition that is not pure metaphysical jargon and chatter must have some possible bearing upon practice. The diagonal of a square is incommensurable with its side. It is difficult to see what experiential difference there can be between commensurable and incommensurable magnitudes; but there is this, that it is useless to try to find the exact expression of the diagonal as a rational fraction of the side. Still, it does not follow that because every theoretical belief is, at least indirectly, a practical belief, this is the *whole* meaning of the theoretical belief. Of theoretical beliefs, in so far as they are not practical, we may distinguish between those

* Cf. 487n.

which are expectations, and those which are not even that. One of the simplest, and for that reason one of the most difficult, of the ideas which it is incumbent upon the author of this book to endeavor to cause the reader to conceive, is that a sense of effort and the experience of any sensation are phenomena of the same kind, equally involving direct experience of the duality of the Without and the Within.* The psychology of the sense of effort is not yet satisfactorily made out. It seems to be a sensation which somehow arises when striped muscles are under tension. But though this is the only way of stimulating it, yet an imagination of it is by association called up, upon the occasion of other slight sensations, even when muscles are uncontracted; and this imagination may sometimes be interpreted as a sign of effort. But though the sense of effort is thus merely a sensation, like any other, it is one in which the duality which appears in every sensation is specially prominent. A sense of exertion is at the same time a sense of being resisted. Exertion cannot be experienced without resistance, nor resistance without exertion. It is all one sense, but a sense of duality. Every sensation involves the same sense of duality, though less prominently. This is the direct perception of the external world of Reid and Hamilton.† This is the *probatio ambulandi*, which Diogenes Laertius perhaps gets mislocated. An idealist need not deny the reality of the external world, any more than Berkeley did. For the reality of the external world means nothing except that real experience of duality. Still, many of them do deny it — or think they do. Very well; an idealist of that stamp is lounging down Regent Street, thinking of the utter nonsense of the opinion of Reid, and especially of the foolish *probatio ambulandi*, when some drunken fellow who is staggering up the street unexpectedly lets fly his fist and knocks him in the eye. What has become of his philosophical reflections now? Will he be so unable to free himself from prepossessions that no experience can show him the force of that argument? There may be some underlying unity beneath the sudden transition from meditation to astonishment. Grant that: does it follow that that transition did not take place? Is not the transition a direct experience of the duality of the inward past and outward present? A poor

* Cf. 1.332ff.

† *The Works of Thomas Reid*, ed. by Sir W. Hamilton, Note A, §1; Note C.

analyst is he who cannot see that the Unexpected is a direct experience of duality, that just as there can be no effort without resistance, so there can be no subjectivity of the unexpected without the objectivity of the unexpected, that they are merely two aspects of one experience given together and beyond all criticism. If the idealist should pick himself up and proceed to argue to the striker, saying "you could not have struck me, because you have no independent existence, you know," the striker might answer, "I dare say I have not separate existence enough for that; but I have separate existence enough to make you feel differently from what you were expecting to feel." Whatever strikes the eye or the touch, whatever strikes upon the ear, whatever affects nose or palate, contains something unexpected. Experience of the unexpected forces upon us the idea of duality. Will you say, "Yes, the idea is forced upon us, but it is not directly experienced, because only what is within is directly experienced"? The reply is that *experience* means nothing but just that of a cognitive nature which the history of our lives has forced upon us. It is *indirect*, if the medium of some other experience or thought is required to bring it out. Duality, thought abstractly, no doubt requires the intervention of reflection; but that upon which this reflection is based, the concrete duality, is there in the very experience itself.

540. In the light of these remarks, we perceive that there is just this difference between a practical belief and an expectation so far as it involves no purpose [or] effort; namely that the former is expectant of muscular sensation, the latter of sensation not muscular. The expectancy consists in the stamp of approval, the act of recognition as one's own, being placed by a deed of the soul upon an imaginary anticipation of experience; so that, if it be fulfilled, though the actual experience will, at all events, contain enough of the unexpected to be recognized as external, yet the person who stands in expectancy will almost claim the event as his due, his triumphant "I told you so" implying a right to expect as much from a justly-regulated world. A man who goes among a barbarous tribe and announces a total eclipse of the sun next day, will expect, not only "his" eclipse from Nature, but due credit for it from that People. In all this, I am endeavoring so to shape what I have

to say as to exhibit, besides, the close alliance, the family identity, of the ideas of externality and unexpectedness.

541. As to purely theoretical beliefs not expectacious, if they are to mean anything, they must be somehow expectative. The word "expect" is now and then applied by careless and ignorant speakers, especially the English, to what is surmised in regard to the past. It is not illogical language: it is only elliptical. "I expect that Adam must have felt a little sore over the extraction of his rib," may be interpreted as meaning that the expectation is, that so it will be found when the secrets of all hearts are laid bare. History would not have the character of a true science if it were not permissible to hope that further evidences may be forthcoming in the future by which the hypotheses of the critics may be tested. A theory which should be capable of being absolutely demonstrated in its entirety by future events, would be no scientific theory but a mere piece of fortune telling. On the other hand, a theory, which goes beyond what may be verified to any degree of approximation by future discoveries is, in so far, metaphysical gabble. To say that a quadratic equation which has no real root has two different imaginary roots does not sound as if it could have any relation to experience. Yet it is strictly expectative. It states what would be expectable if we had to deal with quantities expressing the relations between objects, related to one another like the points of the plane of imaginary quantity. So a belief about the incommensurability of the diagonal relates to what is expectable for a person dealing with fractions; although it means nothing at all in regard to what could be expected in physical measurements, which are, of their very nature, approximate only. Let us examine a highly abstract belief; and see whether there is any expectancy in it. Riemann* declared that infinity has nothing to do with the absence of a limit but relates solely to measure. This means that if a bounded surface be measured in a suitable way it will be found infinite, and that if an unbounded surface be measured in a suitable way, it will be found finite. It relates to what is expectable for a person dealing with different systems of measurement. The Roman church requires the faithful to *believe* that the elements of the eucharist are really transformed into flesh and blood, although all their "sensible

* Art. II, §2, "Ueber die Hypothesen, welche der Geometrie zu Grunde liegen," *Abh. d. König. G. d. W. zu Göttingen*, 13 Bd. (1866-7).

accidents," that is, all that could be expected from physical experience, remain those of bread and wine. The Protestant episcopal church requires its ministers to teach that the elements remain really bread and wine, although they have miraculous spiritual effects different from those of ordinary bread and wine. "No indeed," say the Romanists, "they not only have those spiritual effects but they really are transmuted." But the layman declares that he cannot understand the difference. "That is not necessary," says the priest, "you can believe it implicitly." What does that mean? It means that the layman is to trust that if he could understand the matter and know the truth, he would find that the priest was right.* But trust — and the word belief means trust primarily — essentially refers to the future, or to a contingent future. The implication is that the layman may sometime know, presumably will, in another world; and that he may *expect* that if he ever does come to know, he will find the priest to be right. Thus, analysis shows that even in regard to so excessively metaphysical a matter, the belief, if there can be any belief, has to involve expectation as its very essence.

542. It now begins to look strongly as if perhaps all belief might involve expectation as its essence. That is as much as can justly be said. We have as yet no assurance that this is true of every kind of belief. One class of accepted truths which we have neglected is that of direct perceptual facts. I lay down a wafer, before me. I look at it, and say to myself, "That wafer looks red." What element of expectation is there in the belief that the wafer *looks* red at this moment?

In order to handle this question, it is necessary to draw a distinction. Every belief is belief in a proposition. Now every proposition has its predicate which expresses *what* is believed, and its subjects which express *of what* it is believed. The grammarians of today prefer to say that a sentence has but one subject, which is put in the nominative. But from a logical point of view the terminology of the older grammarians was better, who spoke of the subject nominative and the subject accusative. I do not know that they spoke of the subject dative; but in the proposition, "Anthony gave a ring to Cleopatra," Cleopatra is as much a subject of what is meant

* Cf. 401.

and expressed as is the ring or Anthony. A proposition, then, has one predicate and any number of subjects. The subjects are either names of objects well known to the utterer and to the interpreter of the proposition (otherwise he could not interpret it) or they are virtually almost directions how to proceed to gain acquaintance with what is referred to. Thus, in the sentence "Every man dies," "Every man" implies that the interpreter is at liberty to pick out a man and consider the proposition as applying to him. In the proposition "Anthony gave a ring to Cleopatra," if the interpreter asks, What ring? the answer is that the indefinite article shows that it is a ring which might have been pointed out to the interpreter if he had been on the spot; and that the proposition is only asserted of the suitably chosen ring. The predicate on the other hand is a word or phrase which will call up in the memory or imagination of the interpreter images of things such as he has seen or imagined and may see again. Thus, "gave" is the predicate of the last proposition; and it conveys its meaning because the interpreter has had many experiences in which gifts were made; and a sort of composite photograph of them appears in his imagination. I am told that "Saccharin is 500 times as sweet as cane-sugar." But I never heard of saccharin. On inquiry, I find it is the sulphimide of orthosulphobenzoic acid; that is, it is phthalimide in which one CO group is replaced by SO₂. I can see on paper that there might be such a body. That it is "500 times sweeter than sugar" produces a rather confused idea of a very familiar general kind. *What* I am to expect is expressed by the predicate, while the subjects inform me *on what occasion* I am to expect it. Diogenes Laertius, Suidas, Plutarch, and an anonymous biographer tell us that Aristotle was unable to pronounce the letter R.* I place Aristotle perfectly, of course. He is the author of works I often read and profoundly admire and whose fame far surpasses that of any other logician — The Prince of Philosophers. I have also met people who could not pronounce R; but in other respects they did not seem to be much like Aristotle — not even Dundreary. Should I meet him in the Elysian Fields, I shall know what to expect. That is an impossible supposition; but should I ever meet a great logician, spindle-shanked and pig-eyed, who cannot pronounce R, I shall be interested to see

* See Zeller's *Die Philosophie der Griechen*, II Th., 2 Abt., Anmerkung.

whether he has other characteristics of Aristotle. This example has been selected as one which should seem to a superficial eye to involve no gleam of expectation; and if this testimony of four respectable witnesses, as independent as under the circumstances they could be, is destined never to receive confirmation nor contradiction, nor in any other way to have its probable consequences confronted by future experience, then in truth no expectation does it carry. In that case, it is an idle tale that might, for any practical purpose, have been as well the creation of some ironical poet. In that case, it is, properly speaking, no contribution to knowledge, for at least it is only probability, and probability cannot be reckoned as knowledge, unless it is destined to be indefinitely heightened in the future. Knowledge which should have no possible bearing upon any future experience — bring no expectation whatever — would be information concerning a dream. But in truth no such thing can be presumed of any knowledge. We expect that in time it will produce, or reinforce, or weaken some definite expectation. Give science only a hundred more centuries of increase in geometrical progression, and she may be expected to find that the sound waves of Aristotle's voice have somehow recorded themselves. If not, it were better to hand the reports over to the poets to make something pretty of, and thus turn them to some human use. But the right thing to do is to expect the verification. It is the degenerate pronunciation that is to be expected; the occasion is when Aristotle's voice shall become virtually heard again or when we shall have some other information which shall confirm or refute those reports.

543. Now if the reader should say, "Talk as you please, the assertion that Aristotle was *τραυλός* simply brings to the mental ear the voice of a man unable to pronounce the letter R, and labels that image with an indication of Aristotle, a man who lived three hundred years before Christ," the author may surprise him and grieve any whom he may have convinced, by declaring "I agree with you entirely"; only this assertion, which is identical with the previous one, though translated into other language, *means* nothing unless it be that Aristotle having been brought, directly or indirectly, to our experience, *will be found*, if found at all, to be incapable of pronouncing the R. Let us distinguish between the *proposition* and the *asser-*

tion of that proposition. We will grant, if you please, that the proposition itself merely represents an image with a label or pointer attached to it. But to *assert* that proposition is to make oneself responsible for it, without any definite forfeit, it is true, but with a forfeit no smaller for being unnamed.* Now an *ex post facto* law is forbidden by the Constitution of the United States of America, but an *ex post facto* contract is forbidden by the constitution of things. A man cannot promise what the past shall have been, if he tries. It is evident that to guarantee that, if a piece of work has not already been done right, one will pay for it, and to guarantee that, *if it shall be found* not to have already been done right, one will pay for it, have one and the same meaning. One or other of them therefore must be an elliptical or otherwise unliteral expression, or else both are so. But nobody will maintain that to promise to pay for the work, if it shall be ascertained not to have been already done right, really means to promise to so pay, if it shall in fact not have been already done right, whether it be ascertained or not. It would be equally absurd to say that there was any third meaning which should have reference to an unascertained past. It follows, then, that to contract to pay money if something in the past has been done or not done *can only* mean that the money shall be paid if it is ascertained that the event has happened or has not happened. But there would be no reason why the literal sense should not be understood if it made any sense. Hence there can be no meaning in making oneself responsible for a past event independent of its future ascertainment. But to assert a proposition is to make oneself responsible for its truth. Consequently, the only meaning which an assertion of a past fact can have is that, if in the future the truth be ascertained, so it shall be ascertained to be. There seems to be no rational escape from this.

544. Now let us take up the perceptual judgment "This wafer looks red." It takes some time to write this sentence, to utter it, or even to think it. It must refer to the state of the percept at the time that it, the judgment, began to be made. But the judgment does not exist until it is completely made. It thus only refers to a memory of the past; and all memory is possibly fallible and subject to criticism and control. The

* Cf. 2.315, and 546f.

judgment, then, can only mean that so far as the character of the percept can ever be ascertained, it will be ascertained that the wafer looked red.

545. Perhaps the matter may be stated less paradoxically. Everybody will agree that it would be perfectly meaningless to say that sulphur had the singular property of turning pink when nobody was looking at it, instantly returning to yellowness before the most rapid glance could catch its pink color, or to say that copper was subject to the law that as long as there was no pressure upon it, it was perfectly yielding, becoming hard in proportion as it was pressed; and generally, a law which never should operate would be an empty formula. Indeed, something not very far from the assertion about copper is contained in all treatises on dynamics, although not limited to any particular substance. Namely, it is set down that no tangential force can be exerted upon a perfect fluid. But no writer puts it forth as a statement of fact; it is given as a definition merely. A law, then, which never will operate has no positive existence. Consequently, a law which has operated for the last time has ceased to exist as a law, except as a mere empty formula which it may be convenient to allow to remain. Hence to assert that a law positively exists is to assert that it will operate, and therefore to refer to the future, even though only conditionally. But to say that a body is hard, or red, or heavy, or of a given weight, or has any other property, is to say that it is subject to law and therefore is a statement referring to the future.

§2. JUDGMENT AND ASSERTION*

546. Every new concept first comes to the mind in a judgment. This argument evades the consideration of the difficult question of the logical nature of the judgment, but draws attention to a fact that ordinary speech recognizes; namely, that a judgment is something that *ripens* in the mind, and further that there is a vernacular phrase which betrays a feature of the ripe judgment, the phrase "I says to myself, says I." The phrase indicates the easily verified fact that the ripe judgment, at least, involves an element closely analogous to *assertion*.

* From a fragment c. 1908.

But what is that? What is the nature of assertion? We have no magnifying-glass that can enlarge its features, and render them more discernible; but in default of such an instrument we can select for examination a very formal assertion, the features of which have purposely been rendered very prominent, in order to emphasize its solemnity. If a man desires to assert anything very solemnly, he takes such steps as will enable him to go before a magistrate or notary and take a binding oath to it. Taking an oath is not mainly an event of the nature of a setting forth, *Vorstellung*, or representing. It is not mere saying, but is *doing*. The law, I believe, calls it an "act." At any rate, it would be followed by very real effects, in case the substance of what is asserted should be proved untrue. This ingredient, the assuming of responsibility, which is so prominent in solemn assertion, must be present in every genuine assertion. For clearly, every assertion involves an effort to make the intended interpreter believe what is asserted, to which end a reason for believing it must be furnished. But if a lie would not endanger the esteem in which the utterer was held, nor otherwise be apt to entail such real effects as he would avoid, the interpreter would have no reason to believe the assertion. Nobody takes any positive stock in those conventional utterances, such as "I am perfectly delighted to see you," upon whose falsehood no punishment at all is visited. At this point, the reader should call to mind, or, if he does not know it, should make the observations requisite to convince himself, that even in solitary meditation every judgment is an effort to press home, upon the self of the immediate future and of the general future, some truth. It is a genuine assertion, just as the vernacular phrase represents it; and solitary dialectic is still of the nature of dialogue. Consequently it must be equally true that here too there is contained an element of assuming responsibility, of "taking the consequences."

547. That is the first point of this argument; namely, that the *judgment*, which is the sole vehicle in which a concept can be conveyed to a person's cognizance or acquaintance, is not a purely representitious event, but involves an act, an exertion of energy, and is liable to real consequences, or effects. To this an eager adversary of pragmatism might make answer to the effect that if there be an assumption of responsibility in a

judgment, it can only be in a ripe judgment; whereas the concept makes its appearance before the judgment is ripe, when it is still in the problematic or interrogatory mood; and that this shows that the *volitional element* is quite extraneous to the substance, or "meaning," of the concept. But the reply will be that this answer quite mistakes the aim of the argument. For it is no pragmaticistic doctrine that responsibility attaches to a concept; but the argument is that the predication of a concept is capable of becoming the subject of responsibility, since it actually does become so in the act of asserting that predication.

548. Thereupon it follows that the concept has a capability of having a bearing upon conduct; and this fact will lend it intellectual purport. For it cannot be denied that one, at least, of the functions of intelligence is to adapt conduct to circumstances, so as to subserve desire. If the argument is correct, this applies to any concept whatsoever, unless there be a concept that cannot be predicated.

CHAPTER 5

TRUTH

§1. TRUTH AS CORRESPONDENCE*

549. A *state of things* is an abstract constituent part of reality, of such a nature that a proposition is needed to represent it. There is but one *individual*, or completely determinate, state of things, namely, the all of reality. A *fact* is so highly a prescissively abstract state of things, that it can be wholly represented in a simple proposition, and the term "simple," here, has no absolute meaning, but is merely a comparative expression.

550. A *mathematical form* of a state of things is such a representation of that state of things as represents only the samenesses and diversities involved in that state of things, without definitely qualifying the subjects of the samenesses and diversities. It represents not necessarily all of these; but if it does represent all, it is the *complete* mathematical form. Every mathematical form of a state of things is the complete mathematical form of *some* state of things. The complete mathematical form of any state of things, real or fictitious, represents every ingredient of that state of things except the qualities of feeling connected with it. It represents whatever importance or significance those qualities may have; but the qualities themselves it does not represent.

551. Before any conclusion shall be made to rest upon this almost self-evident proposition, a way of setting it quite beyond doubt shall be explained. As at present enunciated, it is merely put forward as a private opinion of the writer's which will serve to explain the great interest he attaches to the emphatic dualism of the three normative sciences, which may be regarded as being the sciences of the conditions of truth and falsity, of wise and foolish conduct, of attractive and repulsive ideas. Should the reader become convinced that the importance of everything resides entirely in its mathematical

* From the "Basis of Pragmaticism," 1906, continuing 1.574.

form, he, too, will come to regard this dualism as worthy of close attention. Meantime that it exists, and is more marked in these sciences than in any others, is an indisputable fact. To what is this circumstance to be attributed? Skipping the easy reasoning by which it can be shown that this dualism cannot be due to any peculiar quality of feeling that may be connected with these sciences, nor to any intellectual peculiarity of them, which negative propositions will become obtrusively plain at a later stage of our reasoning, we may turn at once to the affirmative reason for attributing the dualism to the reference of the normative sciences to action. It is curious how this reason seems to seek to escape detection, by putting forward an apparent indication that it is not there. For it is evident that it is in esthetics that we ought to seek for the deepest characteristics of normative science, since esthetics, in dealing with the very ideal itself whose mere materialization engrosses the attention of practice and of logic, must contain the heart, soul, and spirit of normative science. But that dualism which is so much marked in the True and False, logic's object of study, and in the Useful and Pernicious of the confession of Practice, is softened almost to obliteration in esthetics. Nevertheless, it would be the height of stupidity to say that esthetics knows no good and bad. It must never be forgotten that evil of any kind is none the less bad though *the occurrence of it* be a good. Because in every case the ultimate in some measure abrogates, and ought to abrogate, the penultimate, it does not follow that the penultimate ought not to have abrogated the antepenultimate in due measure. On the contrary, just the opposite follows.

552. Esthetic good and evil are closely akin to pleasure and pain. They are what would be pleasure or pain to the fully developed superman. What, then, are pleasure and pain? The question has been sufficiently discussed, and the answer ought by this time to be ready. They are secondary feelings or generalizations of such feelings; that is, of feelings attaching themselves to, and excited by, other feelings.* A toothache is painful. It is not pain, but pain *accompanies* it; and if you choose to say that pain is an ingredient of it, that is not far wrong. However, the quality of the feeling of toothache is a simple,

* See 1.376ff, 1.594ff.

positive feeling, distinct from pain; though pain accompanies it. To use the old consecrated terms, pleasure is the feeling that a feeling is "sympathetical," pain that it is "antipathetical." The feeling of pain is a symptom of a feeling which repels us; the feeling of pleasure is the symptom of an attractive feeling. Attraction and repulsion are kinds of action. Feelings are pleasurable or painful according to the kind of action which they stimulate. In general, the good is the attractive — not to everybody, but to the sufficiently matured agent; and the evil is the repulsive to the same. Mr. Ferdinand C. S. Schiller* informs us that he and James have made up their minds that the true is simply the satisfactory. No doubt; but to say "satisfactory" is not to complete any predicate whatever. Satisfactory to what end?

553. That truth is the correspondence of a representation with its object is, as Kant† says, merely the nominal definition of it. Truth belongs exclusively to propositions. A proposition has a subject (or set of subjects) and a predicate. The subject is a sign; the predicate is a sign; and the proposition is a sign that the predicate is a sign of that of which the subject is a sign.‡ If it be so, it is true. But what does this correspondence or reference of the sign, to its object, consist in? The pragmaticist answers this question as follows. Suppose, he says, that the angel Gabriel were to descend and communicate to me the answer to this riddle from the breast of omniscience. Is this supposable; or does it involve an essential absurdity to suppose the answer to be brought to human intelligence? In the latter case, "truth," in this sense, is a useless word, which never can express a human thought. It is real, if you will; it belongs to that universe entirely disconnected from human intelligence which we know as the world of utter nonsense. Having no use for this meaning of the word "truth," we had better use the word in another sense presently to be described. But if, on the other hand, it be conceivable that the secret should be disclosed to human intelligence, it will be something that thought can compass. Now thought is of the nature of a sign. In that case, then, if we can find out the right

* Cf. *Studies in Humanism*, p. 83.

† *Kritik der Reinen Vernunft*, A58, B82.

‡ 2.310ff.

method of thinking and can follow it out — the right method of transforming signs — then truth can be nothing more nor less than the last result to which the following out of this method would ultimately carry us. In that case, that to which the representation should conform, is itself something in the nature of a representation, or sign — something noumenal, intelligible, conceivable, and utterly unlike a thing-in-itself.

554. Truth is the conformity of a representamen to its object, *its* object, ITS object, mind you. The International Dictionary at the writer's elbow, the Century Dictionary which he daily studies, the Standard which he would be glad sometimes to consult, all contain the word *yes*; but that word is not true simply because he is going to ask on this eighth of January 1906, in Pike County, Pennsylvania, whether it is snowing. There must be an action of the object upon the sign to render the latter true. Without that, the object is not the representamen's object. If a colonel hands a paper to an orderly and says, "You will go immediately and deliver this to Captain Hanno," and if the orderly does so, we do not say the colonel told the truth; we say the orderly was obedient, since it was not the orderly's conduct which determined the colonel to say what he did, but the colonel's speech which determined the orderly's action. Here is a view of the writer's house: what makes that house to be the object of the view? Surely not the similarity of appearance. There are ten thousand others in the country just like it. No, but the photographer set up the film in such a way that according to the laws of optics, the film was forced to receive an image of this house. What the sign virtually has to do in order to indicate its object — and make it its — all it has to do is just to seize its interpreter's eyes and forcibly turn them upon the object meant: it is what a knock at the door does, or an alarm or other bell, or a whistle, a cannon-shot, etc. It is pure physiological compulsion; nothing else.

So, then, a sign, in order to fulfill its office, to actualize its potency, must be compelled by its object. This is evidently the reason of the dichotomy of the true and the false. For it takes two to make a quarrel, and a compulsion involves as large a dose of quarrel as is requisite to make it quite impossible that there should be compulsion without resistance.

§2. TRUTH AND SATISFACTION*

555. It appears that there are certain mummified pedants who have never waked to the truth that the act of knowing a real object alters it. They are curious specimens of humanity, and as I am one of them, it may be amusing to see how I think. It seems that our oblivion to this truth is due to our not having made the acquaintance of a new analysis that the True is simply that in cognition which is Satisfactory. As to this doctrine, if it is meant that True and Satisfactory are synonyms, it strikes me that it is not so much a doctrine of philosophy as it is a new contribution to English lexicography.

556. But it seems plain that the formula does express a doctrine of philosophy, although quite vaguely; so that the assertion does not concern two words of our language but, attaching some other *meaning* to the True, makes it to be *coextensive with* the Satisfactory in cognition.

557. In that case, it is indispensable to say what is meant by the True: until this is done the statement has no meaning. I suppose that by the True is meant that at which inquiry aims.

558. It is equally indispensable to ascertain what is meant by Satisfactory; but this is by no means so easy. Whatever be meant, however, if the doctrine is true at all, it must be necessarily true. For it is the very object, conceived in entertaining the purpose of the inquiry, that is asserted to have the character of satisfactoriness.

559. Is the Satisfactory meant to be whatever excites a certain peculiar feeling of satisfaction? In that case, the doctrine is simply hedonism in so far as it affects the field of cognition. For when hedonists talk of "pleasure," they do not mean what is so-called in ordinary speech, but what excites a feeling of satisfaction.

560. But to say that an action or the result of an action is Satisfactory is simply to say that it is congruous to the aim of that action. Consequently, the aim must be determined before it can be determined, either in thought or in fact, to be satisfactory. An action that had no other aim than to be congruous

* Manuscript entitled: "Reflexions upon Pluralistic Pragmatism and upon Cenopythagorean Pragmaticism." c. 1906.

to its aim would have no aim at all, and would not be a deliberate action.

561. The hedonists do not offer their doctrine as an induction from experience but insist that, *in the nature of things*, that is, from the very essence of the conceptions, an action can have no other aim than "pleasure." Now it is *conceivable* that an action should be disconnected from every other in its aim. Such an action, then, according to hedonistic doctrine, can have no other aim than that of satisfying its own aim, which is absurd.

562. But if the hedonist replies that his position does not relate to satisfaction, but to a feeling that only arises upon satisfaction, the rejoinder will be that feeling is incomprehensible; so that no necessary truth can be discovered about it. But as a matter of observation we do, now and then, meet with persons who very largely behave with a view of experiencing this or that feeling. These people, however, are exceptional, and are wretched beings sharply marked off from the mass of busy and happy mankind.

563. It is, however, no doubt true that men act, especially in the action of inquiry, *as if* their sole purpose were to produce a certain state of feeling, in the sense that when that state of feeling is attained, there is no further effort. It was upon that proposition that I originally based pragmatism, laying it down in the article that in November 1877* prepared the ground for my argument for the pragmaticistic doctrine (*Pop. Sci. Monthly* for January, 1878†). In the case of inquiry, I called that state of feeling "firm belief," and said, "As soon as a firm belief is reached we are entirely satisfied, whether the belief be true or false,"‡ and went on to show how the action of experience consequently was to create the conception of real truth. Early in 1880, in the opening paragraphs of my memoir in Vol. III of the *American Journal of Mathematics*,§ I referred the matter to the fundamental properties of protoplasm, showing that purposive action must be action *virtually* directed toward the removal of stimulation.

* Bk. II, No. IV.

† Bk. II, No. V.

‡ See 375.

§ 3.154ff.

564. My paper of November 1877, setting out from the proposition that the agitation of a question ceases when satisfaction is attained with the settlement of belief, and then only, goes on to consider how the conception of truth gradually develops from that principle under the action of experience; beginning with willful belief, or self-mendacity, the most degraded of all intellectual conditions; thence rising to the imposition of beliefs by the authority of organized society; then to the idea of a settlement of opinion as the result of a fermentation of ideas; and finally reaching the idea of truth as overwhelmingly forced upon the mind in experience as the effect of an independent reality.

§3. DEFINITIONS OF TRUTH*

565. *Logical.* (1) Truth is a character which attaches to an abstract proposition, such as a person might utter. It essentially depends upon that proposition's not professing to be exactly true. But we hope that in the progress of science its error will indefinitely diminish, just as the error of 3.14159, the value given for π , will indefinitely diminish as the calculation is carried to more and more places of decimals. What we call π is an ideal limit to which no numerical expression can be perfectly true. If our hope is vain; if in respect to some question — say that of the freedom of the will — no matter how long the discussion goes on, no matter how scientific our methods may become, there never will be a time when we can fully satisfy ourselves either that the question has no meaning, or that one answer or the other explains the facts, then in regard to that question there certainly is no *truth*. But whether or not there would be perhaps any *reality* is a question for the metaphysician, not the logician. Even if the metaphysician decides that where there is no truth there is no reality, still the distinction between the character of truth and the character of reality is plain and definable. Truth is that concordance of an abstract statement with the ideal limit towards which endless investigation would tend to bring scientific belief, which concordance the abstract statement may possess by virtue of the

* From the article "Truth and Falsity and Error," *Dictionary of Philosophy and Psychology*, ed. J. M. Baldwin, pp. 718-20, vol. 2 (1901). Only the part of the article given here was written by Peirce.

confession of its inaccuracy and one-sidedness, and this confession is an essential ingredient of truth. A further explanation of what this concordance consists in will be given below. Reality is that mode of being by virtue of which the real thing is as it is, irrespectively of what any mind or any definite collection of minds may represent it to be. The truth of the proposition that Caesar crossed the Rubicon consists in the fact that the further we push our archaeological and other studies, the more strongly will that conclusion force itself on our minds forever — or would do so, if study were to go on forever. An idealist metaphysician may hold that therein also lies the whole *reality* behind the proposition; for though men may for a time persuade themselves that Caesar did *not* cross the Rubicon, and may contrive to render this belief universal for any number of generations, yet ultimately research — if it be persisted in — must bring back the contrary belief. But in holding that doctrine, the idealist necessarily draws the distinction between truth and reality.

566. In the above we have considered positive scientific truth. But the same definitions equally hold in the normative sciences. If a moralist describes an ideal as the *summum bonum*, in the first place, the perfect truth of his statement requires that it should involve the confession that the perfect doctrine can neither be stated nor conceived. If, with that allowance, the future development of man's moral nature will only lead to a firmer satisfaction with the described ideal, the doctrine is true. A metaphysician may hold that the fact that the ideal thus forces itself upon the mind, so that minds in their development cannot fail to come to accept it, argues that the ideal is *real*: he may even hold that that fact (if it be one) constitutes a *reality*. But the two ideas, *truth* and *reality*, are distinguished here by the same characters given in the above definitions.

567. These characters equally apply to pure mathematics. Projective geometry is not pure mathematics, unless it be recognized that whatever is said of rays holds good of every family of curves of which there is one and one only through any two points, and any two of which have a point in common. But even then it is not pure mathematics until for points we put any complete determinations of any two-dimensional con-

tinuum. Nor will that be enough. A proposition is not a statement of perfectly pure mathematics until it is devoid of all definite meaning, and comes to this — that a property of a certain icon is pointed out and is declared to belong to anything like it, of which instances are given. The perfect truth cannot be stated, except in the sense that it confesses its imperfection. The pure mathematician deals exclusively with hypotheses. Whether or not there is any corresponding real thing, he does not care. His hypotheses are creatures of his own imagination; but he discovers in them relations which surprise him sometimes. A metaphysician may hold that this very forcing upon the mathematician's acceptance of propositions for which he was not prepared, proves, or even constitutes, a mode of being independent of the mathematician's thought, and so a *reality*. But whether there is any reality or not, the truth of the pure mathematical proposition is constituted by the impossibility of ever finding a case in which it fails. This, however, is only possible if we confess the impossibility of precisely defining it.

568. The same definitions hold for the propositions of practical life. A man buys a bay horse, under a warranty that he is sound and free from vice. He brings him home and finds he is dyed, his real colour being undesirable. He complains of false representations; but the seller replies, "I never pretended to state every fact about the horse; what I said was true, so far as it professed to be true." In ordinary life all our statements, it is well understood, are, in the main, rough approximations to what we mean to convey. A tone or gesture is often the most definite part of what is said. Even with regard to perceptual facts, or the immediate judgments we make concerning our single percepts, the same distinction is plain. The percept is the reality. It is not in propositional form. But the most immediate judgment concerning it is abstract. It is therefore essentially unlike the reality, although it must be accepted as true to that reality. Its truth consists in the fact that it is impossible to correct it, and in the fact that it only professes to consider one aspect of the percept.*

569. But even if it were impossible to distinguish between truth and reality, that would not in the least prevent our

* Cf. 115ff.

defining what it is that truth consists in. Truth and falsity are characters confined to propositions. A proposition is a sign which separately indicates its object. Thus, a portrait with the name of the original below it is a proposition. It asserts that if anybody looks at it, he can form a reasonably correct idea of how the original looked. A sign is only a sign *in actu* by virtue of its receiving an interpretation, that is, by virtue of its determining another sign of the same object. This is as true of mental judgments as it is of external signs. To say that a proposition is true is to say that every interpretation of it is true. Two propositions are equivalent when either might have been an interpretant of the other. This equivalence, like others, is by an act of abstraction (in the sense in which forming an abstract noun is a'straction) conceived as identity. And we speak of believing in a proposition, having in mind an entire collection of equivalent propositions with their partial interpretants. Thus, two persons are said to have the same proposition in mind. The interpretant of a proposition is itself a proposition. Any necessary inference from a proposition is an interpretant of it. When we speak of truth and falsity, we refer to the possibility of the proposition being refuted; and this refutation (roughly speaking) takes place in but one way. Namely, an interpretant of the proposition would, if believed, produce the expectation of a certain description of percept on a certain occasion. The occasion arrives: the percept forced upon us is different. This constitutes the falsity of every proposition of which the disappointing prediction was the interpretant.

Thus, a false proposition is a proposition of which some interpretant represents that, on an occasion which it indicates, a percept will have a certain character, while the immediate perceptual judgment on that occasion is that the percept has not that character. A true proposition is a proposition belief in which would never lead to such disappointment so long as the proposition is not understood otherwise than it was intended.*

570. All the above relates to *complex truth*, or the truth of propositions. This is divided into many varieties, among which may be mentioned *ethical truth*, or the conformity of

* Cf. 2.327.

an assertion to the speaker's or writer's belief, otherwise called *veracity*, and *logical truth*, that is, the concordance of a proposition with reality, in such way as is above defined.

571. (2) The word *truth* has also had great importance in philosophy in widely different senses, in which it is distinguished as *simple truth*, which is that truth which inheres in other subjects than propositions.

Plato in the *Cratylus* (385B) maintains that words have truth; and some of the scholastics admitted that an incomplex sign, such as a picture, may have truth.

572. But *truth* is also used in senses in which it is not an affection of a sign, but of things as things. Such truth is called *transcendental truth*. The scholastic maxim was *Ens est unum, verum, bonum*. Among the senses in which transcendental truth was spoken of was that in which it was said that all science has for its object the investigation of *truth*, that is to say, of the real characters of things. It was, in other senses, regarded as a subject of metaphysics exclusively. It is sometimes defined so as to be indistinguishable from reality, or real existence. Another common definition is that truth is the conformity, or conformability, of things to reason. Another definition is that truth is the conformity of things to their essential principles.

573. (3) *Truth* is also used in logic in a sense in which it inheres only in subjects more complex than propositions. Such is *formal truth*, which belongs to an argumentation which conforms to logical laws.

CHAPTER 6

METHODS FOR ATTAINING TRUTH

§1. THE FIRST RULE OF LOGIC^{P*}

574. Certain methods of mathematical computation correct themselves; so that if an error be committed, it is only necessary to keep right on, and it will be corrected in the end. For instance, I want to extract the cube root of 2. The true answer is 1.25992105. . . . The rule is as follows:

Form a column of numbers, which for the sake of brevity we may call the A's. The first 3 A's are any 3 numbers taken at will. To form a new A, add the last two A's, triple the sum, add to this sum the last A but two, and set down the result as the next A. Now any A, the lower in the column the better, divided by the following A gives a fraction which increased by 1 is approximately $\sqrt[3]{2}$.

<i>Correct</i> <i>Computation</i>	Sum of Two	Triple	<i>Erroneous</i> <i>Computation</i>	Sum of Two	Triple
1			1		
0			0		
1	1	3	1	1	3
4	5	15	4	5	15
15	19	57	<i>Error!</i> 16	20	60
58	73	219	61	77	231
223	281	843	235	296	888
858	1081	3243	904	1139	3417
3301	4159	12477	3478	4382	13146
12700			13381		
$1 \frac{3301}{12700}$	1.2599213		$1 \frac{3478}{13381}$	1.2599208	
Error	+.0000002		Error	-.0000002	

* Lecture 3 on "Detached Ideas on Vitally Important Topics" of 1898. Lecture 1 is in vol. 1, bk. IV, ch. 5; Lecture 2 is used in the preface to vol. 4.

You see the error committed in the second computation, though it seemed to multiply itself greatly, became substantially corrected in the end.

If you sit down to solve *ten* ordinary linear equations between ten unknown quantities, you will receive materials for a commentary upon the infallibility of mathematical processes. For you will almost infallibly get a wrong solution. I take it as a matter of course that you are not an expert professional computer. He will proceed according to a method which will correct his errors if he makes any.

575. This calls to mind one of the most wonderful features of reasoning and one of the most important philosophemes in the doctrine of science, of which, however, you will search in vain for any mention in any book I can think of; namely, that reasoning tends to correct itself, and the more so, the more wisely its plan is laid. Nay, it not only corrects its conclusions, it even corrects its premisses. The theory of Aristotle is that a necessary conclusion is just equally as certain as its premisses, while a probable conclusion is somewhat less so. Hence, he was driven to his strange distinction between what is better known to Nature and what is better known to us. But were every probable inference less certain than its premisses, science, which piles inference upon inference, often quite deeply, would soon be in a bad way. Every astronomer, however, is familiar with the fact that the catalogue place of a fundamental star, which is the result of elaborate reasoning, is far more accurate than any of the observations from which it was deduced.

576. That Induction tends to correct itself, is obvious enough. When a man undertakes to construct a table of mortality upon the basis of the Census, he is engaged in an inductive inquiry. And lo, the very first thing that he will discover from the figures, if he did not know it before, is that those figures are very seriously vitiated by their falsity. The young find it to their advantage to be thought older than they are, and the old to be thought younger than they are. The number of young men who are just 21 is altogether in excess of those who are 20, although in all other cases the ages expressed in round numbers are in great excess. Now the operation of inferring a law in a succession of observed numbers is, broadly speaking, inductive; and therefore we see

that a properly conducted Inductive research corrects its own premisses.

577. That the same thing may be true of a Deductive inquiry our arithmetical example has shown. *Theoretically*, I grant you, there is no possibility of error in necessary reasoning. But to speak thus "theoretically," is to use language in a Pickwickian sense. In practice, and in fact, mathematics is not exempt from that liability to error that affects everything that man does. Strictly speaking, it is not certain that twice two is four. If on an average in every thousand figures obtained by addition by the average man there be one error, and if a thousand million men have each added 2 to 2 ten thousand times, there is still a possibility that they have all committed the same error of addition every time. If everything were fairly taken into account, I do not suppose that twice two is four is more certain than Edmund Gurney* held the existence of veridical phantasms of the dying or dead to be. Deductive inquiry, then, has its errors; and it corrects them, too. But it is by no means so sure, or at least so swift to do this as is Inductive science. A celebrated error in the *Mécanique Céleste* concerning the amount of theoretical acceleration of the moon's mean motion deceived the whole world of astronomy for more than half a century.† Errors of reasoning in the first book of Euclid's *Elements*, the logic of which book was for two thousand years subjected to more careful criticism than any other piece of reasoning without exception ever was or probably ever will be, only became known after the non-Euclidean geometry had been developed. The certainty of mathematical reasoning, however, lies in this, that once an error is suspected, the whole world is speedily in accord about it.

578. As for Retroductive Inquiries, or the Explanatory Sciences, such as Geology, Evolution, and the like, they always have been and always must be theatres of controversy. These controversies do get settled, after a time, in the minds of candid inquirers; though it does not always happen that the protagonists themselves are able to assent to the justice of the decision. Nor is the general verdict always logical or just.

579. So it appears that this marvellous self-correcting

* Cf. e.g. his *Phantasms of the Living* (1886).

† See "On the Secular Variation of the Moon's Mean Motion," J. C. Adams, *Philosophical Transactions*, Royal Society, Pt. I, pp. 397-406, vol. 143 (1853).

property of Reason, which Hegel made so much of, belongs to every sort of science, although it appears as essential, intrinsic, and inevitable only in the highest type of reasoning, which is induction. But the logic of relatives shows that the other types of reasoning, Deduction and Retroduction, are not so thoroughly unlike Induction as they might be thought, and as Deduction, at least, always has been thought to be. Stuart Mill alone among the older logicians in his analysis of the *Pons Asinorum* came very near to the view which the logic of relatives forces us to take.* Namely, in the logic of relatives, treated let us say, in order to fix our ideas, by means of those existential graphs of which I gave a slight sketch in the last lecture, † [we] begin a Deduction by writing down all the premisses. Those different premisses are then brought into one field of assertion, that is, are *colligated*, as Whewell ‡ would say, or joined into one copulative proposition. Thereupon, we proceed attentively to observe the graph. It is just as much an operation of *Observation* as is the observation of bees. This observation leads us to make an *experiment* upon the Graph. Namely, we first duplicate portions of it; and then we erase portions of it, that is, we put out of sight part of the assertion in order to see what the rest of it is. We observe the result of this experiment, and that is our deductive conclusion. Precisely those three things are all that enter into the experiment of any Deduction — Colligation, Iteration, Erasure. § The rest of the process consists of observing the result. It is not, however, in every Deduction that all the three possible elements of the Experiment take place. In particular, in ordinary syllogism the iteration may be said to be absent. And that is the reason that ordinary syllogism can be worked by a machine. ¶ There is but one conclusion of any consequence to be drawn by ordinary syllogism from given premisses. Hence, it is that we fall into the habit of talking of *the* conclusion. But in the logic of relatives there are conclusions of different orders, depending upon how much iteration takes place. || What is *the*

* *Logic*, bk. II, ch. 4, §4.

† See the Preface and book II of vol. 4.

‡ *Novum Organon Renovatum* II, iv.

§ Cf. 163, 2.442ff, 4.505f, 4.565f.

¶ See 2.56ff.

|| See e.g., 3.403L.

conclusion deducible from the very simple first principles of number? It is ridiculous to speak of *the* conclusion. *The* conclusion is no less than the aggregate of all the theorems of higher arithmetic that have been discovered or that ever will be discovered. Now let us turn to Induction. This mode of reasoning also begins by a colligation. In fact, it is precisely the colligation that gave induction its name, *ἐπαγειν* with Socrates,* *συναγωγή* with Plato,† *ἐπαγωγή* with Aristotle.‡ It must, by the rule of predesignation,§ be a deliberate experiment. In ordinary induction we proceed to observe something about each instance. Relative induction is illustrated by the process of making out the law of the arrangement of the scales of a pine-cone. It is necessary to mark a scale taken as an instance, and counting in certain directions to come back to that marked scale. This double observation of the same instance corresponds to Iteration in deduction. Finally, we erase the particular instances and leave the class or system sampled directly connected with the characters, relative or otherwise, which have been found in the sample of it.

580. We see, then, that Induction and Deduction are after all not so very unlike. It is true that in Induction we commonly make many experiments and in Deduction only one. Yet this is not always the case. The chemist contents himself with a single experiment to establish any qualitative fact. True, he does this because he knows that there is such a uniformity in the behaviour of chemical bodies that another experiment would be a mere repetition of the first in every respect. But it is precisely such a knowledge of a uniformity that leads the mathematician to content himself with one experiment. The inexperienced student in mathematics will mentally perform a number of geometrical experiments, which the veteran would regard as superfluous, before he will permit himself to come to a general conclusion. For example, if the question is, how many rays can cut four rays fixed in space, the experienced mathematician will content himself with imagining that two of the fixed rays intersect and that the other two likewise intersect. He will see, then, that there is one ray through the two intersections and another along the

* *Timaeus*, 33A.

† *Republic* 526D.

‡ *An. Post.* I, 1, 4.

§ See 2.735f.

intersection of the two planes of pairs of intersecting fixed rays, and will unhesitatingly declare thereupon that but two rays can cut four fixed rays, unless the fixed rays are so situated that an infinite multitude of rays will cut them all. But I dare say many of you would want to experiment with other arrangements of the four fixed rays, before making any confident pronouncement. A friend of mine who seemed to have difficulties in adding up her accounts was once counselled to add each column five times and adopt the mean of the different results. It is evident that when we run a column of figures down as well as up, as a check, or when we review a demonstration in order to look out for any possible flaw in the reasoning, we are acting precisely as when in an induction we enlarge our sample for the sake of the self-correcting effect of induction.

581. As for retroduction, it is itself an experiment. A retroductive research is an experimental research; and when we look upon Induction and Deduction from the point of view of Experiment and Observation, we are merely tracing in those types of reasoning their affinity to Retroduction. It begins always with colligation, of course, of a variety of separately observed facts about the subject of the hypothesis. How remarkable it is, by the way, that the entire army of logicians from Zeno to Whateley should have left it to this mineralogist [Whewell] to point out colligation as a generally essential step in reasoning. To return to Retroduction, then, it begins with colligation. Something corresponding to iteration may or may not take place. And then comes an Observation. Not, however, an External observation of the objects as in Induction, nor yet an observation made upon the parts of a diagram, as in Deduction; but for all that just as truly an observation. For what is observation? What is experience? It is the enforced element in the history of our lives. It is that which we are constrained to be conscious of by an occult force residing in an object which we contemplate. The act of observation is the deliberate yielding of ourselves to that *force majeure* — an early surrender at discretion, due to our foreseeing that we must, whatever we do, be borne down by that power, at last. Now the surrender which we make in Retroduction, is a surrender to the Insistence of an Idea. The hypothesis, as the Frenchman says, *c'est plus fort que moi*. It

is irresistible; it is imperative. We must throw open our gates and admit it at any rate for the time being.

582. Thus it is that inquiry of every type, fully carried out, has the vital power of self-correction and of growth. This is a property so deeply saturating its inmost nature that it may truly be said that there is but one thing needful for learning the truth, and that is a hearty and active desire to learn what is true. If you really want to learn the truth, you will, by however devious a path, be surely led into the way of truth, at last. No matter how erroneous your ideas of the method may be at first, you will be forced at length to correct them so long as your activity is moved by that sincere desire. Nay, no matter if you only half desire it, at first, that desire would at length conquer all others, could experience continue long enough. But the more veraciously truth is described at the outset, the shorter by centuries will the road to it be.

583. In order to demonstrate that this is so, it is necessary to note what is essentially involved in the Will to Learn. The first thing that the Will to Learn supposes is a dissatisfaction with one's present state of opinion. There lies the secret of why it is that our American universities are so miserably insignificant. What have they done for the advance of civilization? What is the great idea or where is [the] single great man who can truly be said to be the product of an American university? The English universities, rotting with sloth as they always have, have nevertheless in the past given birth to Locke and to Newton, and in our time to Cayley, Sylvester, and Clifford. The German universities have been the light of the whole world. The medieval University of Bologna gave Europe its system of law. The University of Paris and that despised scholasticism took Abelard and made him into Descartes. The reason was that they were institutions of learning while ours are institutions for teaching. In order that a man's whole heart may be in teaching he must be thoroughly imbued with the vital importance and absolute truth of what he has to teach; while in order that he may have any measure of success in learning he must be penetrated with a sense of the unsatisfactoriness of his present condition of knowledge. The two attitudes are almost irreconcilable. But just as it is not the self-righteous man who brings multitudes to a sense of sin,

but the man who is most deeply conscious that he is himself a sinner, and it is only by a sense of sin that men can escape its thralldom; so it is not the man, who thinks he knows it all, that can bring other men to feel their need of learning, and it is only a deep sense that one is miserably ignorant that can spur one on in the toilsome path of learning. That is why, to my very humble apprehension, it cannot but seem that those admirable pedagogical methods, for which the American teacher is distinguished, are of little more consequence than the cut of his coat, that they surely are as nothing compared with that fever for learning that must consume the soul of the man who is to infect others with the same apparent malady. Let me say that of the present condition of Harvard I really know nothing at all except that I know the leaders of the department of philosophy to be all true scholars, particularly marked by eagerness to learn and freedom from dogmatism. And in every age, it can only be the philosophy of that age, such as it may be, which can animate the special sciences to any work that shall really carry forward the human mind to some new and valuable truth. Because the valuable truth is not the detached one, but the one that goes toward enlarging the system of what is already known.

584. The Inductive Method springs directly out of dissatisfaction with existing knowledge. The great rule of pre-designation, which must guide it, is as much as to say that an induction to be valid must be prompted by a definite doubt or at least an interrogation; and what is such an interrogation but first, a sense that we do not know something; second, a desire to know it; and third, an effort — implying a willingness to labor — for the sake of seeing how the truth may really be. If that interrogation inspires you, you will be sure to examine the instances; while if it does not, you will pass them by without attention.

585. I repeat that I know nothing about the Harvard of today, but one of the things which I hope to learn during my stay in Cambridge is the answer to this question, whether the Commonwealth of Massachusetts has set up this university to the end that such young men as can come here may receive a fine education and may thus be able to earn handsome incomes, and have a canvas-back and a bottle of Clos de

Vougeot for dinner — whether this is what she is driving at — or whether it is that, knowing that all America looks largely to sons of Massachusetts for the solutions of the most urgent problems of each generation, she hopes that in this place something may be studied out which shall be of service in the solutions of those problems. In short, I hope to find out whether Harvard is an educational establishment or whether it is an institution for learning what is not yet thoroughly known, whether it is for the benefit of the individual students or whether it is for the good of the country and for the speedier elevation of man into that rational animal of [which] he is the embryonic form.

There is one thing that I am sure a Harvard education cannot fail to do, because it did that much even in my time, and for a very insouciant student; I mean that it cannot fail to disabuse the student of the popular notion that modern science is so very great a thing as to be commensurate with Nature and indeed to constitute of itself some account of the universe, and to show him that it is yet, what it appeared to Isaac Newton to be, a child's collection of pebbles gathered upon the beach — the vast ocean of Being lying there unsounded.

586. It is not merely that in all our gropings we bump up against problems which we cannot imagine how to attack, why space should have but three dimensions, if it really has but three, why the Listing numbers which define its shape should all equal one, if they really do, or why some of them should be zero, as Listing himself and many geometers think they are, if that be the truth, of why forces should determine the second derivative of the space rather than the third or fourth, of why matter should consist of about seventy distinct kinds, and all those of each kind apparently exactly alike, and these different kinds having masses nearly in arithmetical progression and yet not exactly so, of why atoms should attract one another at a distance in peculiar ways, if they really do, or if not what produced such vortices, and what gave the vortices such peculiar laws of attraction, of how or by what kind of influence matter came to be sifted out, so that the different kinds occur in considerable aggregations, of why certain motions of the atoms of certain kinds of protoplasm are accompanied by sensation, and so on through the whole list.* These

* Cf. 6.6.

things do indeed show us how superficial our science still is; but its littleness is made even more manifest when we consider within how narrow a range all our inquiries have hitherto lain. The instincts connected with the need of nutrition have furnished all animals with some virtual knowledge of space and of force, and made them applied physicists. The instincts connected with sexual reproduction have furnished all animals at all like ourselves with some virtual comprehension of the minds of other animals of their kind, so that they are applied psychists. Now not only our accomplished science, but even our scientific questions have been pretty exclusively limited to the development of those two branches of natural knowledge.* There may for aught we know be a thousand other kinds of relationship which have as much to do with connecting phenomena and leading from one to another, as dynamical and social relationships have. Astrology, magic, ghosts, prophecies, serve as suggestions of what such relationships might be.

587. Not only is our knowledge thus limited in scope, but it is even more important that we should thoroughly realize that the very best of what we, humanly speaking, know [we know] only in an uncertain and inexact way.

Nobody would dream of contending that because the sun has risen and set every day so far, that afforded any reason at all for supposing that it would go on doing so to all eternity. But when I say that there is not the very slightest reason for thinking that no material atoms ever go out of existence or come into existence, there I fail to carry the average man with me; and I suppose the reason is, that he dimly conceives that there is some reason, other than the pure and simple induction, for holding matter to be ingenerable and indestructible. For it is plain that if it be a mere question of our weighings or other experiences, all that appears is that not more than one atom in a million or ten million becomes annihilated before the deficiency of mass is pretty certain to be balanced by another atom's being created. Now when we are speaking of atoms, a million or ten million is an excessively minute quantity. So that as far as purely inductive evidence is concerned we are very very far from being entitled to think that matter is absolutely permanent. If you put the question to a physicist his

* See 591, 603; 1.118.

reply will probably be, as it certainly ought to be, that physicists only deal with such phenomena as they can either directly or indirectly observe, or are likely to become able to observe until there is some great revolution in science, and to that he will very likely add that any limitation upon the permanence of matter would be a purely gratuitous hypothesis without anything whatever to support it. Now this last part of the physicist's reply is, in regard to the order of considerations which he has in mind, excellent good sense. But from an absolute point of view, I think it leaves something out of account. Do you believe that the fortune of the Rothschilds will endure forever? Certainly not; because although they may be safe enough as far as the ordinary causes go which engulf fortunes, yet there is always a chance of some revolution or catastrophe which may destroy all property. And no matter how little that chance may be, as far as this decade or this generation goes, yet in limitless decades and generations, it is pretty sure that the pitcher will get broken, at last. There is no danger, however slight, which in an indefinite multitude of occasions does not come as near to absolute certainty as probability can come. The existence of the human race, we may be as good as sure, will come to an end at last. For not to speak of the gradual operation of causes of which we know, the action of the tides, the resisting medium, the dissipation of energy, there is all the time a certain danger that the earth may be struck by a meteor or wandering star so large as to ruin it, or by some poisonous gas. That a purely gratuitous hypothesis should turn out to be true is, indeed, something so exceedingly improbable that we cannot be appreciably wrong in calling it zero. Still, the chance that out of an infinite multitude of gratuitous hypotheses an infinitesimal proportion, which may itself be an infinite multitude, should turn out to be true, is zero multiplied by infinity, which is absolutely indeterminate. That is to say we simply know nothing whatever about it. Now that any single atom should be annihilated is a gratuitous hypothesis. But there are, we may suppose, an infinite multitude of atoms, and a similar hypothesis may be made for each. And thus we return to my original statement that as to whether any finite number or even an infinite number of atoms are annihilated per year, that is something of

which we are simply in a state of blank ignorance, unless we have found out some method of reasoning altogether superior to induction. If, therefore, we should detect any general phenomenon of nature which could very well be explained, not by supposing any definite breach of the laws of nature, for that would be no explanation at all, but by supposing that a continual breach of all the laws of nature, every day and every second, was itself one of the laws or habitudes of nature, there would be no power in induction to offer the slightest logical objection to that theory. But as long as we are aware of no such general phenomena tending to show such continual inexactitude in law, then we must remain absolutely without any rational opinion upon the matter *pro* or *con*.

588. There are various ways in which the natural cocksureness and conceit of man struggles to escape such confession of total ignorance. But they seem to be all quite futile. One of the commonest, and at the same time the silliest, is the argument that God would for this or that excellent reason never act in such an irregular manner. I think all the men who talk like that must be near-sighted. For to suppose that any man who could see the moving clouds and survey a wide expanse of landscape and note its wonderful complexity, and consider how unimaginably small it all was in comparison to the whole face of the globe, not to speak of the millions of orbs in space, and who would not presume to predict what move Morphy or Steinitz might make in so simple a thing as a game of chess, should undertake to say what God would do, would seem to impeach his sanity. But if instead of its being a God, after whose image we are made, and whom we can, therefore, begin to understand, it were some metaphysical principle of Being, even more incomprehensible, whose action the man pretended to compute, that would seem to be a pitch of absurdity one degree higher yet.

589. People talk of a hypothesis where there is a *vera causa*. But in such cases the inference is not hypothetic but inductive. A *vera causa* is a state of things known to be present and known partially at least to explain the phenomena, but not known to explain them with quantitative precision. Thus, when seeing ordinary bodies round us accelerated toward the earth's centre and seeing also the moon, which both in its

albedo and its volcanic appearance altogether resembles stone, to be likewise accelerated toward the earth, and when finding these two accelerations are in the inverse duplicate ratios of their distances from that centre, we conclude that their nature, whatever it may be, is the same, we are inferring an analogy, which is a type of inference having all the strength of induction and more, besides.* For the sake of simplicity, I have said nothing about it in these lectures; but I am here forced to make that remark. Moreover, when we consider that all that we infer about the gravitation of the moon is a continuity between the terrestrial and lunar phenomena, a continuity which is found throughout physics, and when we add to that, the analogies of electrical and magnetical attractions, both of which vary inversely as the square of the distance, we plainly recognize here one of the strongest arguments of which science affords any example. Newton was entirely in the right when he said, *Hypotheses non fingo*.† It is they who have criticized the dictum whose logic is at fault. They are attributing an obscure psychological signification to *force*, or *vis insita*, which in physics only connotes a regularity among accelerations. Thus inferences concerning *veræ causæ* are inductions not retroductions, and of course have only such uncertainty and inexactitude as belong to induction. When I say that a reductive inference is not a matter for belief at all, I encounter the difficulty that there are certain inferences which, scientifically considered, are undoubtedly hypotheses and yet which practically are perfectly certain. Such for instance is the inference that Napoleon Bonaparte really lived at about the beginning of this century, a hypothesis which we adopt for the purpose of explaining the concordant testimony of a hundred memoirs, the public records of history, tradition, and numberless monuments and relics. It would surely be downright insanity to entertain a doubt about Napoleon's existence. A still better example is that of the translations of the cuneiform inscriptions which began in mere guesses, in which their authors could have had no real confidence. Yet by piling new conjectures upon former conjectures apparently verified, this science has gone on to produce under our very eyes a result so bound together

* Cf. 2.513, 2.733.

† See 2.707.

by the agreement of the readings with one another, with other history, and with known facts of linguistics, that we are unwilling any longer to apply the word *theory* to it. You will ask me how I can reconcile such facts as these with my dictum that hypothesis is not a matter for belief. In order to answer this question I must first examine such inferences in their scientific aspect and afterwards in their practical aspect. The only end of science, as such, is to learn the lesson that the universe has to teach it. In Induction it simply surrenders itself to the force of facts. But it finds, at once — I am partially inverting the historical order, in order to state the process in its logical order — it finds I say that this is not enough. It is driven in desperation to call upon its inward sympathy with nature, its instinct for aid, just as we find Galileo at the dawn of modern science making his appeal to *il lume naturale*. But in so far as it does this, the solid ground of fact fails it. It feels from that moment that its position is only provisional. It must then find confirmations or else shift its footing. Even if it does find confirmations, they are only partial. It still is not standing upon the bedrock of fact. It is walking upon a bog, and can only say, this ground seems to hold for the present. Here I will stay till it begins to give way. Moreover, in all its progress, science vaguely feels that it is only learning a lesson. The value of *Facts to it*, lies only in this, that they belong to Nature; and Nature is something great, and beautiful, and sacred, and eternal, and real — the object of its worship and its aspiration. It therein takes an entirely different attitude toward facts from that which Practice takes. For Practice, facts are the arbitrary forces with which it has to reckon and to wrestle. Science, when it comes to understand itself, regards facts as merely the vehicle of eternal truth, while for Practice they remain the obstacles which it has to turn, the enemy of which it is determined to get the better. Science feeling that there is an arbitrary element in its theories, still continues its studies, confident that so it will gradually become more and more purified from the dross of subjectivity; but practice requires something to go upon, and it will be no consolation to it to know that it is on the path to objective truth — the actual truth it must have, or when it cannot attain certainty must at least have high probability, that is, must know that, though a

few of its ventures may fail, the bulk of them will succeed. Hence the hypothesis which answers the purpose of theory may be perfectly worthless for art. After a while, as Science progresses, it comes upon more solid ground. It is now entitled to reflect: this ground has held a long time without showing signs of yielding. I may hope that it will continue to hold for a great while longer. This reflection, however, is quite aside from the purpose of science. It does not modify its procedure in the least degree. It is extra-scientific. For Practice, however, it is vitally important, quite altering the situation. As Practice apprehends it, the conclusion no longer rests upon mere retrodution, it is inductively supported. For a large sample has now been drawn from the entire collection of occasions in which the theory comes into comparison with fact, and an overwhelming proportion, in fact all the cases that have presented themselves, have been found to bear out the theory. And so, says Practice, I can safely presume that so it will be with the great bulk of the cases in which I shall go upon the theory; especially as they will closely resemble those which have been well tried. In other words there is now reason to believe in the theory, for belief is the willingness to risk a great deal upon a proposition. But this belief is no concern of science, which has nothing at stake on any temporal venture but is in pursuit of eternal verities (not semblances to truth) and looks upon this pursuit, not as the work of one man's life, but as that of generation after generation, indefinitely. Thus those retroductive inferences which at length acquire such high degrees of certainty, so far as they are so probable, are not pure retroductions and do not belong to science, as such; while, so far as they are scientific and are pure retroductions, have no true probability and are not matters for belief. We call them in science established truths, that is, they are propositions into which the economy of endeavor prescribes that, for the time being, further inquiry shall cease.

§2. ON SELECTING HYPOTHESES*

590. If we are to give the names of Deduction, Induction, and Abduction to the three grand classes of inference, then Deduction must include every attempt at mathematical dem-

* From the Eighth Lowell Lecture of 1903, entitled "How to Theorize."

onstration, whether it relate to single occurrences or to "probabilities," that is, to statistical ratios; Induction must mean the operation that induces an assent, with or without quantitative modification, to a proposition already put forward, this assent or modified assent being regarded as the provisional result of a method that must ultimately bring the truth to light; while Abduction must cover all the operations by which theories and conceptions are engendered.

591. How is it that man ever came by any correct theories about nature? We know by Induction that man has correct theories; for they produce predictions that are fulfilled. But by what process of thought were they ever brought to his mind? A chemist notices a surprising phenomenon. Now if he has a high admiration of Mill's *Logic*, as many chemists have, he will remember that Mill tells him that he must work on the principle that, under precisely the same circumstances, like phenomena are produced. Why does he then not note that this phenomenon was produced on such a day of the week, the planets presenting a certain configuration, his daughter having on a blue dress, he having dreamed of a white horse the night before, the milkman having been late that morning, and so on? The answer will be that in early days chemists did use to attend to some such circumstances, but that they have learned better. How have they learned this? By an induction. Very well, that induction must have been based upon a theory which the induction verified. How was it that man was ever led to entertain that true theory? You cannot say that it happened by chance, because the possible theories, if not strictly innumerable, at any rate exceed a trillion — or the third power of a million; and therefore the chances are too overwhelmingly against the single true theory in the twenty or thirty thousand years during which man has been a thinking animal, ever having come into any man's head. Besides, you cannot seriously think that every little chicken, that is hatched, has to rummage through all possible theories until it lights upon the good idea of picking up something and eating it. On the contrary, you think the chicken has an innate idea of doing this; that is to say, that it can think of this, but has no faculty of thinking anything else. The chicken you say pecks by instinct. But if you are going to think every poor chicken endowed with an

innate tendency toward a positive truth, why should you think that to man alone this gift is denied? If you carefully consider with an unbiassed mind all the circumstances of the early history of science and all the other facts bearing on the question, which are far too various to be specifically alluded to in this lecture, I am quite sure that you must be brought to acknowledge that man's mind has a natural adaptation to imagining correct theories of some kinds, and in particular to correct theories about forces, without some glimmer of which he could not form social ties and consequently could not reproduce his kind. In short, the instincts conducive to assimilation of food, and the instincts conducive to reproduction, must have involved from the beginning certain tendencies to think truly about physics, on the one hand, and about psychics, on the other. It is somehow more than a mere figure of speech to say that nature fecundates the mind of man with ideas which, when those ideas grow up, will resemble their father, Nature.

592. But if that be so, it must be good reasoning to say that a given hypothesis is good, as a hypothesis, because it is a natural one, or one readily embraced by the human mind. It must concern logic in the highest degree to ascertain precisely how far and under what limitations this maxim may be held. For of all beliefs, none is more natural than the belief that it is natural for man to err. The logician ought to find out what the relation is between these two tendencies.

593. It behooves a man first of all to free his mind of those four idols of which Francis Bacon speaks in the first book of the *Novum Organum*. So much is the dictate of Ethics, itself. But after that, what? Descartes, as you know, maintained that if a man could only get a perfectly clear and distinct idea* — to which Leibniz added the third requirement that it should be adequate† — then that idea must be true. But this is far too severe. For never yet has any man attained to an apprehension perfectly clear and distinct, let alone its being adequate; and yet I suppose that true ideas have been entertained. Ordinary ideas of perception, which Descartes thought were most horribly confused, have nevertheless something in them

* *Meditations* III; *Method*, Pt. II; *Principles*, Pt. I, 30, 43, etc.

† Leibniz's *Nouveaux Essais*, Bk. II, ch. 31; *Discours*, XXIV, XXV.

that very nearly warrants their truth, if it does not quite so. "Seeing is believing," says the instinct of man.

594. The question is what theories and conceptions we *ought* to entertain. Now the word "ought" has no meaning except relatively to an *end*. That ought to be done which is conducive to a certain end. The inquiry therefore should begin with searching for the *end* of thinking. What do we think *for*? What is the physiological function of thought? If we say it is action, we must mean the government of action to some end. To what end? It must be something, good or admirable, regardless of any ulterior reason. This can only be the esthetically good. But what is esthetically good? Perhaps we may say the full expression of an idea?* Thought, however, is in itself essentially of the nature of a sign. But a sign is not a sign unless it translates itself into another sign in which it is more fully developed. Thought requires achievement for its own development, and without this development it is nothing. Thought must live and grow in incessant new and higher translations, or it proves itself not to be genuine thought.

595. But the mind loses itself in such general questions and seems to be floating in a limitless vacuity. It is of the very essence of thought and purpose that it should be special, just as truly as it is of the essence of either that it should be general. Yet it illustrates the point that the valuable idea must be eminently fruitful in special applications, while at the same time it is always growing to wider and wider alliances.

596. Classical antiquity was far too favorable to the sort of concept that was

fortis, et in se ipso totus, teres atque rotundus.†

I often meet with such theories in philosophical books, especially in the works of theological students and of others who draw their ideas from antiquity. Such is the circular theory, which assumes itself and returns into itself — the aristocratical theory which holds itself aloof from vulgar facts. Logic has not the least objection to such a view, so long as it maintains its self-sufficiency, keeps itself strictly to itself, as its nobility obliges it to do, makes no pretension of meddling with the

* Cf. vol. 1, bk. IV, ch. 2, 4.

† Horace, *Satires*, II, 7, 86.

world of experience, and does not ask anybody to assent to it.

597.* Auguste Comte, at the other extreme, would condemn every theory that was not "verifiable." Like the majority of Comte's ideas, this is a bad interpretation of a *truth*. An explanatory hypothesis, that is to say, a conception which does not limit its purpose to enabling the mind to grasp into one a variety of facts, but which seeks to connect those facts with our general conceptions of the universe, ought, in one sense, to be *verifiable*; that is to say, it ought to be little more than a ligament of numberless possible predictions concerning future experience, so that if they fail, it fails. Thus, when Schliemann entertained the hypothesis that there really had been a city of Troy and a Trojan War, this meant to his mind among other things that when he should come to make excavations at Hissarlik he would probably find remains of a city with evidences of a civilization more or less answering to the descriptions of the Iliad, and which would correspond with other probable finds at Mycenae, Ithaca, and elsewhere. So understood, Comte's maxim is sound. Nothing but that is an explanatory hypothesis. But Comte's own notion of a *verifiable* hypothesis was that it must not suppose anything that you are not able directly to observe.† From such a rule it would be fair to infer that he would permit Mr. Schliemann to suppose he was going to find arms and utensils at Hissarlik, but would forbid him to suppose that they were either made or used by any human being, since no such beings could ever be detected by direct percept. He ought on the same principle to forbid us to suppose that a fossil skeleton had ever belonged to a living ichthyosaurus. This seems to be substantially the opinion of M. Poincaré at this day. The same doctrine would forbid us to believe in our memory of what happened at dinnertime today. I have for many years been an adherent of what is technically called Common Sense in philosophy, myself; and do not think that my Tychistic opinions conflict with that position; but I nevertheless think that such theories as that of Comte and Poincaré about verifiable hypotheses frequently deserve the most serious consideration; and the examination of them is never lost time; for it brings lessons not otherwise so easily learned. Of course with memory would have to go all opinions

* Cf. 2.511n.

† *Cours de philosophie positive*, 28^{me} leçon.

about everything not at this moment before our senses. You must not believe that you hear me speaking to you, but only that you hear certain sounds while you see before you a spot of black, white, and flesh color; and those sounds somehow seem to suggest certain ideas which you must not connect at all with the black and white spot. A man would have to devote years to training his mind to such habits of thought, and even then it is doubtful whether it would be possible. And what would be gained? If it would alter our beliefs as to what our sensuous experience is going to be, it would certainly be a change for the worse, since we do not find ourselves disappointed in any expectations due to common sense beliefs. If on the other hand it would not make any such difference, as I suppose it would not, why not allow us the harmless convenience of believing in these fictions, if they be fictions? Decidedly we must be allowed these ideas, if only as cement for the matter of our sensations. At the same time, I protest that such permission would not be at all enough. Comte, Poincaré, and Karl Pearson take what they consider to be the first impressions of sense, but which are really nothing of the sort, but are percepts that are products of psychical operations, and they separate these from all the intellectual part of our knowledge, and arbitrarily call the first *real* and the second *fictions*. These two words *real* and *fictive* bear no significations whatever except as marks of *good* and *bad*. But the truth is that what they call *bad* or *fictitious*, or *subjective*, the intellectual part of our knowledge, comprises all that is valuable on its own account, while what they mark *good*, or *real*, or *objective*, is nothing but the pretty vessel that carries the precious thought.

598. I can excuse a person who has lost a dear companion and whose reason is in danger of giving way under the grief, for trying, on that account, to believe in a future life. I can more than excuse him because his usefulness is at stake, although I myself would not adopt a hypothesis, and would not even take it on probation, simply because the idea was pleasing to me. Without judging others, I should feel, for my own part, that that would be a crime against the integrity of the reason that God has lent to me. But if I had the choice between two hypotheses, the one more ideal and the other more materialistic, I should prefer to take the ideal one upon

probation, simply because ideas are fruitful of consequences, while mere sensations are not so; so that the idealistic hypothesis would be the *more verifiable*, that is to say, would *predict more*, and could be put the more thoroughly to the test.

Upon this same principle, if two hypotheses present themselves, one of which can be satisfactorily tested in two or three days, while the testing of the other might occupy a month, the former should be tried first, even if its apparent likelihood is a good deal less.

599. It is a very grave mistake to attach much importance to the antecedent likelihood* of hypotheses, except in extreme cases; because likelihoods are mostly merely subjective, and have so little real value, that considering the remarkable opportunities which they will cause us to miss, in the long run attention to them does not pay. Every hypothesis should be put to the test by forcing it to make verifiable predictions. A hypothesis on which no verifiable predictions can be based should never be accepted, except with some mark attached to it to show that it is regarded as a mere convenient vehicle of thought — a mere matter of form.

600. In an extreme case, where the likelihood is of an unmistakably objective character, and is strongly supported by good inductions, I would allow it to cause the postponement of the testing of a hypothesis. For example, if a man came to me and pretended to be able to turn lead into gold, I should say to him, "My dear sir, I haven't time to make gold." But even then the likelihood would not weigh with me directly, as such, but because it would become a factor in what really is in all cases the leading consideration in Abduction, which is the question of Economy — Economy of money, time, thought, and energy.†

601. It is Prof. Ernst Mach‡ who has done the most to show the importance in logic of the consideration of Economy although I had written a paper on the subject as early as 1878.§ But Mach goes altogether too far. For he allows thought no

* Cf. 2.662f.

† See 1.122.

‡ See, e.g., "The Economical Nature of Physical Inquiry," in the *Popular Scientific Lectures* (1895).

§ Chapter 1 of bk. II, vol. 6?

other value than that of economizing experiences. This cannot for an instant be admitted. Sensation, to my thinking, has no value whatever except as a vehicle of thought.

602. Proposals for hypotheses inundate us in an overwhelming flood, while the process of verification to which each one must be subjected before it can count as at all an item, even of likely knowledge, is so very costly in time, energy, and money — and consequently in ideas which might have been had for that time, energy, and money, that Economy would override every other consideration even if there were any other serious considerations. In fact there are no others. For abduction commits us to nothing. It merely causes a hypothesis to be set down upon our docket of cases to be tried.

603. I shall be asked, Do you really mean to say that we ought not to adopt any opinion whatever as an opinion until it has sustained the ordeal of furnishing a prediction that has been verified?

In order to answer that question, it will be requisite to inquire how an abduction can be justified, here understanding by abduction any mode or degree of acceptance of a proposition as a truth, because a fact or facts have been ascertained whose occurrence would necessarily or probably result in case that proposition were true. The abduction so defined amounts, you will remark, to observing a fact and then professing to say what idea it was that gave rise to that fact. One would think a man must be privy to the counsels of the Most High so to presume. The only justification possible, other than some such positive fact which would put quite another color upon the matter, is the justification of desperation. That is to say, that if he is not to say such things, he will be quite unable to know anything of positive fact.

In a general way, this justification certainly holds. If man had not had the gift, which every other animal has, of a mind adapted to his requirements, he not only could not have acquired any knowledge, but he could not have maintained his existence for a single generation. But he is provided with certain instincts, that is, with certain natural beliefs that are true. They relate in part to forces, in part to the action of minds. The manner in which he comes to have this knowledge seems to me tolerably clear. Certain uniformities, that is to

say certain general ideas of action, prevail throughout the universe, and the reasoning mind is [it]self a product of this universe. These same laws are thus, by logical necessity, incorporated in his own being. For example, what we call straight lines are nothing but one out of an innumerable multitude of families of nonsingular lines such that through any two points there is one and one only. The particular family of lines called straight has no geometrical properties that distinguish it from any other of the innumerable families of lines of which there is one and one only through any two points. It is a law of *dynamics* that every dynamical relation between two points, no third point being concerned, except by combinations of such pairs, is altogether similar, except in quantity, to every such dynamical relation between any other two points on the same ray, or straight line. It is a consequence of this that a ray or straight line is the shortest distance between two points; whence, light appears to move along such lines; and that being the case, we recognize them by the eye, and call them straight. Thus, the faculty of sight naturally causes us to assign great prominence to such lines; and thus when we come to form a hypothesis about the motion of a particle left uninfluenced by any other, it becomes *natural* for us to suppose that it moves in a straight line. The reason this turns out true is, therefore, that this first law of motion is a corollary from a more general law which, governing all dynamics, governs light, and causes the idea of straightness to be a predominant one in our minds.

604. In this way, general considerations concerning the universe, strictly philosophical considerations, all but demonstrate that if the universe conforms, with any approach to accuracy, to certain highly pervasive laws, and if man's mind has been developed under the influence of those laws, it is to be expected that he should have a *natural light*, or *light of nature*, or *instinctive insight*, or genius, tending to make him guess those laws aright, or nearly aright. This conclusion is confirmed when we find that every species of animal is endowed with a similar genius. For they not only one and all have some correct notions of force, that is to say, some correct notions, though excessively narrow, of phenomena which we, with our broader conceptions, should call phenomena of force,

5.604] PRAGMATISM AND PRAGMATICISM

and some similarly correct notions about the minds of their own kind and of other kinds, which are the two sufficient cotyledons of all our science, but they all have, furthermore, wonderful endowments of genius in other directions. Look at the little birds, of which all species are so nearly identical in their physique, and yet what various forms of genius do they not display in modelling their nests? This would be impossible unless the ideas that are naturally predominant in their minds were true. It would be too contrary to analogy to suppose that similar gifts were wanting to man. Nor does the proof stop here. The history of science, especially the early history of modern science, on which I had the honor of giving some lectures in this hall some years ago,* completes the proof by showing how few were the guesses that men of surpassing genius had to make before they rightly guessed the laws of nature. . . .

* In 1869.

APPENDIX

§1. KNOWLEDGE*

605. This word is used in logic in two senses: (1) as a synonym for Cognition, and (2), and more usefully, to signify a perfect cognition, that is, a cognition fulfilling three conditions: first, that it holds for true a proposition that really is true; second, that it is perfectly self-satisfied and free from the uneasiness of doubt; third, that some character of this satisfaction is such that it would be logically impossible that this character should ever belong to satisfaction in a proposition not true.

606. Knowledge is divided, firstly, according to whatever classification of the sciences is adopted. Thus, Kantians distinguish formal and material knowledge. Secondly, knowledge is divided according to the different ways in which it is attained, as into immediate and mediate knowledge. Immediate knowledge is a cognition, or objective modification of consciousness, which is borne in upon a man with such resistless force as to constitute a guarantee that it (or a representation of it) will remain permanent in the development of human cognition. Such knowledge is, if its existence be granted, either borne in through an avenue of sense, external or internal, as a percept of an individual, or springs up within the mind as a first principle of reason or as a mystical revelation. Mediate knowledge is that for which there is some guarantee behind itself, although, no matter how far criticism be carried, simple evidency, or direct insistency, of something has to be relied upon. The external guarantee rests ultimately either upon authority, i.e., testimony, or upon observation. In either case mediate knowledge is attained by Reasoning, which see for further divisions.† It is only necessary to mention here that the Aristotelians distinguished knowledge *ὄρι*, or of the facts themselves, and knowledge *διότι*, or of the rational connection

* Baldwin's *Dictionary of Philosophy and Psychology*, vol. 1, p. 603, Macmillan & Co., N. Y. (1901), signed by C. S. P. and C. L. F. (Christine Ladd-Franklin).

† 2.773ff.

of facts, the knowledge of the how and why (cf. the preceding topic). They did not distinguish between the how and the why, because they held that knowledge *διότι* is solely produced by Syllogism* in its greatest perfection, as demonstration. The term empirical knowledge is applied to knowledge, mediate or immediate, which rests upon percepts; while the terms philosophical and rational knowledge are applied to knowledge, mediate or immediate, which rests chiefly or wholly upon conclusions or revelations of reason. Thirdly, knowledge is divided, according to the character of the immediate object, into apprehensive and judicative knowledge, the former being of a percept, image, or *Vorstellung*, the latter of the existence or non-existence of a fact. Fourthly, knowledge is divided, according to the manner in which it is in the mind, into actual, virtual, and habitual knowledge. See Scotus, *Opus Oxoniense*, lib. I, dist. iii. quest. 2, paragraph beginning "Loquendo igitur." Fifthly, knowledge is divided according to its end, into speculative and practical.

§2. REPRESENTATIONISM†

607. The doctrine that percepts stand for something behind them.

In a certain sense it must be admitted, even by presentationists, that percepts only perform the function of conveying knowledge of something else. That is to say, they have to be combined and generalized to become useful knowledge; so that they may be said to represent their own generalizations. In this, representationists and presentationists may agree. But the dispute between them consists in this, that the representationist regards the percept in the light of testimony or a picture, from which by inference, or a mental act analogous to inference, the hidden cause of the percept may become known; while the presentationist holds that perception is a two-sided consciousness in which the percept appears as forcibly acting upon us, so that in perception the consciousness of an active object and of a subject acted on are as indivisible as, in making a muscular effort, the sense of exertion is one with and inseparable from the sense of resistance. The representationist

* See 2.552ff.

† *Ibid.*, vol. 2, pp. 464-5.

would not allow that there is any bilateral consciousness even in the latter sense, regarding the bilaterality as a quasi-inference, or product of the mind's action; while the presentationist insists that there is nothing intellectual or intelligible in this duality. It is, he says, a hard fact experienced but never understood. A representationist will naturally regard the theory that everything in the outward world is atoms, their masses, motions, and energy, as a statement of the real fact which percepts represent. The presentationist, on the other hand, will more naturally regard it as a formula which is fitted to sum up and reconcile the percepts as the only ultimate facts. These are, however, merely different points of view in which neither ought to find anything absolutely contrary to his own doctrine.

§3. ULTIMATE*

608. (1) Last in a series; especially in a series of purposes each, except the last, subsidiary to an *ulterior* one following it in the arrangement considered, or of actions each of which, except the last, leads to the performance of another.

Thus, the phrase *ultimate signification* implies that a sign determines another sign of the same object, and this another; and so on until something is reached which is a sign only for itself. *Ultimate fact* implies that there is a series of facts each explicable by the one following it, until a fact is reached utterly inexplicable. (Cf. Hamilton's *Reid*, Note A, V, ii 6, *et seq.*)

609. (2) Applied also to the limiting state of an endless series of states which approach indefinitely near to the limiting state, and on the whole nearer and nearer, without necessarily ever reaching it; although the word ultimate does not imply a denial of actual attainment.

Thus, it has been held that a real object is that which will be represented in the ultimate opinion about it. This implies that a series of opinions succeed one another, and that it is hoped that they may ultimately tend more and more towards some limiting opinion, even if they do not reach and rest in a last opinion. Cf. Truth and Error, Logical [Bk. III, ch. 5, §3].

* *Ibid.*, vol. 2, pp. 723-4.

§4. MR. PETERSON'S PROPOSED DISCUSSION*

610. Very valuable ideas oftentimes appear so obvious, when once set forth, that high laudation of their inventors would invite ridicule. Such, we are told, was the notion that obsessed C. Colombo, and such is Mr. Peterson's proposal† to start in *The Monist* a discussion of philosophical terminology. It may be a very simple proposal, but nobody, as far as one careful reader of *The Monist* remembers, had made it before; and its utility to students of phenomenology, normative science, and metaphysics will have a high coefficient in its proportionality to the advantage they take of it. Duty calls upon us to contribute, each one what he can that will be useful, whether in the way of question or in that of answer. It seems likely that in my lifetime of study I may have learned something of the way to investigate questions such as Mr. Peterson puts; and if so, here is an opportunity to be of aid to other students.

611. *Experience*, the first term concerning which Mr. Peterson asks for light, is somewhat remarkable for having been employed as nearly as possible in the same sense from Polus the Acragantine (i.e. native of Girgenti) sophist down to Avenarius and Haeckel. As my first step in investigating its meaning, I should look out its equivalent *empeiria*,¹ in Bonitz's *Index Aristotelicus*. For every serious student of philosophy ought to be able to read the common dialect of Greek at sight, and needs on his shelves the Berlin Aristotle, in the fifth volume of which is that index. On looking out *empeiria* there, what first strikes one is that it is not a very common word with Aristotle, nor yet an unusual one, since Bonitz cites something over a dozen passages in which it occurs. The first (*Post. Anal.* II, xix) runs: "From sense are engendered memories, and from multiplied memory of the same thing is engendered experience; for many memories make up a single experience."

* *The Monist*, vol. 16, pp. 147-151 (1906).

† "Some Philosophical Terms," *The Monist*, vol. 15, pp. 629-633, (1905).

¹ ἐμπειρία.

Waitz (*Organon*, II, 429) has a minute note on this passage. Another passage to which the Index refers (*Nic. Ethics*, VI, viii) is thus translated by Stewart in his valuable "Notes" on the work: "If we . . . ask why a boy may be a mathematician, but cannot understand philosophy or natural science, we find that it is because the truths of mathematics are abstract" [a bad explanation but that does not affect the evidence as to the meaning of *empeiria*], "whereas the principles of philosophy and natural science are reached through long *experience*. A boy does not realize the meaning of the principles of philosophy and natural science, but merely repeats by rote the formulæ used to express them." In the *Politics* (A, xi) Aristotle remarks that theorizing is free, while experience is necessitated, and goes on to speak of experience with live stock, etc. In another place in the *Politics* (E, ix) he says that the military commander of greatest experience in strategy is to be preferred, even though his habit of peculation be known; while for the chief of police, or for a treasurer, experience is of no account in comparison with integrity. But the cynosural passage is the first chapter of Book A of the *Metaphysics*; and here he remarks (as he likewise does in the *Ethics*), that experience is a knowledge (*gnosis*)¹ of singulars. Therein Aristotle's language differs from that of the Socrates of Plato, with whom *empeiria* is the skill that results from long dealings with any matter. Aristotle never intended to say that there is no other cognition of singulars than in experience; for that would directly contradict his doctrine that experience is a mass of memories relating to the same subject. His remark was, however, understood in the Middle Ages to be a *definition* of experience, and was repeated as such, a blunder that was not so unnatural as it would have been if the scholastic doctors had dealt with direct experience. The teachings of the *Aristotelic Index* having been exhausted, I turn to Harper's *Latin Lexicon*, which informs me that no writer of the Golden Age used *experientia* in the general sense, though that acception became common in the Silver Age, especially with Tacitus. The next work that I personally should consult would be my own notes collected during more than forty years. I always carry a pad of the size of a Post Card, of thick papers (50 in a pad, enough to last for two days,

¹ γνῶσις.

at least); and on these I note whatever elements of experience may reach me.* I keep these in drawers and boxes like the card catalogue of a library. I arrange and rearrange them from time to time. It is a treasure more valuable than a policy of insurance. I probably have near two hundred thousand such notes. But in order to bring what I have to say to a close, I will quote from the definition of experience given by the father of modern experiential philosophy, Dr. John Locke. In the *Essay concerning Humane*¹ *Understanding*, (II, i, 2) we read (and the italics are in the original): "Whence has [the mind] all the materials of reason and knowledge? To this I answer, in one word, from *experience*: in that all our knowledge is founded, and from that it ultimately derives itself. Our observation employed either about *external sensible objects*, or about the *internal operations of our minds*, perceived and reflected on by ourselves, is that which supplies our understanding with all the materials of thinking." This definition so formally stated, by such an authority, quite peerless for our present purpose, should be accepted as definite and as a landmark that it would be a crime to displace or disturb. For in order that philosophy should become a successful science, it must, like biology, have its own vocabulary; and as in biology, it must be the rule that whoever wishes to introduce a new concept is to invent a new word to express it. This is no suggestion of the moment.† I am, for my humble part, maturely convinced that philosophy will never be upon the road to sound results until we dismiss our affection for old words and our dislike of newfangled words, and make its vocabulary over after the fashion of taxonomic zoölogy and botany. I limit my recommendation to technical terms; for I can pretend to no competence to give advice about *belles-lettres*. Yet even there I perceive that people read old authors, and admire them for saying what they never meant to say; because the modern readers forget that two or three centuries ago words still familiar suggested quite different ideas from those the same words now suggest.

612. But somebody may object that Locke's definition is vague, being founded on a misconception of the nature of perception. Suppose, the objector will say, that a newborn

* See 4.597.

¹ *Humane* and *human* were one and the same word in Locke's day.

† See 413ff, and vol. 2, bk. II, ch. 1.

male infant were to be brought up among a colony of men on a desert island, without ever having seen a woman and barely having heard of such a creature. Suppose that, arrived at the age of twenty, he were to meet on the beach a Pacific Island woman who had swum over from another island. Would not the irresistible, the only possible cognition he could have of this creature be strongly colored by his own instincts? It would be the ineluctable result of "*observation employed concerning an external sensible object.*" The word "experience," however, is employed by Locke chiefly to enable him to say that human cognitions are inscribed by the individual's life-history upon a *tabula rasa*, and are not, like those of the lower animals, gifts of inborn instinct. His definition is vague for the reason that he never realized how important the innate element of our directest perceptions really is.

613. To such an objector I might say, My dear fellow, you must be joking; for under the guise of an objection you reinforce what I was saying with a new argument for restricting the use of the word "experience" to the expression of that vague idea which Locke so well defines. You make it plain that a distinct word is wanted, or rather two distinct words, to express the two more precise concepts which you suggest. The idea of the word "experience" was to refer to that which is forced upon a man's recognition, will-he nill-he, and shapes his thoughts to something quite different from what they naturally would have been. But the philosophers of experience, like many of other schools, forget to how great a degree it is true that the universe is all of a piece, and that we are all of us natural products, naturally partaking of the characteristics that are found everywhere through nature. It is in some measure nonsensical to talk of a man's nature as opposed to what perceptions force him to think. True, man continually finds himself resisted, both in his active desires and in that passive inertia of thought which causes any new phenomenon to give him a shock of surprise. You may think of an element of knowledge which thus resists his superficial tendencies; but to express precisely that idea you must have a new word: it will not answer the purpose to call it *experience*. You may also reflect that every man's environment is in some measure unfavorable to his development; and so far as this affects

his cognitive development, you have there an element that is opposed to the man's nature. But surely the word *experience* would be ill-chosen to express that.

614. But I am encroaching far too much upon the space of this number, and am taking too much advantage of our good editor's indulgence. I did wish to consider what element of his philosophy Comte had specially in mind in christening it *Positive*. He plainly meant that it should be unlike the metaphysical thought which kneads over and over what we know already, and would be like the sort of material which is furnished by a microscope or by an archæologist's spade. I hope Mr. Peterson's suggestion may bring a whole crop of fruit.

CHARLES SANTIAGO* SANDERS PEIRCE.

* The additional name Santiago, St. James in Spanish, was adopted by Peirce about this time, apparently in honor of his life-long friend, William James.

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VOLUME VI
SCIENTIFIC METAPHYSICS

Errata

- 6.63 (p. 44, line 2) *for baldly read baldly†; insert footnote † Cf. 6.606.*
6.381n† *add [is by Peirce and Baldwin]*
6.384n* (p. 269) *for 600 read 600–601*
6.390n* *for 281–282 read 373–374*
p. 283 *Move superscript “E” from chapter title, “The Order of Nature,” to section title, “The Significance of Order.”*
6.512n** (p. 350) *for vol. 8 read 7.162–255*
6.517n‡ *for to be reprinted in vol. 9 read 8.132ff*
6.536n* (p. 364) *for vol. 8 read 7.162–255*
6.606, line 6 *for world read word*
p. 448: *Index s.v. Autobiographical for 334n read 335n1*
p. 453: *Index s.v. Idealism, objective for 603 read 605*

INTRODUCTION

Peirce's punctuation and spelling have, wherever possible, been retained. Titles supplied by editors for papers previously published are marked with an *E*, while Peirce's titles for unpublished papers are marked with a *P*. Peirce's titles for previously published papers and the editors' titles for unpublished papers are not marked. Remarks and additions by the editors are enclosed in light-face square brackets. The editors' footnotes are indicated by various typographical signs, while Peirce's are indicated by numbers. Paragraphs are numbered consecutively throughout the volume. At the top of each page the numbers signify the volume and the first paragraph of that page. All references in the indices are to the numbers of the paragraphs.

The department and the editors desire to express their gratitude to Miss M. Hurst and to Mrs. Charles Hartshorne for their assistance with the proofs, references, and editorial footnotes.

HARVARD UNIVERSITY
APRIL, 1935.

EDITORIAL NOTE

With the present volume Peirce's philosophical system reaches its culmination in a "scientific" metaphysics, the study of "thirdness as thirdness" or "efficient reasonableness" (5.121).

Metaphysics, as the third of the philosophic disciplines, has, according to Peirce, three branches — ontology, religion, and cosmology (see 1.192). As he viewed it, it presupposes logic, the topic of volumes II–IV, which in turn rests on ethics, esthetics and phenomenology, discussed in volume I. Though his architectonic prescribes a separate treatment for ontology and cosmology, he never actually separated them. The first book of the present volume, built around five articles first published in 1892–93, embraces both subjects. Of primary interest are its discussions of absolute chance, or tychism, and objective continuity, or synechism (the latter being viewed as a synthesis of the former with pragmatism, the topic of volume V). It is this portion of Peirce's philosophy that most interested his philosophical contemporaries, and which is most pertinent to current cosmological speculations. It relates directly to that type of naturalism which takes scientific laws to be real and immanent — and thus subject to change, and incapable of precise determination. The second book of the volume, devoted to religion or "psychical metaphysics," has rather tenuous connections with the rest of the system, offering, apart from scattered flashes of insight, views which have a sociological or biographical, rather than a fundamental systematic interest.

For the general student the best approach to the present volume is through those passages in the previous volumes which are referred to in the preface, the most important being 1.487ff; after which the volume should be read in the order of presentation.

BRYN MAWR COLLEGE
UNIVERSITY OF CHICAGO
APRIL, 1935.

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PREFACE

§1. THE BACKWARD STATE OF METAPHYSICS*

1. Logic requires that the more abstract sciences should be developed earlier than the more concrete ones.† For the more concrete sciences require as fundamental principles the results of the more abstract sciences, while the latter only make use of the results of the former as data; and if one fact is wanting, some other will generally serve to support the same generalization.

2. But notwithstanding this, there is one highly abstract science which is in a deplorably backward condition. I mean Metaphysics. There is and can be no doubt that this immature condition of Metaphysics has very greatly hampered the progress of one of the two great branches of special science, I mean the Moral or Psychical Sciences. Most immediately has it checked the development of psychology; while the backward state of psychology has been a great disadvantage to all the other psychical sciences, such as linguistics, anthropology, social science, etc. To my mind it is equally clear that defective and bad metaphysics has been almost as injurious to the physical sciences, and is the real reason why all that depends upon the science of the constitution of matter, even physiology, is more or less rolling in the trough of the sea in rudderless fashion. The common opinion has been that Metaphysics is backward because it is intrinsically beyond the reach of human cognition. But that, I think I can clearly discern, is a complete mistake. Why should metaphysics be so difficult? Because it is abstract? But the abstracter a science is, the easier it is, both as a general rule of experience and as a corollary from logical principles. Mathematics, which is far more abstract than metaphysics, is certainly far more developed than any special science; and the same is true, though less tremendously so, of logic. But it will be said that metaphysics is inscrutable

* From "The Logic of Events", 1898, the last of a proposed set of eight lectures. See 212n. Cf. also ch. 7, which appears to be an alternative draft.

† See 1.244ff.

because its objects are not open to observation. This is doubtless true of some systems of metaphysics, though not to the extent that it is supposed to be true. The things that any science discovers are beyond the reach of direct observation. We cannot see energy, nor the attraction of gravitation, nor the flying molecules of gases, nor the luminiferous ether, nor the forests of the carbonaceous era, nor the explosions in nerve-cells. It is only the premisses of science, not its conclusions, which are directly observed. But metaphysics, even bad metaphysics, really rests on observations, whether consciously or not; and the only reason that this is not universally recognized is that it rests upon kinds of phenomena with which every man's experience is so saturated that he usually pays no particular attention to them. The data of metaphysics are not less open to observation, but immeasurably more so, than the data, say, of the very highly developed science of astronomy, to make any important addition to whose observations requires an expenditure of many tens of thousands of dollars. No, I think we must abandon the idea that metaphysics is backward owing to any intrinsic difficulty of it.

3.* In my opinion the chief cause of its backward condition is that its leading professors have been theologians. Were they simply Christian ministers the effect of intrusting very important scientific business to their hands would be quite as bad as if the same number of Wall Street promoters and Broad Street brokers were appointed to perform the task. The unfitness in the one case, as in the other, would consist in those persons having no idea of any broader interests than the personal interests of some person or collection of persons. Both classes are practical men. Now it is quite impossible for a practical man to comprehend what science is about unless he becomes as a little child and is born again. Scientific men are made out of youths who during the plastic period of life are set to study science for a number of years. Most of these develop into mere teachers; only a minority imbibe the spirit of science. The practical man has a definite job which he sets himself to accomplish. For that purpose he has to adopt some consistent plan which must be based upon a theory, and to that theory he must be wedded before the work begins. Even if his practical

* Cf. 216ff., 1.619ff.

problem is no more serious than playing a game of whist, when there are only three rounds of a hand to be played, he must go upon the supposition that the cards lie so that he can win the odd trick. If he is a judge presiding over the hearing of a cause, that cause must be decided somehow, no matter how defective the evidence may be; and consequently he is constrained to lay down a rule for the burden of proof. But the idea of science is to pile the ground before the foot of the outworks of truth with the carcasses of this generation, and perhaps of others to come after it, until some future generation, by treading on them, can storm the citadel. The difference comes to this, that the practical man stakes everything he cares for upon the hazard of a die, and must believe with all the force of his manhood that the object for which he strives is good and that the theory of his plan is correct; while the scientific man is above all things desirous of learning the truth and, in order to do so, ardently desires to have his present provisional beliefs (and all his beliefs are merely provisional) swept away, and will work hard to accomplish that object. This is the reason that a good practical man cannot do the best scientific work. The temperaments requisite for the two kinds of business are altogether contrary to one another. This is above all true of the practical teacher [who] has no calling for his work unless he thoroughly believes that he is already in possession of all-important truth, with which he seeks by every physiological means to imbue other minds, so that they shall be unable to give it up. But a scientific man, who has any such immovable beliefs to which he regards himself as religiously bound to be loyal, cannot at the same time desire to have his beliefs altered. In other words he cannot wish to learn the truth. Hence, I say that had the business of metaphysics been intrusted to ordinary parish priests it would have been performed unscientifically enough. But what has in fact been its fate has been far more tragic, in that it has been given over not to parish priests but to the caste of theologians. How much theologians may have contributed to the cause of Christianity, how far their writings and performances may have [been] the instruments of bringing home to men's hearts the truth of the Gospel of Love, or how far, on the other hand, they may have subserved the agencies that work to make Christians forget that

truth, it is not in my province to inquire. I once bought and read through Dr. Schaff's three volumes upon the *Creeeds of Christendom** for the purpose of ascertaining whether the theologians, who composed them, had ever once, from the first to the last, inserted a single clause in one of them by way of recognition of the principle of love; and I found that such a thing had never been done. But then we must remember that, that principle being fully admitted by all Christians, its insertion would not have served to damn anybody. Now the principal business of theologians is to make men feel the enormity of the slightest departure from the metaphysics they assume to be connected with the standard faith. Upon their religious side, however, I will not pretend to any opinion about the influence of theologians. But since theology pretends to be a science, they must also be judged as scientific men. And in that regard I must say that another so deplorably corrupt an influence as theirs upon the morals of science I do not believe has ever been operative. Theology, I am persuaded, derives its initial impulse from a religious wavering; for there is quite as much, or more, that is mysterious and calculated to awaken scientific curiosity in the intercourse of men with one another as in their intercourse with God, and it [is] a problem quite analogous to that of theology. Yet we do not find that theologians have cared much for those problems. They have taken human conversation as a matter of course, with rather a remarkable absence of all curiosity about it. But, as far as I can penetrate into the motive of theology, it begins in an effort of men who have joined the Christian army and sworn fidelity to it to silence the suggestions of their hearts that they renounce their allegiance. How far it is successful in that purpose I will not inquire. But nothing can be more unscientific than the attitude of minds who are trying to confirm themselves in early beliefs. The struggle of the scientific man is to try to see the errors of his beliefs — if he can be said to have any beliefs.† The logic which observational science uses is not, like the logic that the books teach, quite independent of the motive and spirit of the reasoner. There is an ethics indissolubly bound up with it — an ethics of fairness and impar-

* *The Creeeds of Christendom*, by Philip Schaff, 2d edition, 1878.

† See 5.589.

tiality — and a writer, who teaches, by his example, to find arguments for a conclusion which he wishes to believe, saps the very foundations of science by trifling with its morals. To sum up, the case is this:

4. We should expect to find metaphysics, judging from its position in the scheme of the sciences,* to be somewhat more difficult than logic, but still on the whole one of the simplest of sciences, as it is one whose main principles must be settled before very much progress can be gained either in psychics or in physics.

5. Historically we are astonished to find that it has been a mere arena of ceaseless and trivial disputation. But we also find that it has been pursued in a spirit the very contrary of that of wishing to learn the truth, which is the most essential requirement of the logic of science; and it is worth trying whether by proceeding modestly, recognizing in metaphysics an observational science, and applying to it the universal methods of such science, without caring one straw what kind of conclusions we reach or what their tendencies may be, but just honestly applying induction and hypothesis,† we cannot gain some ground for hoping that the disputes and obscurities of the subject may at last disappear.‡

§2. THE PROBLEMS OF METAPHYSICS§

6. *Metaphysics* is the proper designation for the third, and completing department of coenoscropy,¶ which in places welds itself into idioscopy,¶ or special science. Its business is to study the most general features of reality and real objects. But in its present condition it is, even more than the other branches of coenoscropy, a puny, rickety, and scrofulous science. It is only too plain that those who pretend to cultivate it carry not the hearts of true men of science within their breast. Instead of striving with might and main to find out what errors they have fallen into, and exulting joyously at every such dis-

* See 1.186.

† See vol. 2, bk. III, b for a detailed discussion of the nature of induction and hypothesis (or abduction).

‡ For the rest of this manuscript, see 214ff.

§ From an unidentified fragment, c. 1903.

¶ See 1.241n, 1.242n for definitions of these terms.

covery, they are scared to look Truth in the face. They turn tail and flee her. Only a small number out of the great catalogue of problems which it is their business to solve have they ever taken up at all, and those few most feebly. Here let us set down almost at random a small specimen of the questions of metaphysics which press, not for hasty answers, but for industrious and solid investigation: Whether or no there be any real indefiniteness, or real possibility and impossibility?* Whether or not there is any definite indeterminacy?† Whether there be any strictly individual existence?‡ Whether there is any distinction, other than one of more and less, between fact and fancy? Or between the external and the internal worlds?§ What general explanation or account can be given of the different qualities of feeling and their apparent connection with determinations of mass, space, and time?¶ Do all possible qualities of sensation, including, of course, a much vaster variety of which we have no experience than of those which we know, form one continuous system, as colors seem to do?|| What external reality do the qualities of sense represent, in general?° Is Time a real thing, and if not, what is the nature of the reality that it represents?** How about Space, in these regards?†† How far, and in what respects, is Time external or has immediate contents that are external?‡‡ Are Time and Space continuous?§§ What numerically are the Chorsy, Cyclosy, Periphrazy, and Apeiry of Space?¶¶ Has Time, or has Space, any limit or node?||| Is hylozoism an opinion, actual or conceivable, rather than a senseless vocable; and if so, what is, or would be, that opinion?°° What is consciousness or mind

* See 185f, 364ff, 3.527, 4.65ff, 4.172, 4.514, 5.447f, 5.453ff.

† See 185ff, 4.61, 5.447f.

‡ See 1.433f, 3.93, 3.216, 4.172, 5.299ff, 5.429, 5.448n.

§ See 1.321, 3.527f, 5.45, 5.474, 5.487, 5.493, 5.539.

¶ See 132f, 1.305f, 1.412f, 1.549.

|| See 132f, 197, 211, 1.311.

° See 1.422.

** See 87, 96, 127f, 506, 1.489ff.

†† See 82f, 1.501ff, 3.134n.

‡‡ See 1.492f, 1.495f.

§§ See 82, 86, 127ff, 133ff, 1.170, 1.499, 5.530.

¶¶ See 211, 4.222ff.

||| See 28, 82, 210, 419f, 1.274ff, 4.223.

°° See 24f, 264ff.

like; meaning, is it a single continuum like Time and Space, which is for different purposes variously broken up by that which it contains; or is it composed of solid atoms, or is it more like a fluid?* Has truth, in Kantian phrase, any "material" characteristics in general, by which it can, with any degree of probability, be recognized?† Is there, for example, any general tendency in the course of events, any progress in one direction on the whole?‡

* See 268f.

† See 350f, 5.142, 5.549ff.

‡ See 27, 91, 189f, 311f, 582.

BOOK I

ONTOLOGY AND COSMOLOGY

SCIENTIFIC METAPHYSICS

A. Tychism

CHAPTER 1

*THE ARCHITECTURE OF THEORIES**

§1. PHILOSOPHIC ARCHITECTONIC^E

7. Of the fifty or hundred systems of philosophy that have been advanced at different times of the world's history, perhaps the larger number have been, not so much results of historical evolution, as happy thoughts which have accidentally occurred to their authors. An idea which has been found interesting and fruitful has been adopted, developed, and forced to yield explanations of all sorts of phenomena. The English have been particularly given to this way of philosophizing; witness, Hobbes, Hartley, Berkeley, James Mill. Nor has it been by any means useless labor; it shows us what the true nature and value of the ideas developed are, and in that way affords serviceable materials for philosophy. Just as if a man, being seized with the conviction that paper was a good material to make things of, were to go to work to build a *papier mâché* house, with roof of roofing paper, foundations of pasteboard, windows of paraffined paper, chimneys, bath tubs, locks, etc., all of different forms of paper, his experiment would probably afford valuable lessons to builders, while it would certainly make a detestable house, so those one-idea'd philosophies are exceedingly interesting and instructive, and yet are quite unsound.

8. The remaining systems of philosophy have been of the nature of reforms, sometimes amounting to radical revolutions, suggested by certain difficulties which have been found to beset systems previously in vogue; and such ought certainly to be in large part the motive of any new theory. This is like partially

* *The Monist*, vol. 1, pp. 161-176 (1891); the first of a series of five articles. The second appears as ch. 2, the third as ch. 5, the fourth as ch. 9, and the fifth as ch. 11 of this book.

rebuilding a house. The faults that have been committed are, first, that the repairs of the dilapidations have generally not been sufficiently thorough-going, and, second, that not sufficient pains have been taken to bring the additions into deep harmony with the really sound parts of the old structure.

When a man is about to build a house, what a power of thinking he has to do before he can safely break ground! With what pains he has to excogitate the precise wants that are to be supplied! What a study to ascertain the most available and suitable materials, to determine the mode of construction to which those materials are best adapted, and to answer a hundred such questions! Now without riding the metaphor too far, I think we may safely say that the studies preliminary to the construction of a great theory should be at least as deliberate and thorough as those that are preliminary to the building of a dwelling house.

9. That systems ought to be constructed architectonically has been preached since Kant, but I do not think the full import of the maxim has by any means been apprehended. What I would recommend is that every person who wishes to form an opinion concerning fundamental problems should first of all make a complete survey of human knowledge, should take note of all the valuable ideas in each branch of science, should observe in just what respect each has been successful and where it has failed, in order that, in the light of the thorough acquaintance so attained of the available materials for a philosophical theory and of the nature and strength of each, he may proceed to the study of what the problem of philosophy consists in, and of the proper way of solving it. I must not be understood as endeavoring to state fully all that these preparatory studies should embrace; on the contrary, I purposely slur over many points, in order to give emphasis to one special recommendation, namely, to make a systematic study of the conceptions out of which a philosophical theory may be built, in order to ascertain what place each conception may fitly occupy in such a theory, and to what uses it is adapted.

The adequate treatment of this single point would fill a volume, but I shall endeavor to illustrate my meaning by glancing at several sciences and indicating conceptions in them

serviceable for philosophy. As to the results to which long studies thus commenced have led me, I shall just give a hint at their nature.

10. We may begin with dynamics — field in our day of perhaps the grandest conquest human science has ever made — I mean the law of the conservation of energy. But let us revert to the first step taken by modern scientific thought — and a great stride it was — the inauguration of dynamics by Galileo. A modern physicist on examining Galileo's works is surprised to find how little experiment had to do with the establishment of the foundations of mechanics. His principal appeal is to common sense and *il lume naturale*. He always assumes that the true theory will be found to be a simple and natural one. And we can see why it should indeed be so in dynamics. For instance, a body left to its own inertia moves in a straight line, and a straight line appears to us the simplest of curves. In *itself*, no curve is simpler than another. A system of straight lines has intersections precisely corresponding to those of a system of like parabolas similarly placed, or to those of any one of an infinity of systems of curves. But the straight line appears to us simple, because, as Euclid says, it lies evenly between its extremities; that is, because viewed endwise it appears as a point. That is, again, because light moves in straight lines. Now, light moves in straight lines because of the part which the straight line plays in the laws of dynamics. Thus it is that, our minds having been formed under the influence of phenomena governed by the laws of mechanics, certain conceptions entering into those laws become implanted in our minds, so that we readily guess at what the laws are.* Without such a natural prompting, having to search blindfold for a law which would suit the phenomena, our chance of finding it would be as one to infinity. The further physical studies depart from phenomena which have directly influenced the growth of the mind, the less we can expect to find the laws which govern them "simple," that is, composed of a few conceptions natural to our minds.

11. The researches of Galileo, followed up by Huygens and others, led to those modern conceptions of *Force* and *Law*, which have revolutionized the intellectual world. The great

* Cf. 1.118, 5.47, 5.586, 5.591, 5.603.

attention given to mechanics in the seventeenth century soon so emphasized these conceptions as to give rise to the Mechanical Philosophy, or doctrine that all the phenomena of the physical universe are to be explained upon mechanical principles. Newton's great discovery imparted a new impetus to this tendency. The old notion that heat consists in an agitation of corpuscles was now applied to the explanation of the chief properties of gases. The first suggestion in this direction was that the pressure of gases is explained by the battering of the particles against the walls of the containing vessel, which explained Boyle's law of the compressibility of air. Later, the expansion of gases, Avogadro's chemical law, the diffusion and viscosity of gases, and the action of Crookes's radiometer were shown to be consequences of the same kinetical theory; but other phenomena, such as the ratio of the specific heat at constant volume to that at constant pressure, require additional hypotheses, which we have little reason to suppose are simple, so that we find ourselves quite afloat. In like manner with regard to light. That it consists of vibrations was almost proved by the phenomena of diffraction, while those of polarization showed the excursions of the particles to be perpendicular to the line of propagation; but the phenomena of dispersion, etc., require additional hypotheses which may be very complicated. Thus, the further progress of molecular speculation appears quite uncertain. If hypotheses are to be tried haphazard, or simply because they will suit certain phenomena, it will occupy the mathematical physicists of the world say half a century on the average to bring each theory to the test, and since the number of possible theories may go up into the trillions, only one of which can be true, we have little prospect of making further solid additions to the subject in our time. When we come to atoms, the presumption in favor of a simple law seems very slender. There is room for serious doubt whether the fundamental laws of mechanics hold good for single atoms, and it seems quite likely that they are capable of motion in more than three dimensions.*

12. To find out much more about molecules and atoms we must search out a natural history of laws of nature which may fulfill that function which the presumption in favor of simple

* Cf. 575.

laws fulfilled in the early days of dynamics, by showing us what kind of laws we have to expect and by answering such questions as this: Can we, with reasonable prospect of not wasting time, try the supposition that atoms attract one another inversely as the seventh power of their distances, or can we not? To suppose universal laws of nature capable of being apprehended by the mind and yet having no reason for their special forms, but standing inexplicable and irrational, is hardly a justifiable position. Uniformities are precisely the sort of facts that need to be accounted for. That a pitched coin should sometimes turn up heads and sometimes tails calls for no particular explanation; but if it shows heads every time, we wish to know how this result has been brought about. Law is *par excellence* the thing that wants a reason.

§2. THREE THEORIES OF EVOLUTION ^{*E}

13. Now the only possible way of accounting for the laws of nature and for uniformity in general is to suppose them results of evolution. This supposes them not to be absolute, not to be obeyed precisely. It makes an element of indeterminacy, spontaneity, or absolute chance in nature.† Just as, when we attempt to verify any physical law, we find our observations cannot be precisely satisfied by it, and rightly attribute the discrepancy to errors of observation, so we must suppose far more minute discrepancies to exist owing to the imperfect cogency of the law itself, to a certain swerving of the facts from any definite formula.

14. Mr. Herbert Spencer‡ wishes to explain evolution upon mechanical principles. This is illogical, for four reasons. First, because the principle of evolution requires no extraneous cause, since the tendency to growth can be supposed itself to have grown from an infinitesimal germ accidentally started. Second, because law ought more than anything else to be supposed a result of evolution. Third, because exact law obviously never can produce heterogeneity out of homogeneity; and arbitrary heterogeneity is the feature of the universe the most manifest and characteristic. Fourth, because the law of the conserva-

* Cf. 296ff, 1.103f, 1.173f.

† See 553f, for Peirce's earliest statement of this view.

‡ See his *First Principles*, part 2, ch. 18.

tion of energy is equivalent to the proposition that all operations governed by mechanical laws are reversible; so that an immediate corollary from it is that growth is not explicable by those laws, even if they be not violated in the process of growth. In short, Spencer is not a philosophical evolutionist, but only a half-evolutionist — or, if you will, only a semi-Spencerian. Now philosophy requires thorough-going evolutionism or none.

15. The theory of Darwin was that evolution had been brought about by the action of two factors: first, heredity, as a principle making offspring nearly resemble their parents, while yet giving room for “sporting” or accidental variations — for very slight variations often, for wider ones rarely; and, second, the destruction of breeds or races that are unable to keep the birth rate up to the death rate. This Darwinian principle is plainly capable of great generalization. Wherever there are large numbers of objects having a tendency to retain certain characters unaltered, this tendency, however, not being absolute but giving room for chance variations, then, if the amount of variation is absolutely limited in certain directions by the destruction of everything which reaches those limits, there will be a gradual tendency to change in directions of departure from them. Thus, if a million players sit down to bet at an even game, since one after another will get ruined, the average wealth of those who remain will perpetually increase. Here is indubitably a genuine formula of possible evolution, whether its operation accounts for much or little in the development of animal and vegetable species.

16. The Lamarckian theory* also supposes that the development of species has taken place by a long series of insensible changes, but it supposes that those changes have taken place during the lives of the individuals, in consequence of effort and exercise, and that reproduction plays no part in the process except in preserving these modifications. Thus, the Lamarckian theory only explains the development of characters for which individuals strive, while the Darwinian theory only explains the production of characters really beneficial to the race, though these may be fatal to individuals.¹ But more

* See Lamarck, *Philosophie Zoologique*, vol. 1, ch. VII, Paris (1873).

¹ The neo-Darwinian, Weismann, has shown that mortality would almost necessarily result from the action of the Darwinian principle. [See his *Essays upon Heredity*, I, “The Duration of Life” (1889).]

broadly and philosophically conceived, Darwinian evolution is evolution by the operation of chance, and the destruction of bad results, while Lamarckian evolution is evolution by the effect of habit and effort.

17. A third theory of evolution is that of Mr. Clarence King.* The testimony of monuments and of rocks is that species are unmodified or scarcely modified, under ordinary circumstances, but are rapidly altered after cataclysms or rapid geological changes. Under novel circumstances, we often see animals and plants sporting excessively in reproduction, and sometimes even undergoing transformations during individual life, phenomena no doubt due partly to the enfeeblement of vitality from the breaking up of habitual modes of life, partly to changed food, partly to direct specific influence of the element in which the organism is immersed. If evolution has been brought about in this way, not only have its single steps not been insensible, as both Darwinians and Lamarckians suppose, but they are furthermore neither haphazard on the one hand, nor yet determined by an inward striving on the other, but on the contrary are effects of the changed environment, and have a positive general tendency to adapt the organism to that environment, since variation will particularly affect organs at once enfeebled and stimulated. This mode of evolution, by external forces and the breaking up of habits, seems to be called for by some of the broadest and most important facts of biology and paleontology; while it certainly has been the chief factor in the historical evolution of institutions as in that of ideas; and cannot possibly be refused a very prominent place in the process of evolution of the universe in general.

§3. THE LAW OF HABIT^E

18. Passing to psychology, we find the elementary phenomena of mind fall into three categories.† First, we have Feelings, comprising all that is immediately present, such as pain, blue, cheerfulness, the feeling that arises when we contemplate a consistent theory, etc. A feeling is a state of mind having its own living quality, independent of any other state

* See his *Catastrophism and the Evolution of Environment*, 1877.

† These categories are discussed in detail in vol. 1, bk. III.

of mind. Or, a feeling is an element of consciousness which might conceivably override every other state until it monopolized the mind, although such a rudimentary state cannot actually be realized, and would not properly be consciousness. Still it is conceivable, or supposable, that the quality of blue should usurp the whole mind, to the exclusion of the ideas of shape, extension, contrast, commencement and cessation, and all other ideas whatsoever. A feeling is necessarily perfectly simple, *in itself*, for if it had parts these would also be in the mind, whenever the whole was present, and thus the whole could not monopolize the mind.¹

19. Besides Feelings, we have Sensations of reaction; as when a person blindfold suddenly runs against a post, when we make a muscular effort, or when any feeling gives way to a new feeling. Suppose I had nothing in my mind but a feeling of blue, which were suddenly to give place to a feeling of red; then, at the instant of transition, there would be a shock, a sense of reaction, my blue life being transmuted into red life. If I were further endowed with a memory, that sense would continue for some time, and there would also be a peculiar feeling or sentiment connected with it. This last feeling might endure (conceivably I mean) after the memory of the occurrence and the feelings of blue and red had passed away. But the *sensation* of reaction cannot exist except in the actual presence of the two feelings blue and red to which it relates. Whenever we have two feelings and pay attention to a relation between them of whatever kind, there is the sensation of which I am speaking. But the sense of action and reaction has two types: it may either be a perception of relation between two ideas, or it may be a sense of action and reaction between feeling and something out of feeling. And this sense of external reaction again has two forms; for it is either a sense of something happening to us, by no act of ours, we being passive in the matter, or it is a sense of resistance, that is, of our expending feeling upon something without. The sense of reaction is thus a sense of connection or comparison between feelings, either, *A*, between one feeling and another, or *B* between feeling and its absence or lower degree; and under *B* we have, first,

¹ A feeling may certainly be compound, but only in virtue of a perception which is not that feeling nor any feeling at all.

the sense of the access of feeling, and second, the sense of remission of feeling.

20. Very different both from feelings and from reaction-sensations or disturbances of feeling are general conceptions. When we think, we are conscious that a connection between feelings is determined by a general rule, we are aware of being governed by a habit. Intellectual power is nothing but facility in taking habits and in following them in cases essentially analogous to, but in non-essentials widely remote from, the normal cases of connections of feelings under which those habits were formed.

21. The one primary and fundamental law of mental action consists in a tendency to generalization. Feeling tends to spread; connections between feelings awaken feelings; neighboring feelings become assimilated; ideas are apt to reproduce themselves. These are so many formulations of the one law of the growth of mind. When a disturbance of feeling takes place, we have a consciousness of gain, the gain of experience; and a new disturbance will be apt to assimilate itself to the one that preceded it. Feelings, by being excited, become more easily excited, especially in the ways in which they have previously been excited. The consciousness of such a habit constitutes a general conception.

22. The cloudiness of psychological notions may be corrected by connecting them with physiological conceptions.* Feeling may be supposed to exist wherever a nerve-cell is in an excited condition. The disturbance of feeling, or sense of reaction, accompanies the transmission of disturbance between nerve-cells, or from a nerve-cell to a muscle-cell, or the external stimulation of a nerve-cell. General conceptions arise upon the formation of habits in the nerve-matter, which are molecular changes consequent upon its activity and probably connected with its nutrition.

23. The law of habit exhibits a striking contrast to all physical laws in the character of its commands. A physical law is absolute. What it requires is an exact relation. Thus, a physical force introduces into a motion a component motion to be combined with the rest by the parallelogram of forces; but the component motion must actually take place exactly as

* Cf. 246ff, 280, 1.385ff.

required by the law of force. On the other hand, no exact conformity is required by the mental law. Nay, exact conformity would be in downright conflict with the law; since it would instantly crystallize thought and prevent all further formation of habit. The law of mind only makes a given feeling *more likely* to arise. It thus resembles the "non-conservative" forces of physics, such as viscosity and the like, which are due to statistical uniformities in the chance encounters of trillions of molecules.

§4. OBJECTIVE IDEALISM*^E

24. The old dualistic notion of mind and matter, so prominent in Cartesianism, as two radically different kinds of substance, will hardly find defenders today. Rejecting this, we are driven to some form of hylopathy, otherwise called monism. Then the question arises whether physical laws on the one hand and the psychical law on the other are to be taken —

(a) as independent, a doctrine often called *monism*, but which I would name *neutralism*; or,

(b) the psychical law as derived and special, the physical law alone as primordial, which is *materialism*; or,

(c) the physical law as derived and special, the psychical law alone as primordial, which is *idealism*.

The materialistic doctrine seems to me quite as repugnant to scientific logic as to common sense; since it requires us to suppose that a certain kind of mechanism will feel, which would be a hypothesis absolutely irreducible to reason — an ultimate, inexplicable regularity; while the only possible justification of any theory is that it should make things clear and reasonable.

Neutralism is sufficiently condemned by the logical maxim known as Ockham's razor, i.e., that not more independent elements are to be supposed than necessary. By placing the inward and outward aspects of substance on a par, it seems to render both primordial.

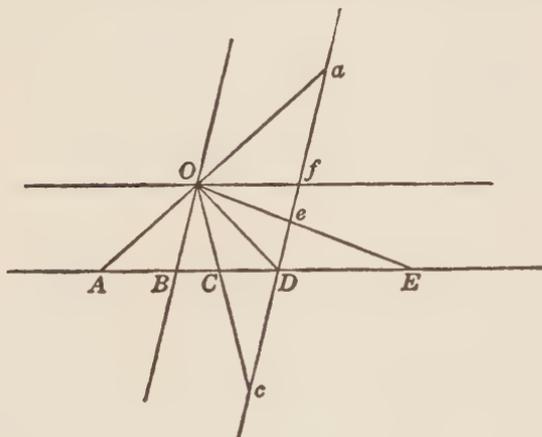
25. The one intelligible theory of the universe is that of objective idealism, that matter is effete mind, inveterate habits becoming physical laws. But before this can be

* C. 264ff, 4.551.

accepted it must show itself capable of explaining the tri-dimensionality of space, the laws of motion, and the general characteristics of the universe, with mathematical clearness and precision; for no less should be demanded of every philosophy.

§5. THE NATURE OF SPACE*^E

26. Modern mathematics is replete with ideas which may be applied to philosophy. I can only notice one or two. The manner in which mathematicians generalize is very instructive. Thus, painters are accustomed to think of a picture as consisting geometrically of the intersections of its plane by rays of light from the natural objects to the eye. But geometers use a generalized perspective. For instance, in the figure



let O be the eye, let $A B C D E$ be the edgewise view of any plane, and let $a f e D c$ be the edgewise view of another plane. The geometers draw rays through O cutting both these planes, and treat the points of intersection of each ray with one plane as representing the point of intersection of the same ray with the other plane. Thus, e represents E , in the painter's way. D represents itself. C is represented by c , which is farther from the eye; and A is represented by a which is on the other side of the eye. Such generalization is not bound down to sensuous images. Further, according to this mode of rep-

* Cf. 82f.

resentation every point on one plane represents a point on the other, and every point on the latter is represented by a point on the former. But how about the point f which is in a direction from O parallel to the represented plane, and how about the point B which is in a direction parallel to the representing plane? Some will say that these are exceptions; but modern mathematics does not allow exceptions which can be annulled by generalization. As a point moves from C to D and thence to E and off toward infinity, the corresponding point on the other plane moves from c to D and thence to e and toward f . But this second point can pass through f to a ; and when it is there the first point has arrived at A . We therefore say that the first point has passed *through infinity*, and that every line joins in to itself somewhat like an oval. Geometers talk of the parts of lines at an infinite distance as points. This is a kind of generalization very efficient in mathematics.

27. Modern views of measurement have a philosophical aspect.* There is an indefinite number of systems of measuring along a line; thus, a perspective representation of a scale on one line may be taken to measure another, although, of course, such measurements will not agree with what we call the distances of points on the latter line. To establish a system of measurement on a line we must assign a distinct number to each point of it, and for this purpose we shall plainly have to suppose the numbers carried out into an infinite number of places of decimals. These numbers must be ranged along the line in unbroken sequence. Further, in order that such a scale of numbers should be of any use, it must be capable of being shifted into new positions, each number continuing to be attached to a single distinct point. Now it is found that if this is true for "imaginary" as well as for real points (an expression which I cannot stop to elucidate),† any such shifting will necessarily leave two numbers attached to the same points as before. So that when the scale is moved over the line by any continuous series of shiftings of one kind, there are two points which no numbers on the scale can ever reach, except the numbers fixed there. This pair of points, thus unattainable in measurement, is called the Absolute. These

* Cf. 1.275f, 4.142ff.

† See 4.145ff.

two points may be distinct and real, or they may coincide, or they may be both imaginary. As an example of a linear quantity with a double absolute we may take probability, which ranges from an unattainable absolute certainty *against* a proposition to an equally unattainable absolute certainty *for* it. A line, according to ordinary notions, we have seen is a linear quantity where the two points at infinity coincide. A velocity is another example. A train going with infinite velocity from Chicago to New York would be at all the points on the line at the very same instant, and if the time of transit were reduced to less than nothing it would be moving in the other direction. An angle is a familiar example of a mode of magnitude with no real immeasurable values. One of the questions philosophy has to consider is whether the development of the universe is like the increase of an angle, so that it proceeds forever without tending toward anything unattained, which I take to be the Epicurean view, or whether the universe sprang from a chaos in the infinitely distant past to tend toward something different in the infinitely distant future, or whether the universe sprang from nothing in the past to go on indefinitely toward a point in the infinitely distant future, which, were it attained, would be the mere nothing from which it set out.*

28.† The doctrine of the absolute applied to space comes to this, that either —

First, space is, as Euclid teaches, both *unlimited* and *immeasurable*, so that the infinitely distant parts of any plane seen in perspective appear as a straight line, in which case the sum of the three angles of a triangle amounts to 180° ; or,

Second, space is *immeasurable* but *limited*, so that the infinitely distant parts of any plane seen in perspective appear as a circle, beyond which all is blackness, and in this case the sum of the three angles of a triangle is less than 180° by an amount proportional to the area of the triangle; or,

Third, space is *unlimited* but *finite* (like the surface of a sphere), so that it has no infinitely distant parts; but a finite journey along any straight line would bring one back to his original position, and looking off with an unobstructed view

* See 189f, 582, 1.362.

† Cf. 4.143.

one would see the back of his own head enormously magnified, in which case the sum of the three angles of a triangle exceeds 180° by an amount proportional to the area.

29. Which of these three hypotheses is true we know not.* The largest triangles we can measure are such as have the earth's orbit for base, and the distance of a fixed star for altitude. The angular magnitude resulting from subtracting the sum of the two angles at the base of such a triangle from 180° is called the star's *parallax*. The parallaxes of only about forty stars have been measured as yet. Two of them come out negative, that of Arided (α Cygni), a star of magnitude $1\frac{1}{2}$, which is $-0.''082$, according to C. H. F. Peters, and that of a star of magnitude $7\frac{3}{4}$, known as Piazzini III 422,† which is $-0.''045$, according to R. S. Ball. But these negative parallaxes are undoubtedly to be attributed to errors of observation;‡ for the probable error of such a determination is about $\pm 0.''075$, and it would be strange indeed if we were to be able to see, as it were, more than half way round space, without being able to see stars with larger negative parallaxes. Indeed, the very fact that of all the parallaxes measured only two come out negative would be a strong argument that the smallest parallaxes really amount to $+0.''1$, were it not for the reflection that the publication of other negative parallaxes may have been suppressed. I think we may feel confident that the parallax of the farthest star lies somewhere between $-0.''05$ and $+0.''15$, and within another century our grandchildren will surely know whether the three angles of a triangle are greater or less than 180° — that they are *exactly* that amount is what nobody ever can be justified in concluding. It is true that according to the axioms of geometry the sum of the three sides of a triangle are precisely 180° ; but these axioms are now exploded, and geometers confess that they, as geometers, know not the slightest reason for supposing them to be precisely true.§ They are expressions of our inborn conception of space, and as such are entitled to credit, so far as their

* But see 82f.

† 242?

‡ According to the Yale Observatory, the above figures "are affected by errors nearly one hundred times as great as good modern determinations."

§ Cf. 1.130ff, 1.401f.

truth could have influenced the formation of the mind. But that affords not the slightest reason for supposing them exact.

30. Now, metaphysics has always been the ape of mathematics. Geometry suggested the idea of a demonstrative system of absolutely certain philosophical principles; and the ideas of the metaphysicians have at all times been in large part drawn from mathematics. The metaphysical axioms are imitations of the geometrical axioms; and now that the latter have been thrown overboard, without doubt the former will be sent after them. It is evident, for instance, that we can have no reason to think that every phenomenon in all its minutest details is precisely determined by law. That there is an arbitrary element in the universe we see — namely, its variety. This variety must be attributed to spontaneity in some form.

31. Had I more space, I now ought to show how important for philosophy is the mathematical conception of continuity. Most of what is true in Hegel is a darkling glimmer of a conception which the mathematicians had long before made pretty clear, and which recent researches have still further illustrated.

§6. FIRST, SECOND, AND THIRD*^E

32. Among the many principles of Logic which find their application in Philosophy, I can here only mention one. Three conceptions are perpetually turning up at every point in every theory of logic, and in the most rounded systems they occur in connection with one another. They are conceptions so very broad and consequently indefinite that they are hard to seize and may be easily overlooked. I call them the conceptions of First, Second, Third. First is the conception of being or existing independent of anything else. Second is the conception of being relative to, the conception of reaction with, something else. Third is the conception of mediation, whereby a first and second are brought into relation. To illustrate these ideas, I will show how they enter into those we have been considering. The origin of things, considered not as leading to anything, but in itself, contains the idea of First,

*Cf. vol. I, bk. 3.

the end of things that of Second, the process mediating between them that of Third.* A philosophy which emphasizes the idea of the One is generally a dualistic philosophy in which the conception of Second receives exaggerated attention; for this One (though of course involving the idea of First) is always the other of a manifold which is not one. The idea of the Many, because variety is arbitrariness and arbitrariness is repudiation of any Secondness, has for its principal component the conception of First. In psychology Feeling is First, Sense of reaction Second, General conception Third, or mediation.† In biology, the idea of arbitrary sporting is First, heredity is Second, the process whereby the accidental characters become fixed is Third.‡ Chance is First, Law is Second, the tendency to take habits is Third.§ Mind is First, Matter is Second, Evolution is Third.

33. Such are the materials out of which chiefly a philosophical theory ought to be built, in order to represent the state of knowledge to which the nineteenth century has brought us. Without going into other important questions of philosophical architectonic, we can readily foresee what sort of a metaphysics would appropriately be constructed from those conceptions. Like some of the most ancient and some of the most recent speculations it would be a Cosmogonic Philosophy. It would suppose that in the beginning— infinitely remote — there was a chaos of unpersonalized feeling, which being without connection or regularity would properly be without existence. This feeling, sporting here and there in pure arbitrariness, would have started the germ of a generalizing tendency. Its other sportings would be evanescent, but this would have a growing virtue. Thus, the tendency to habit would be started; and from this, with the other principles of evolution, all the regularities of the universe would be evolved. At any time, however, an element of pure chance survives and will remain until the world becomes an absolutely perfect, rational, and symmetrical system, in which mind is at last crystallized in the infinitely distant future.

* Cf. 214ff.

† Cf. 1.374ff.

‡ Cf. 1.395ff.

§ Cf. 1.409.

34. That idea has been worked out by me with elaboration.* It accounts for the main features of the universe as we know it — the characters of time, space, matter, force, gravitation, electricity, etc. It predicts many more things which new observations can alone bring to the test. May some future student go over this ground again, and have the leisure to give his results to the world.

* See chs. 7 and 8.

CHAPTER 2

THE DOCTRINE OF NECESSITY EXAMINED*

§1. THE MECHANICAL PHILOSOPHY^B

35. In *The Monist* for January, 1891,† I endeavored to show what elementary ideas ought to enter into our view of the universe. I may mention that on those considerations I had already grounded a cosmical theory, and from it had deduced a considerable number of consequences capable of being compared with experience. This comparison is now in progress, but under existing circumstances must occupy many years.

36. I propose here to examine the common belief that every single fact in the universe is precisely determined by law. It must not be supposed that this is a doctrine accepted everywhere and at all times by all rational men. Its first advocate appears to have been Democritus, the atomist, who was led to it, as we are informed, by reflecting upon the “impene- trability, translation, and impact of matter (ἀντιτυπία καὶ φορά καὶ πληγὴ τῆς ὕλης).”‡ That is to say, having restricted his attention to a field where no influence other than mechanical constraint could possibly come before his notice, he straightway jumped to the conclusion that throughout the universe that was the sole principle of action — a style of reasoning so usual in our day with men not unreflecting as to be more than excusable in the infancy of thought. But Epicurus, in revising the atomic doctrine and repairing its defenses, found himself obliged to suppose that atoms swerve from their courses by spontaneous chance; and thereby he conferred upon the theory life and entelechy.§ For we now see clearly that the peculiar function of the molecular hypothesis

* *The Monist*, vol. 2, pp. 321-337 (1892); the second paper of a series of five. See note to ch. 1.

† Ch. 1.

‡ See H. Diels, *Die Fragmente der Vorsokratiker*, c. 55, A66.

§ See Aetius, *Placita*, I, 12, 15.

in physics is to open an entry for the calculus of probabilities. Already, the prince of philosophers had repeatedly and emphatically condemned the dictum of Democritus (especially in the *Physics*, Book II, chapters 4, 5, 6), holding that events come to pass in three ways, namely, (1) by external compulsion, or the action of efficient causes, (2) by virtue of an inward nature, or the influence of final causes, and (3) irregularly without definite cause, but just by absolute chance; and this doctrine is of the inmost essence of Aristotelianism. It affords, at any rate, a valuable enumeration of the possible ways in which anything can be supposed to have come about. The freedom of the will, too, was admitted both by Aristotle* and by Epicurus.† But the Stoa,‡ which in every department seized upon the most tangible, hard, and lifeless element, and blindly denied the existence of every other, which, for example, impugned the validity of the inductive method and wished to fill its place with the *reductio ad absurdum*, very naturally became the one school of ancient philosophy to stand by a strict necessitarianism, thus returning to a single principle of Democritus that Epicurus had been unable to swallow. Necessitarianism and materialism with the Stoics went hand in hand, as by affinity they should. At the revival of learning, Stoicism met with considerable favor, partly because it departed just enough from Aristotle to give it the spice of novelty, and partly because its superficialities well adapted it for acceptance by students of literature and art who wanted their philosophy drawn mild. Afterwards, the great discoveries in mechanics inspired the hope that mechanical principles might suffice to explain the universe; and, though without logical justification, this hope has since been continually stimulated by subsequent advances in physics. Nevertheless, the doctrine was in too evident conflict with the freedom of the will and with miracles to be generally acceptable, at first. But meantime there arose that most widely spread of philosophical blunders, the notion that associationalism belongs intrinsically to the materialistic family of doctrines; and thus

* See Aristotle, *De Interpretatione*, 18b, 31: 19a, 7. *Ethica Nicomachea*, 1112a, 7-10.

† Epicurus, *Epistle*, III, 133-134.

‡ See Cleanthes, in Epictetus, *Manual*, ch. 53; Seneca, *De Providentia*, V, 8.

was evolved the theory of motives; and libertarianism became weakened. At present, historical criticism has almost exploded the miracles, great and small; so that the doctrine of necessity has never been in so great vogue as now.

37. The proposition in question is that the state of things existing at any time, together with certain immutable laws, completely determine the state of things at every other time (for a limitation to *future* time is indefensible). Thus, given the state of the universe in the original nebula, and given the laws of mechanics, a sufficiently powerful mind could deduce from these data the precise form of every curlicue of every letter I am now writing.

38. Whoever holds that every act of the will as well as every idea of the mind is under the rigid governance of a necessity* coördinated with that of the physical world will logically be carried to the proposition that minds are part of the physical world in such a sense that the laws of mechanics determine anything that happens according to immutable attractions and repulsions. In that case, that instantaneous state of things, from which every other state of things is calculable, consists in the positions and velocities of all the particles at any instant. This, the usual and most logical form of necessitarianism, is called the mechanical philosophy.

§2. NECESSITY CONSIDERED AS A POSTULATE^E

39. When I have asked thinking men what reason they had to believe that every fact in the universe is precisely determined by law, the first answer has usually been that the proposition is a "presupposition" or postulate of scientific reasoning. Well, if that is the best that can be said for it, the belief is doomed. Suppose it be "postulated": that does not make it true, nor so much as afford the slightest rational motive for yielding it any credence. It is as if a man should come to borrow money and, when asked for his security, should reply he "postulated" the loan. To "postulate" a proposition is no more than to hope it is true. There are, indeed, practical emergencies in which we act upon assump-

* Peirce gives a list of various uses of the term "necessity" in the *Century Dictionary* (1889) and in Baldwin's *Dictionary of Philosophy and Psychology*, vol. 2 (1901).

tions of certain propositions as true, because if they are not so, it can make no difference how we act. But all such propositions I take to be hypotheses of individual facts. For it is manifest that no universal principle can in its universality be comprised* in a special case or can be requisite for the validity of any ordinary inference. To say, for instance, that the demonstration by Archimedes of the property of the lever would fall to the ground if men were endowed with free will is extravagant; yet this is implied by those who make a proposition incompatible with the freedom of the will the postulate of all inference. Considering, too, that the conclusions of science make no pretense to being more than probable, and considering that a probable inference can at most only suppose something to be most frequently, or otherwise approximately, true, but never that anything is precisely true without exception throughout the universe, we see how far this proposition in truth is from being so postulated.

40. But the whole notion of a postulate being involved in reasoning appertains to a by-gone and false conception of logic. Non-deductive or ampliative inference is of three kinds: induction, hypothesis, and analogy.† If there be any other modes, they must be extremely unusual and highly complicated, and may be assumed with little doubt to be of the same nature as those enumerated. For induction, hypothesis, and analogy, as far as their ampliative character goes, that is, so far as they conclude something not implied in the premisses, depend upon one principle and involve the same procedure. All are essentially inferences from sampling. Suppose a ship arrives at Liverpool laden with wheat in bulk. Suppose that by some machinery the whole cargo be stirred up with great thoroughness. Suppose that twenty-seven thimblefuls be taken equally from the forward, midships, and aft parts, from the starboard, center, and larboard parts, and from the top, half depth, and lower parts of her hold, and that these being mixed and the grains counted, four-fifths of the latter are found to be of quality *A*. Then we infer, experientially and provisionally, that approximately four-fifths of all the grain in the cargo is of the same quality. I say we infer this *experien-*

* The published paper has "compromised".

† See 2.508-513.

tially and *provisionally*. By saying that we infer it *experientially*, I mean that our conclusion makes no pretension to knowledge of wheat-in-itself, our *ἀλήθεια*, as the derivation of that word implies, has nothing to do with *latent* wheat. We are dealing only with the matter of possible experience — experience in the full acceptation of the term as something not merely affecting the senses but also as the subject of thought. If there be any wheat hidden on the ship, so that it can neither turn up in the sample nor be heard of subsequently from purchasers — or if it be half-hidden, so that it may, indeed, turn up, but is less likely to do so than the rest — or if it can affect our senses and our pockets, but from some strange cause or causelessness cannot be reasoned about — all such wheat is to be excluded (or have only its proportional weight) in calculating that true proportion of quality *A*, to which our inference seeks to approximate. By saying that we draw the inference *provisionally*, I mean that we do not hold that we have reached any assigned degree of approximation as yet, but only hold that if our experience be indefinitely extended, and if every fact of whatever nature, as fast as it presents itself, be duly applied, according to the inductive method, in correcting the inferred ratio, then our approximation will become indefinitely close in the long run; that is to say, close to the experience *to come* (not merely close by the exhaustion of a finite collection) so that if experience in general is to fluctuate irregularly to and fro, in a manner to deprive the ratio sought of all definite value, we shall be able to find out approximately within what limits it fluctuates, and if, after having one definite value, it changes and assumes another, we shall be able to find that out, and in short, whatever may be the variations of this ratio in experience, experience indefinitely extended will enable us to detect them, so as to predict rightly, at last, what its ultimate value may be, if it have any ultimate value, or what the ultimate law of succession of values may be, if there be any such ultimate law, or that it ultimately fluctuates irregularly within certain limits, if it do so ultimately fluctuate. Now our inference, claiming to be no more than thus experiential and provisional, manifestly involves no postulate whatever.

41. For what is a postulate? It is the formulation of a

material fact which we are not entitled to assume as a premiss, but the truth of which is requisite to the validity of an inference. Any fact, then, which might be supposed postulated, must either be such that it would ultimately present itself in experience, or not. If it will present itself, we need not postulate it now in our provisional inference, since we shall ultimately be entitled to use it as a premiss. But if it never would present itself in experience, our conclusion is valid but for the possibility of this fact being otherwise than assumed, that is, it is valid as far as possible experience goes, and that is all that we claim. Thus, every postulate is cut off, either by the provisionality or by the experientiality of our inference. For instance, it has been said that induction postulates that, if an indefinite succession of samples be drawn, examined, and thrown back each before the next is drawn, then in the long run every grain will be drawn as often as any other, that is to say, postulates that the ratio of the numbers of times in which any two are drawn will indefinitely approximate to unity. But no such postulate is made; for if, on the one hand, we are to have no other experience of the wheat than from such drawings, it is the ratio that presents itself in those drawings and not the ratio which belongs to the wheat in its latent existence that we are endeavoring to determine; while if, on the other hand, there is some other mode by which the wheat is to come under our knowledge, equivalent to another kind of sampling, so that after all our care in stirring up the wheat some experiential grains will present themselves in the first sampling operation more often than others in the long run, this very singular fact will be sure to get discovered by the inductive method, which must avail itself of every sort of experience; and our inference, which was only provisional, corrects itself at last. Again, it has been said, that induction postulates that under like circumstances like events will happen, and that this postulate is at bottom the same as the principle of universal causation.* But this is a blunder, or *bévue*, due to thinking exclusively of inductions where the concluded ratio is either 1 or 0. If any such proposition were postulated, it would be that under like circumstances (the circumstances of drawing the different samples) different events occur in the same proportions in all

* Cf. 2.761ff.

the different sets — a proposition which is false and even absurd.* But in truth no such thing is postulated, the experiential character of the inference reducing the condition of validity to this, that if a certain result does not occur, the opposite result will be manifested, a condition assured by the provisionality of the inference. But it may be asked whether it is not conceivable that every instance of a certain class destined to be ever employed as a datum of induction should have one character, while every instance destined not to be so employed should have the opposite character. The answer is that, in that case, the instances excluded from being subjects of reasoning would not be experienced in the full sense of the word, but would be among these *latent* individuals of which our conclusion does not pretend to speak.

42. To this account of the rationale of induction I know of but one objection worth mention: it is that I thus fail to deduce the full degree of force which this mode of inference in fact possesses; that according to my view, no matter how thorough and elaborate the stirring and mixing process had been, the examination of a single handful of grain would not give me any assurance, sufficient to risk money upon, that the next handful would not greatly modify the concluded value of the ratio under inquiry, while, in fact, the assurance would be very high that this ratio was not greatly in error. If the true ratio of grains of quality *A* were 0.80 and the handful contained a thousand grains, nine such handfuls out of every ten would contain from 780 to 820 grains of quality *A*. The answer to this is that the calculation given is correct when we know that the units of this handful and the quality inquired into have the normal independence of one another, if for instance the stirring has been complete and the character sampled for has been settled upon in advance of the examination of the sample.† But in so far as these conditions are not known to be complied with, the above figures cease to be applicable. Random sampling and predesignation of the character sampled for should always be striven after in inductive reasoning, but when they cannot be attained, so long as it is conducted honestly, the inference retains some value. When we cannot ascertain how

* Cf. 2.683f.

† See 2.725ff.

the sampling has been done or the sample-character selected, induction still has the essential validity which my present account of it shows it to have.

§3. THE OBSERVATIONAL EVIDENCE FOR NECESSITARIANISM^E

43. I do not think a man who combines a willingness to be convinced with a power of appreciating an argument upon a difficult subject can resist the reasons which have been given to show that the principle of universal necessity cannot be defended as being a postulate of reasoning. But then the question immediately arises whether it is not proved to be true, or at least rendered highly probable, by observation of nature.

44. Still, this question ought not long to arrest a person accustomed to reflect upon the force of scientific reasoning. For the essence of the necessitarian position is that certain continuous quantities have certain exact values. Now, how can observation determine the value of such a quantity with a probable error absolutely *nil*? To one who is behind the scenes, and knows that the most refined comparisons of masses, lengths, and angles, far surpassing in precision all other measurements, yet fall behind the accuracy of bank accounts, and that the ordinary determinations of physical constants, such as appear from month to month in the journals, are about on a par with an upholsterer's measurements of carpets and curtains, the idea of mathematical exactitude being demonstrated in the laboratory will appear simply ridiculous. There is a recognized method of estimating the probable magnitudes of errors in physics — the method of least squares. It is universally admitted that this method makes the errors smaller than they really are; yet even according to that theory an error indefinitely small is indefinitely improbable; so that any statement to the effect that a certain continuous quantity has a certain exact value, if well founded at all, must be founded on something other than observation.

45. Still, I am obliged to admit that this rule is subject to a certain qualification. Namely, it only applies to continuous¹ quantity. Now, certain kinds of continuous quantity are dis-

¹ *Continuous* is not exactly the right word, but I let it go to avoid a long and irrelevant discussion.

continuous at one or at two limits, and for such limits the rule must be modified. Thus, the length of a line cannot be less than zero. Suppose, then, the question arises how long a line a certain person had drawn from a marked point on a piece of paper. If no line at all can be seen, the observed length is zero; and the only conclusion this observation warrants is that the length of the line is less than the smallest length visible with the optical power employed. But indirect observations — for example, that the person supposed to have drawn the line was never within fifty feet of the paper — may make it probable that no line at all was made, so that the concluded length will be strictly zero. In like manner, experience no doubt would warrant the conclusion that there is absolutely *no* indigo in a given ear of wheat, and absolutely *no* attar in a given lichen. But such inferences can only be rendered valid by positive experiential evidence, direct or remote, and cannot rest upon a mere inability to detect the quantity in question. We have reason to think there is no indigo in the wheat, because we have remarked that wherever indigo is produced it is produced in considerable quantities, to mention only one argument. We have reason to think there is no attar in the lichen, because essential oils seem to be in general peculiar to single species. If the question had been whether there was iron in the wheat or the lichen, though chemical analysis should fail to detect its presence, we should think some of it probably was there, since iron is almost everywhere. Without any such information, one way or the other, we could only abstain from any opinion as to the presence of the substance in question. It cannot, I conceive, be maintained that we are in any *better* position than this in regard to the presence of the element of chance or spontaneous departures from law in nature.

46. Those observations which are generally adduced in favor of mechanical causation simply prove that there is an element of regularity in nature, and have no bearing whatever upon the question of whether such regularity is exact and universal or not. Nay, in regard to this *exactitude*, all observation is directly *opposed* to it; and the most that can be said is that a good deal of this observation can be explained away. Try to verify any law of nature, and you will find that the more precise your observations, the more certain they will be to show

irregular departures from the law. We are accustomed to ascribe these, and I do not say wrongly, to errors of observation; yet we cannot usually account for such errors in any antecedently probable way. Trace their causes back far enough and you will be forced to admit they are always due to arbitrary determination, or chance.

§4. ABSOLUTE CHANCE^E

47. But it may be asked whether if there were an element of real chance in the universe it must not occasionally be productive of signal effects such as could not pass unobserved. In answer to this question, without stopping to point out that there is an abundance of great events which one might be tempted to suppose were of that nature, it will be simplest to remark that physicists hold that the particles of gases are moving about irregularly, substantially as if by real chance, and that by the principles of probabilities there must occasionally happen to be concentrations of heat in the gases contrary to the second law of thermodynamics, and these concentrations, occurring in explosive mixtures, must sometimes have tremendous effects. Here, then, is in substance the very situation supposed; yet no phenomena ever have resulted which we are forced to attribute to such chance concentration of heat, or which anybody, wise or foolish, has ever dreamed of accounting for in that manner.

48. In view of all these considerations, I do not believe that anybody, not in a state of case-hardened ignorance respecting the logic of science, can maintain that the precise and universal conformity of facts to law is clearly proved, or even rendered particularly probable, by any observations hitherto made. In this way, the determined advocate of exact regularity will soon find himself driven to *a priori* reasons to support his thesis. These received such a socdolager from Stuart Mill* in his examination of Hamilton, that holding to them now seems to me to denote a high degree of imperviousness to reason, so that I shall pass them by with little notice.

49. To say that we cannot help believing a given proposition is no argument, but it is a conclusive fact if it be true; and with the substitution of "I" for "we," it is true in the mouths

* See his *Examination of Sir William Hamilton's Philosophy*, ch. 16.

of several classes of minds: the blindly passionate, the unreflecting and ignorant, and the person who has overwhelming evidence before his eyes. But that which has been inconceivable today has often turned out indisputable on the morrow. Inability to conceive is only a stage through which every man must pass in regard to a number of beliefs — unless endowed with extraordinary obstinacy and obtuseness. His understanding is enslaved to some blind compulsion which a vigorous mind is pretty sure soon to cast off.

50.* Some seek to back up the *a priori* position with empirical arguments. They say that the exact regularity of the world is a natural belief, and that natural beliefs have generally been confirmed by experience. There is some reason in this. Natural beliefs, however, if they generally have a foundation of truth, also require correction and purification from natural illusions. The principles of mechanics are undoubtedly natural beliefs; but, for all that, the early formulations of them were exceedingly erroneous. The general approximation to truth in natural beliefs is, in fact, a case of the general adaptation of genetic products to recognizable utilities or ends. Now, the adaptations of nature, beautiful and often marvelous as they verily are, are never found to be quite perfect; so that the argument is quite *against* the absolute exactitude of any natural belief, including that of the principle of causation.

51. Another argument, or convenient commonplace, is that absolute chance is *inconceivable*. This word has eight current significations. The *Century Dictionary*† enumerates six. Those who talk like this will hardly be persuaded to say in what sense they mean that chance is inconceivable. Should they do so, it would easily be shown either that they have no sufficient reason for the statement or that the inconceivability is of a kind which does not prove that chance is non-existent.

52.‡ Another *a priori* argument is that chance is unintelligible; that is to say, while it may perhaps be conceivable, it does not disclose to the eye of reason the how or why of things; and since a hypothesis can only be justified so far as it renders some phenomenon intelligible, we never can have any right to

* Cf. 5.445; 5.508f.

† See page 3042, edition of 1889, for Peirce's definitions.

‡ Cf. 322.

suppose absolute chance to enter into the production of anything in nature. This argument may be considered in connection with two others. Namely, instead of going so far as to say that the supposition of chance can *never* properly be used to explain any observed fact, it may be alleged merely that no facts are known which such a supposition could in any way help in explaining. Or again, the allegation being still further weakened, it may be said that since departures from law are not unmistakably observed, chance is not a *vera causa*,* and ought not unnecessarily to be introduced into a hypothesis.

53. These are no mean arguments, and require us to examine the matter a little more closely. Come, my superior opponent, let me learn from your wisdom. It seems to me that every throw of sixes with a pair of dice is a manifest instance of chance.

“While you would hold a throw of deuce-ace to be brought about by necessity?” (The opponent’s supposed remarks are placed in quotation marks.)

Clearly one throw is as much chance as another.

“Do you think throws of dice are of a different nature from other events?”

I see that I must say that *all* the diversity and specificness of events is attributable to chance.

54. “Would you, then, deny that there is any regularity in the world?”

That is clearly undeniable. I must acknowledge there is an approximate regularity, and that every event is influenced by it. But the diversification, specificness, and irregularity of things I suppose is chance. A throw of sixes appears to me a case in which this element is particularly obtrusive.

“If you reflect more deeply, you will come to see that *chance* is only a name for a cause that is unknown to us.”

Do you mean that we have no idea whatever what kind of causes could bring about a throw of sixes?

“On the contrary, each die moves under the influence of precise mechanical laws.”

55. But it appears to me that it is not these *laws* which made the die turn up sixes; for these laws act just the same when other throws come up. The chance lies in the diversity of

* See 242n for a definition of this term.

throws; and this diversity cannot be due to laws which are immutable.

“The diversity is due to the diverse circumstances under which the laws act. The dice lie differently in the box, and the motion given to the box is different. These are the unknown causes which produce the throws, and to which we give the name of chance; not the mechanical law which regulates the operation of these causes. You see you are already beginning to think more clearly about this subject.”

56. Does the operation of mechanical law not increase the diversity?

“Properly not. You must know that the instantaneous state of a system of particles is defined by six times as many numbers as there are particles, three for the coördinates of each particle’s position, and three more for the components of its velocity. This number of numbers, which expresses the amount of diversity in the system, remains the same at all times. There may be, to be sure, some kind of relation between the coördinates and component velocities of the different particles, by means of which the state of the system might be expressed by a smaller number of numbers. But, if this is the case, a precisely corresponding relationship must exist between the coördinates and component velocities at any other time, though it may doubtless be a relation less obvious to us. Thus, the intrinsic complexity of the system is the same at all times.”

57. Very well, my obliging opponent, we have now reached an issue. You think all the arbitrary specifications of the universe were introduced in one dose, in the beginning, if there was a beginning, and that the variety and complication of nature has always been just as much as it is now. But I, for my part, think that the diversification, the specification, has been continually taking place. Should you condescend to ask me why I so think, I should give my reasons as follows:

58. (1) Question any science which deals with the course of time. Consider the life of an individual animal or plant, or of a mind. Glance at the history of states, of institutions, of language, of ideas. Examine the successions of forms shown by paleontology, the history of the globe as set forth in geology, of what the astronomer is able to make out concerning the

changes of stellar systems. Everywhere the main fact is growth and increasing complexity. Death and corruption are mere accidents or secondary phenomena. Among some of the lower organisms, it is a moot point with biologists whether there be anything which ought to be called death. Races, at any rate, do not die out except under unfavorable circumstances. From these broad and ubiquitous facts we may fairly infer, by the most unexceptionable logic, that there is probably in nature some agency by which the complexity and diversity of things can be increased; and that consequently the rule of mechanical necessity meets in some way with interference.

59. (2) By thus admitting pure spontaneity or life as a character of the universe, acting always and everywhere though restrained within narrow bounds by law, producing infinitesimal departures from law continually, and great ones with infinite infrequency, I account for all the variety and diversity of the universe, in the only sense in which the really *sui generis* and new can be said to be accounted for. The ordinary view has to admit the inexhaustible multitudinous variety of the world, has to admit that its mechanical law cannot account for this in the least, that variety can spring only from spontaneity, and yet denies without any evidence or reason the existence of this spontaneity, or else shoves it back to the beginning of time and supposes it dead ever since. The superior logic of my view appears to me not easily controverted.

60. (3) When I ask the necessitarian how he would explain the diversity and irregularity of the universe, he replies to me out of the treasury of his wisdom that irregularity is something which from the nature of things we must not seek to explain. Abashed at this, I seek to cover my confusion by asking how he would explain the uniformity and regularity of the universe, whereupon he tells me that the laws of nature are immutable and ultimate facts, and no account is to be given of them. But my hypothesis of spontaneity does explain irregularity, in a certain sense; that is, it explains the general fact of irregularity, though not, of course, what each lawless event is to be. At the same time, by thus loosening the bond of necessity, it gives room for the influence of another kind of causation, such as seems to be operative in the mind in the formation of associations, and enables us to understand how the uniformity of

nature could have been brought about. That single events should be hard and unintelligible, logic will permit without difficulty: we do not expect to make the shock of a personally experienced earthquake appear natural and reasonable by any amount of cogitation. But logic does expect things *general* to be understandable. To say that there is a universal law, and that it is a hard, ultimate, unintelligible fact, the why and wherefore of which can never be inquired into, at this a sound logic will revolt, and will pass over at once to a method of philosophizing which does not thus barricade the road of discovery.

61. (4) Necessitarianism cannot logically stop short of making the whole action of the mind a part of the physical universe. Our notion that we decide what we are going to do, if, as the necessitarian says, it has been calculable since the earliest times, is reduced to illusion. Indeed, consciousness in general thus becomes a mere illusory aspect of a material system. What we call red, green, and violet are in reality only different rates of vibration. The sole reality is the distribution of qualities of matter in space and time. Brain-matter is protoplasm in a certain degree and kind of complication—a certain arrangement of mechanical particles. Its feeling is but an inward aspect, a phantom. For, from the positions and velocities of the particles at any one instant, and the knowledge of the immutable forces, the positions at all other times are calculable; so that the universe of space, time, and matter is a rounded system uninterfered with from elsewhere. But, from the state of feeling at any instant, there is no reason to suppose the states of feeling at all other instants are thus exactly calculable; so that feeling is, as I said, a mere fragmentary and illusive aspect of the universe. This is the way, then, that necessitarianism has to make up its accounts. It enters consciousness under the head of sundries, as a forgotten trifle; its scheme of the universe would be more satisfactory if this little fact could be dropped out of sight. On the other hand, by supposing the rigid exactitude of causation to yield, I care not how little—be it but by a strictly infinitesimal amount—we gain room to insert mind into our scheme, and to put it into the place where it is needed, into the position which, as the sole self-intelligible thing, it is entitled to occupy, that of the foun-

tain of existence; and in so doing we resolve the problem of the connection of soul and body.*

62. (5) But I must leave undeveloped the chief of my reasons, and can only adumbrate it. The hypothesis of chance-spontaneity is one whose inevitable consequences are capable of being traced out with mathematical precision into considerable detail. Much of this I have done and find the consequences to agree with observed facts to an extent which seems to me remarkable.† But the matter and methods of reasoning are novel, and I have no right to promise that other mathematicians shall find my deductions as satisfactory as I myself do, so that the strongest reason for my belief must for the present remain a private reason of my own, and cannot influence others. I mention it to explain my own position; and partly to indicate to future mathematical speculators a veritable gold mine, should time and circumstances and the abridger of all joys prevent my opening it to the world.

63. If now I, in my turn, inquire of the necessitarian why he prefers to suppose that all specification goes back to the beginning of things, he will answer me with one of those last three arguments which I left unanswered.

First, he may say that chance is a thing absolutely unintelligible, and therefore that we never can be entitled to make such a supposition. But does not this objection smack of naïve impudence? It is not mine, it is his own conception of the universe which leads abruptly up to hard, ultimate, inexplicable, immutable law, on the one hand, and to inexplicable specification and diversification of circumstances on the other. My view, on the contrary, hypothetizes nothing at all, unless it be hypothesis to say that all specification came about in some sense, and is not to be accepted as unaccountable. To undertake to account for anything by saying baldly‡ that it is due to chance would, indeed, be futile. But this I do not do. I make use of chance chiefly to make room for a principle of generalization, or tendency to form habits, which I hold has produced all regularities. The mechanical philosopher leaves

* Cf. ch. 10; 4.611.

† The editors have been unable to discover any manuscript whose contents clearly answer to the foregoing description.

‡ See 606.

the whole specification of the world utterly unaccounted for, which is pretty nearly as bad as to baldly attribute it to chance. I attribute it altogether to chance, it is true, but to chance in the form of a spontaneity which is to some degree regular. It seems to me clear at any rate that one of these two positions must be taken, or else specification must be supposed due to a spontaneity which develops itself in a certain and not in a chance way, by an objective logic like that of Hegel. This last way I leave as an open possibility, for the present;* for it is as much opposed to the necessitarian scheme of existence as my own theory is.

64. Secondly, the necessitarian may say there are, at any rate, no observed phenomena which the hypothesis of chance could aid in explaining. In reply, I point first to the phenomenon of growth and developing complexity, which appears to be universal, and which, though it may possibly be an affair of mechanism perhaps, certainly presents all the appearance of increasing diversification. Then, there is variety itself, beyond comparison the most obtrusive character of the universe: no mechanism can account for this. Then, there is the very fact the necessitarian most insists upon, the regularity of the universe which for him serves only to block the road of inquiry. Then, there are the regular relationships between the laws of nature — similarities and comparative characters, which appeal to our intelligence as its cousins, and call upon us for a reason. Finally, there is consciousness, feeling, a patent fact enough, but a very inconvenient one to the mechanical philosopher.

65. Thirdly, the necessitarian may say that chance is not a *vera causa*, that we cannot know positively there is any such element in the universe. But the doctrine of the *vera causa* has nothing to do with elementary conceptions. Pushed to that extreme, it at once cuts off belief in the existence of a material universe; and without that necessitarianism could hardly maintain its ground. Besides, variety is a fact which must be admitted; and the theory of chance merely consists in supposing this diversification does not antedate all time. Moreover, the avoidance of hypotheses involving causes nowhere positively known to act is only a recommendation of logic, not a

* See chs. 7 and 8.

positive command. It cannot be formulated in any precise terms without at once betraying its untenable character — I mean as rigid rule, for as a recommendation it is wholesome enough.

I believe I have thus subjected to fair examination all the important reasons for adhering to the theory of universal necessity, and have shown their nullity. I earnestly beg that whoever may detect any flaw in my reasoning will point it out to me, either privately or publicly; for, if I am wrong, it much concerns me to be set right speedily. If my argument remains unrefuted, it will be time, I think, to doubt the absolute truth of the principle of universal law; and when once such a doubt has obtained a living root in any man's mind, my cause with him, I am persuaded, is gained.*

* See Appendix A for Peirce's published reply to Dr. Paul Carus's criticisms of this paper.

CHAPTER 3

CAUSATION AND FORCE*^P

§1. PHYSICAL CAUSATION

66. Those who make causality one of the original *uralt* elements in the universe or one of the fundamental categories of thought — of whom you will find that I am not one — have one very awkward fact to explain away. It is that men's conceptions of a Cause are in different stages of scientific culture entirely different and inconsistent. The great principle of causation which, we are told, it is absolutely impossible not to believe, has been one proposition at one period of history and an entirely disparate one [at] another and is still a third one for the modern physicist. The only thing about it which has stood, to use my friend Carus's word, a *κτῆμα ἐξ ἀεί*, *semper eadem*, is the name of it. As Aristotle† remarks, what the Ionian philosophers were trying to find out as the principles of things was what they were made of. Aristotle himself, as I need not remind you, recognizes four distinct kinds of cause,‡ which go to determining a fact: the *matter* to which it owes its existence, the *form* to which it owes its nature, the *efficient cause* which acts upon it from past time, and the *final cause* which acts upon it from future time. Oh, but it is commonly said, these are merely verbal distinctions. This to my apprehension is one of those superficial explanations, which pass current till men examine them, and serve, like the elegant bankers' memorandum, *pour donner le change* to the unwary. They seem to me to mark different types of retroductively§ inferred facts — facts, which it was supposed, furnished the universal

* Lecture No. 4 on "Detached Ideas on Vitaly Important Topics," 1898 See vol. 1, bk. IV, ch. 5; vol. 4, Preface; vol. 5, bk. III, ch. 6, § 1 for the first three lectures.

† *Metaphysica*, 983b, 6-8.

‡ *Ibid.*, 983a, 24-34.

§ "Retroductive" is an alternative expression for "abductive," for which see vol. 2, *passim*.

process of Nature the occasions from which different features of the fact were brought about. The conception is that Nature syllogizes from one grand major premiss, and the causes are the different minor premisses of nature's syllogistic development. It is generally held that the word "cause" has simply been narrowed to that one of the four Aristotelian causes which was named from the circumstance that it alone produces an *effect*. But this notion that our conception of cause is that of the Aristotelian efficient cause will hardly bear examination. The efficient cause was, in the first place, generally a thing, not an event; then, something which need not do anything; its mere existence might be sufficient. Neither did the effect always necessarily follow. True when it did follow it was said to be compelled. But it was not necessary in our modern sense. That is, it was not invariable. Even in ancient literature we occasionally meet with the idea that a cause is an event of such a kind as to be necessarily followed by another event which is the effect. This is the current idea, now. But it is only in the last two centuries that it has become the dominant conception. It is not so with the most accurate thinkers of the time of Descartes.

67. Those whose admiration for John Stuart Mill knows no bounds consider it one of his most admirable *aperçues* that he regards the cause as the aggregate of all the circumstances under which an event occurs.* Whether it be admirable or not, it was certainly a commonplace remark before John Mill ever set pen to paper. But the truth is that the remark is founded upon a misconception. So far as the conception of cause has any validity — that is to say, as I shall show you — in a limited domain, the cause and its effect are two *facts*. Now, Mill seems to have thoughtlessly or nominalistically assumed that a fact is the very objective history of the universe for a short time, in its objective state of existence in itself. But that is not what a fact is.† A fact is an abstracted element of that. A fact is so much of the reality as is represented in a single *proposition*. If a proposition is true, that which it represents is a *fact*. If, according to a true law of nature as major premiss, it syllogistically follows from the truth of one proposition that another is true, then that abstracted part of the reality which

* See his *System of Logic*, bk. III, ch. 5, §3.

† Cf. 1.427ff.

the former proposition represents is the *cause* of the corresponding element of reality represented by the latter proposition. Thus, the fact that a body is moving over a rough surface is the cause of its coming to rest. It is absurd to say that its color is any part of the cause or of the effect. The color is a part of the reality; but it does not belong to those parts of the reality which constitute the two *facts* in question.

68. But the grand principle of causation which is generally held to be the most certain of all truths and literally beyond the possibility of doubt (so much so that if a scientific man seeks to limit its truth it is thought pertinent to attack his sincerity and moral character generally) involves three propositions to which I beg your particular attention. The first is, that the state of things at any one instant is completely and exactly determined by the state of things at *one* other instant. The second is that the cause, or determining state of things, precedes the effect or determined state of things in time. The third is that no fact determines a fact *preceding* it in time in the same sense in which it determines a fact *following* it in time. These propositions are generally held to be self-evident truths; but it is further urged that whether they be so or not, they are indubitably proved by modern science. In truth, however, all three of them are in flat contradiction to the principles of mechanics. According to the dominant mechanical philosophy, nothing is real in the physical universe except particles of matter with their *masses*, their relative *positions* in space at different instants of *time*, and the immutable laws of the relations of those three elements of space, time, and matter. Accordingly, at any one *instant* all that is real is the masses and their positions, together with the laws of their motion. But according to Newton's second law of motion the positions of the masses at any one instant are not determined by their positions at any other single instant, even with the aid of the laws. On the contrary, that which is determined is an acceleration. Now an acceleration is the relation of the position at one instant *not* to the position at another instant, but to the positions at a second and a third instant. Let *a*, *b*, *c* be the positions of a particle at three instants very near to one another, and at equal intervals of time, say, for convenience, one second.

Then we may make a table thus:

Dates	Positions	Velocities	Acceleration
0 ^s	a	$(b-a)/(1^s-0^s)$ $(c-b)/(2^s-1^s)$	$[(c-b)/(2^s-1^s) - (b-a)/(1^s-0^s)] / (1\frac{1}{2}^s - 0\frac{1}{2}^s) = (c-2b+a)/(1\frac{1}{2}^s - 0\frac{1}{2}^s)_2$
1 ^s	b		
2 ^s	c		

Or if the intervals are not equal:

Dates	Positions	Velocities	Acceleration
t ₀	a	$(b-a)/(t_1-t_0)$ $(c-b)/(t_2-t_1)$	$[(c-b)/(t_2-t_1) - (b-a)/(t_1-t_0)] / (\frac{1}{2}(t_2+t_1) - \frac{1}{2}(t_1+t_0)) = [c(t_1-t_0) - b(t_2-t_0) + a(t_2-t_1)] / (t_2-t_1)(t_1-t_0) \cdot \frac{1}{2}(t_2-2t_1+t_0)^*$
t ₁	b		
t ₂	c		

69. It will be perceived that there is an essential *thirdness*, which the principle of causality fails to recognize, so that its first proposition is false. The second proposition, that the cause precedes the effect in time, is equally false. The effect is the acceleration. The cause which produces this effect under the law of force is, according to the doctrine of the conservation of energy, the relative positions of the particles. Now the acceleration which the position requires does not come *later* than the assumption of that position. It is, on the contrary, absolutely simultaneous with it. Thus, the second proposition of the principle of causation is false. The third is equally so. This proposition is that no event determines a previous event in the same sense in which it determines a subsequent one. But, according to the law of the conservation of energy, the position of the particle relative to the center of force, expressed by *b*, determines what the acceleration shall be at the moment the particle is in that position. That is to say, taking the number *b*, whose value expresses the position of the particle, we can calculate from this number alone, by the application of a rule supplied by the law of the force, a number which I may denote by *Fb*, which is the numerical value of the acceleration $\frac{c-2b+a}{(1\frac{1}{2}^s-0\frac{1}{2}^s)^2}$. So that we have the

* $(t_2-2t_1+t_0)$ should be (t_2-t_0) .

equation $\frac{c-2b+a}{(1\frac{1}{2}^s-0\frac{1}{2}^s)^2} = Fb$. Now, if we know the positions, a and b , of the particle at the two earlier dates, this equation does enable us to calculate the position, c , of the particle at the last date. But since a and c enter into this equation in the same way, and since the difference of dates in the denominator is squared, so that if they are interchanged it makes no difference (because the square of the negative of a number is the [square of the] number itself), it follows that the very same rule, by which we could calculate the value of c , that is, the position at the latest of the three dates, from a and b , those at the two earlier dates, may usually be applied, and in precisely the same form, to calculating the position, a , of the particle at the earliest date, from c and b , its positions at the two later dates. Thus, we see that, according to the law of energy, the positions at the two later instants determine the position at the earliest instant, in precisely the same way, and no other, in which the positions at the two earlier instants determine the position at the latest instant. In short, so far as phenomena governed by the law of the conservation of energy are concerned, the future determines the past in precisely the same way in which the past determines the future; and for those cases, at least, it is a mere human and subjective fashion of looking at things which makes us prefer one of those modes of statement to the other. Thus, all three of the propositions involved in the principle of causation are in flat contradiction to the science of mechanics.

§2. PSYCHICAL CAUSATION

70. But when from the world of physical force we turn to the psychical world all is entirely different. Here we find no evident trace of any state of mind depending in opposite ways upon two previous states of mind. Every state of mind, acting under an overruling association, produces another state of mind. Or if different states of mind contribute to producing another, they simply act concurrently, and not in opposite ways, as the two earlier positions of a particle of matter do, in determining a third position. I come down in the morning; and the sight of the newspaper makes me think of the *Maine*,

the breakfast is brought in, and the sight of something I like puts me into a state of cheerful appetite; and so it goes all day long. Moreover, the effect is not simultaneous with the cause. I do not think of the explosion of the *Maine* simultaneously with seeing the newspaper, but after seeing it, though the interval be but a thirtieth of a second. Furthermore, the relations of the present to the past and to the future, instead of being the same, as in the domain of the Law of Energy, are utterly unlike. I remember the past, but I have absolutely no slightest approach to such knowledge of the future. On the other hand I have considerable *power* over the future, but nobody except the Parisian mob imagines that he can change the past by much or by little. Thus all three propositions of the law of causation are here fully borne out.

§3. NON-CONSERVATIVE FORCES

71. Even supposing the physical and the psychical laws not to be precisely as they seem to be, yet, though the gulph between the two worlds would not be of so absolute a nature, still in regard to the general features we cannot be mistaken.

But further than that, we can assert that not only is the psychical world within us governed by the law of causation, but even phenomena of psychical interest without us, even those of inanimate matter so far as they attract everyday notice, either are, or have the *semblance of being*, under the same governance. In order to bring this highly significant fact into evidence, it will be necessary for me to explain two characteristics of phenomena that are determined by forces obeying the law of the conservation of energy. I am sorry that I shall once more be obliged to employ some very simple algebra. The first of the two characteristics I speak of is this, that if any force obeying the law of the conservation of energy or, as we usually say, any *conservative force* (that is, any force whose value depends exclusively on the situation of the body acted on relatively to the bodies that act on it), if any such force, I say, can produce any *given motion*, then the very same force can equally produce the reverse motion. That is to say, if at any one instant all the particles were to strike fixed plastic plane surfaces, and were to strike them square, so as to rebound

in the directions from which they came and with unchanged velocities, each would move backward through precisely the same path that it had moved forward, and with the same velocities, no matter for how long a time the motion might have been going on. This really follows from what I have shown, that conservative force determines the past in the same way that it determines the future. An extremely elementary demonstration would be easy; but I omit it to save time. The other characteristic of conservative force is, as its name implies, that the Energy is conserved, that is, that the *living force* or square of the velocity of a particle is simply a function of the position relative to the interacting particles, the exact function depending on the nature of the force *plus* a quantity constant throughout the motion, which has a value depending on the accidents of the particular case. You are so familiar with this that I will not waste time in proving it. But I will mention that it readily follows from the fact, that a second difference multiplied by the sum of the two adjacent first differences is equal to the difference of the squares of those differences, which is obvious.

For since $\Delta^2 = \Delta_2 - \Delta_1$, obviously $(\Delta_1 + \Delta_2)\Delta^2 = (\Delta_2)^2 - (\Delta_1)^2$.

72. Now employing these two characteristics, and especially the former, as criteria, we at once recognize that almost all the phenomena of bodies here on earth which attract our familiar notice are non-conservative, that is, are inexplicable by means of the Law of the Conservation of Energy. For they are actions which cannot be reversed. In the language of physics they are irreversible. Such, for instance, is birth, growth, life. Such is all motion resisted by friction or by the viscosity of fluids, as all terrestrial motion is. Such is the conduction of heat, combustion, capillarity, diffusion of fluids. Such is the thunder bolt, the production of high colors by a prism, the flow of rivers, the formations of bars at their mouths, the wearing of their channels; in short, substantially everything that ordinary experience reveals, except the motions of the stars. And even those we do not see to be reversed, though we may well believe them reversible. About the only familiar actions which appear to sense reversible are the motion of a

projectile, the bending of a bow or other spring, a freely swinging pendulum, a telephone, a microphone, a galvanic battery, and a dynamo. And all but two of these are unfamiliar to man in his early development. No wonder the doctrine of the conservation of energy was a late discovery.

73. It is certainly a desideratum in philosophy to unify the phenomena of mind and matter. The logic of retroduction directs us to adopt Monism as a provisional hypothesis of philosophy, whether we think it likely or not; and not to abandon it till the position is stormed and we are forced out of it. In view of this, it becomes exceedingly interesting to inquire how the physicist explains those actions which seem to violate the law of energy. Now such of them as physicists have deeply studied are all explained by the action of *chance*.

For example, if one horizontal layer of air moves northerly, passing over another layer at rest, the reason why the northerly current will be retarded is that the molecules are flying about in all directions and hence chance will carry a good many of them from one layer to the other. And these chance molecules, so carried from either layer to the other, will be so numerous that it is practically certain that, on the average, they will have as much northerly motion as the average of all the molecules in the layer from which they have emerged. Thus, after a while, the average northerly motion of the molecules in each layer approximates toward that of the other layer. And to say that the average northerly motion of the molecules of the upper layer becomes less is the same as to say that the northerly motion of that layer as a whole becomes less. For the motion of the layer as a whole is nothing but the average motion of its molecules.

§4. FORTUITOUS DISTRIBUTIONS

74. Now in order that we may make any application of this method, of explaining non-conservative quasi-forces, to psychical phenomena it is necessary to make an exact analysis and description of its essential elements, omitting all circumstances that do not contribute to the effect. To this end, the first requisite is a definition of *Chance*, not as to the causes that produce it, but as to the phenomenon itself. Surely, I need not

waste breath in refuting that feeblest of attempts at analysis which makes chance to consist in our ignorance. For that has already been sufficiently done in the *Logic of Chance* of John Venn, a logician, some of whose opinions may be untenable, but whose thought is apt to penetrate beneath the form to the matter he discusses — and after examining a hundred or two logical treatises one begins to think that a high distinction. It is the operation of chance which produces the retardation of the upper layer of air we were just considering; but surely it is no ignorance of ours that has that effect. Chance, then, as an objective phenomenon, is a property of a *distribution*. That is to say, there is a large collection consisting, say, of colored things and of white things. Chance is a particular manner of distribution of color among all the things. But in order that this phrase should have any meaning, it must refer to some definite arrangement of all the things.

75. Let us begin by supposing that the multitude of colored things is *denumerable*,* and that of the white things is likewise *denumerable*. The denumerable multitude as I explained in a former lecture is that of all the whole numbers. Every denumerable collection may be numbered. That is, the number 1 may be affixed to one of its objects, 2 to another, and so on in such a way that every object of the collection receives a number. When that is done I call the relation of an object, receiving any number but 1, to the object receiving the next lower number, a *generating relation* of the collection. It is by no means indispensable to introduce any mention of the numbers in defining a generating relation. I only do so for the sake of using ideas with which you are familiar and thus save time and trouble. Now I must define the important conception of *independence*, which incessantly recurs in the doctrine of chances.† A character, say blueness, is said to be independent of a character, say smoothness, in a given collection if and only if the ratio of the multitude of those objects (PQ) of the collection that are both blue and smooth to the multitude of those objects ($P\bar{Q}$) of the collection that are blue but not smooth equals the ratio of the multitude of objects ($\bar{P}Q$) that are not blue but are smooth to the multitude of objects ($\bar{P}\bar{Q}$)

* See 4.188ff.

† Cf. 3.21, 3.33.

that are not blue and not smooth. Mr. Jevons* makes a fuss about proving that if P is independent of Q , so is Q of P . It is because in the proportion

$$(PQ) : (P\bar{Q}) = (\bar{P}Q) : (\bar{P}\bar{Q}),$$

(PQ)	$(\bar{P}Q)$
$(P\bar{Q})$	$(\bar{P}\bar{Q})$

we can transpose the means, giving

$$(PQ) : (\bar{P}\bar{Q}) = (\bar{P}Q) : (P\bar{Q}).$$

Now in our collection of denumeral colored things and denumeral white things, let F signify a particular generating relation, so that when the objects are numbered, according to that relation, the object numbered $n+1$ is F of the object numbered n . Then, I say that a fortuitous distribution of color and whiteness in the collection consists in this, that any object of the collection being colored or not is independent of its being an F of a colored thing, and is also independent of its being an F of an F of a colored thing, and is also independent of its being at once an F of a colored thing and an F of an F of a white thing; and in short that an object's being colored or not is independent of its having or not having any character definable in terms of F , color, and whiteness. That satisfactorily defines a *fortuitous distribution* when the colored things and white things are both denumeral. †

76. When either or both the two subcollections of colored things and white things are *enumerable*, that is, finite in number, such independence, as the definition requires, becomes impossible. Nevertheless, if both are large enumerable collections, there may be an approximation to the fulfillment of the definition, and then we loosely call the distribution fortuitous. If, for example, there are 500,000 colored things and 500,000 white things, then of all possible modes of sequences of 20 successive objects as to their being colored or white there will be only about one of each example. Therefore we cannot say that an object's being colored or not is independent of the sequence of color and whiteness among the twenty objects that precede it, for one of the four terms of the proportion that defines independence will probably be zero. On the other hand there will be about a thousand occurrences of each pos-

* See his *Pure Logic, and Other Minor Works*, London (1890), p. 189.

† Peirce has here a marginal note — "Repeat with 'follows next after' [substituted] for F ."

sible mode of sequence of 10 objects as to being colored or white and if, from 1 object up to 10 objects, the required proportionality is nearly fulfilled, there will be no harm in calling the distribution fortuitous.

77. In comparing two infinite collections we have to distinguish between one being *inclusive* of more or less than the other and one being more or less *multitudinous* than the other. I call a collection *inclusive* of more than another if it includes all the objects of the latter and others besides; but to say that one collection, say the simpletons, is more multitudinous than another, say the sages, means that to every sage a distinct simpleton might be assigned, and assigned to no other sage, while it would be impossible to assign to every simpleton a distinct sage for him alone. Two collections may neither of them be *inclusive* of all the other *includes*, as for example the Buddhists and the Japanese; but they cannot each be *inclusive* of *ALL* the other includes unless they are identically the same. On the other hand, of any two collections whatsoever, one must be at least as multitudinous as the other, and each *may be* so. That is, they may be equal. Of equal collections one may be inclusive of more than the other; but the less multitudinous of two collections cannot be the more inclusive. All these propositions except one are easily proved; and that one is proved in the *Monist*.*

78. If of the two subcollections, the colored things and the white things, one is denumeral while the other is more than denumeral, we may still speak, and sometimes do speak, of a fortuitous distribution. It is true that for a collection more than denumeral there can be no generating relation. But still, unless the total collection is a continuum of more than one dimension, with or without topical singularities, all the objects of it may be placed in a sequence, at any rate by means of a relatively insignificant multitude of ruptures and junctions. It must be understood that the fortuitousness refers to the particular way in which the objects are placed in sequence. It must furthermore be understood that by a definite mode the whole sequence is broken up into a denumeral collection of subcollections, and the fortuitousness is relative to that mode of breaking up, and moreover this mode

* See 3.546ff.

of dissection must be capable of a particular mode of variation such that the subcollections may be made all at once inclusive of less and less without limit, and the fortuitousness is still further relative to that mode of shrinking. If, then, no matter how small these subcollections are taken, the character of a subcollection containing a blue thing or not containing a blue thing is independent of that subcollection having any character definable in terms of the generating relation of the denumeral collection, of containing a blue thing and of not containing a colored thing, then the distribution is fortuitous. For example, we may say that certain marked points are fortuitously distributed upon an infinitely long line, meaning that if that line is cut up into a denumeral series of lengths, no matter how small, the lengths containing marked points will be fortuitously distributed along the whole series of lengths.

We might speak of a finite number of points being fortuitously distributed upon the circumference of a circle, meaning an approximate fortuitous distribution. When we say that a finite number [of] points are distributed *at random* on the circumference, that is quite another matter. We then have in mind a fortuitous distribution, it is true, but it is a fortuitous distribution of the denumeral cases in which a man might, in the course of all time, throw points down upon the circumference.

I do not say that no sense could be attached to the term *fortuitous distribution* in case both the blue things and the white things were more than denumeral. On the contrary, the difficulty is that several senses might be attached to the phrase, and, having no experience in that line of thought, I am not prepared to say which one would be more appropriate. I therefore pass that case by.

79. We have now determined precisely what Chance, as an objective phenomenon, consists in. In works on probabilities (of which I particularly recommend that of Laurent* as being brief and clear and yet at the same time scientific) very beautiful and valuable properties of the fortuitous distribution will be found traced out, especially that which relates to the probability curve.

* *Traité du calcul des probabilités*, Paris, 1873.

In the fortuitous distribution the colored things and the white things are mixed up together with an irregularity which is perfect. It is the very highest pitch of irregularity. Departures from this, or regularities, may tend in either of two directions. On the one hand they may mix the colored things and white things more perfectly and uniformly, as when colored things and white things alternate, or they may sift them out, as when all the colored things come in one series and all the white things in another. Even the alternation might be called a sifting, for it puts all the colored things into the odd places and all the white things into the even places, and these constitute two distinct series. Still, having the word *regularity* for that, we may as well restrict the word *sifting* so as to enable us to express the less fundamental, but still not altogether unimportant, distinction between leaving the two series mingled and separating them.

80. Let us glance for a moment at the ways in which the three states of things — siftedness, uniform combination, and fortuitous irregularity of mixture — are in fact brought about in nature; and then in the light of these examples we shall be able to see how they could conceivably be brought about.

Sifting is performed by any conservative force quite inevitably. For example, a ray of white light strikes upon a prism. The different colors have different refrangibilities and the light is decomposed. The action is conservative because it is reversible. For if the dispersed light were reflected back upon its course it would be recompounded. But this does not happen except in the laboratory and that only imperfectly, when it is due to the elaborate contrivance of the experimenter. Conservative force, left to itself, can produce no such result, because it depends on the *purposeful* exact adjustment of each pencil of light. Now one of the first things that the mechanical philosophy discovered was that there are no final causes in pure mechanical action. In the same way, were a great number of meteors to start from the same almost infinitely distant point, all moving in the same direction so as to bring them within the sun's strong attraction, but were they to move with various velocities, the sun's attraction would separate their motions so that when they departed again they would all be arranged in the order of their veloci-

ties; the one with no velocity returning just as it came, the one with infinite velocity proceeding in a right line unchecked, and all the rest in more or less bent paths.



81. So much for the sifting. Let us next consider how a state of *fortuitous distribution* is brought about. How, for example, is it that the throws of a dice occur in the utterly irregular way in which they do? It is because when we turn over the dice box, there are slight differences in the motion, and also when we put the dice into the box there are small differences in the motion; and no regularity connects the differences of one kind with those of the other. Still, these circumstances would not in themselves give the character of fortuitous distribution to the throws were there not a fortuitous distribution either in the differences of our motion in putting the dice into the box or else fortuitous distribution in the variations of motion in throwing them out.* We see, then, that in this case the fortuitous distribution arises from another fortuitous distribution in one or more of the conditions of the production of the phenomenon. All this has been carefully studied by various writers on the theory of errors. Suppose we put into a jar some hot nitrogen and then some cold oxygen. At first, the molecules of nitrogen will be moving with various *vires vivae* distributed according to a modification of the probability curve and therefore fortuitously, while the molecules of oxygen will likewise have *vires vivae* distributed according to the same general law, but on the average *their* motion will be much slower. In the first state of things, therefore, the distribution of *vires vivae* among all the molecules considered as one collection will *not* be fortuitous. But there will be continual encounters of molecules, which, in these encounters, will be governed by conservative forces, generally attractions. In consequence of the different modes of these encounters being distributed fortuitously, which is itself due to the fortuitous distribution of the molecules in space, and the fortuitous distribution of the directions and velocities of their motions, continual interchanges of *vis viva* will take place, so that as time goes on there will be a closer

* Cf. 53f.

and closer approximation to one fortuitous distribution of *vis viva* among all the molecules. There we see a fortuitous distribution in process of being brought about. That which happens, happens entirely under the governance of conservative forces; but the character of fortuitous distribution toward which there is a tendency is entirely due to the various fortuitous distributions existing in the different initial conditions of the motion, with which conservative forces never have anything to do. This is the more remarkable because the peculiar distribution which characterized the initial distribution of *vires vivae* gradually dies out. True, traces of it always remain; but they become fainter and fainter and approach without limit toward complete disappearance. The fortuitous distributions, however, which equally have nothing but initial conditions to sustain them, not only hold their ground, but, wherever the conservative forces act, at once mark their character in the effects. Hence, it is that we find ourselves forced to speak of the "action of chance." . . .*

§5. SPACE

82.† Would not the human race, supposing that it could survive the shock at all, be pretty sure to develop a new form of intuition in which the things that now appear near would appear far? For what is the real truth of nearness? Who is my neighbor? Is it not he with whom I intimately react? In short, the suggested explanation is that space is that form of intuition in which is presented the law of the mutual reaction of those objects whose mode of existence consists in mutually reacting. Let us see how much this hypothesis will explain. What are its necessary consequences? I must abridge the reasoning to a mere sketch. In the first place space, as a presentation of law, must be *continuous* and without singularities. In the second place, since reaction is essentially *hic et nunc*, or anti-general, it follows that the reacting objects must be entirely independent of one another in their purely spatial determinations. That is, one object being in one particular place in no way requires another object to be in any particular place. From this again it necessarily follows that

* Four manuscript pages are missing here.

† Cf. 1.501f.

each object occupies a single point of space, so that matter must consist of Boscovichian atomicules,* whatever their multitude may be. On the same principle it furthermore follows that any law among the reactions must involve some other continuum than merely Space alone. Why Time should be that other continuum I shall hope to make clear when we come to consider Time.† In the third place, since Space has the mode of being of a law, not that of a reacting existent, it follows that it cannot be the law that, in the absence of reaction, a particle shall adhere to its place; for that would be attributing to it an attraction for that place. Whence it follows that in so far as a particle is not acted upon by another, that which it retains is a relation between space and time. Now it is not logically accurate to say that the law of motion prescribes that a particle, so far as it is not acted upon by forces, continues to move in a straight line, describing equal intervals in equal times. On the contrary the true statement is that straight lines are that family of lines which particles, so far as they are unacted upon, describe, and that equal spaces are such spaces as such a particle describes in equal times. There are some further consequences of this principle the statement of which it will be convenient to postpone for a few minutes.

In the fourth place, since Space presents a law whose prescriptions are nothing but conditions of reactions, and since reaction is Duality, it follows that the conditions of the prescriptions of space are necessarily Dual. Hence immediately follow five corollaries. The first is that all forces are between pairs of particles. The second is that, when two places of the path of an isolated particle are determined, the law determines all the other places; so that two different straight lines cannot have two different points in common. The third corollary is that when the places of an isolated body at two instants are given, the law prescribes its places at all other instants. That is, the first differential coefficient, or mere difference between the places at two instants, determines its places at all other instants. That is, the velocity remains constant. From these corollaries again, together with the general principle from

* See P. R. J. Boscovich, *Theoria philosophiae naturalis*, §7, 81, Vienna (1758).

† See 86f.

which they are derived, it follows that when a body is acted upon by another body that which is directly affected is the uniform velocity in a straight line, and that in such a way that, in so far as the action of the active body remains the same, two velocities or, what comes to the same thing, three positions with their dates, determine all the velocities the particle will take. This explains, therefore, why the force should produce acceleration rather than any other differential coefficient of the space relatively to the time. Hence, it further follows that a force at each moment of time acts to impart to the body a new rectilinear motion; whence it follows that forces will necessarily be compounded according to a parallelogram of forces. In the non-Euclidean geometry this is only so far modified that the parallelograms must be drawn infinitely small. And it further follows that the line of the force is the straight line through the two particles. There is still another apparent consequence; but I am not satisfied with the reasoning, since it rests upon a principle I am unable abstractly to define. I will, however, state it for what it is worth. Namely, since the force acts to impart an acceleration and since the law presented in space is perfectly general and comprehensive, it follows that the acceleration imparted may be different in kind and not merely in amount from the acceleration the particle already possesses. That is the point I consider doubtful. If it be admitted, it certainly follows that space must have at least three dimensions. Moreover, it again follows as a fourth corollary from space being a law of reactive conditions that, except for the quality of the particles themselves, it is the pure spatial determination which prescribes what the reaction of one particular particle upon another shall be; that is, the force between two particles depends only upon their qualities and their places at the instant. Moreover, as a fifth corollary, it follows that the mechanical law only prescribes how a *pair* of particles will act. It does not generally prescribe any relation between the actions of different pairs of particles, nor even of the action of a particle upon particles of the same kind placed differently. Hence, not only may different kinds of pairs of particles act differently, but the law of the variation of the action with the relative positions is left to depend upon the qualities of the particles, and this so com-

pletely that there is nothing to prevent a particle exercising different forces on different sides of it.

In the fifth place, from the fact that space presents a law of reciprocal reactions, several corollaries follow, particularly these two. First, when one particle, *A*, acts on another, *B*, this latter, *B*, will likewise act on *A*; and moreover this action cannot impart to both the same acceleration, because the law is such as to affect their relative places. This follows by the aid of the third principle already enunciated, as we shall see. Hence, it can only impart opposite accelerations to *A* and *B*. Secondly, those two accelerations must be equal, so that the masses of all atomcules are equal. From this, again, it follows that the masses are unchangeable; and further that if two bodies, or aggregates of atomcules, react upon one another in a certain ratio to one another, in that same ratio they will also react upon any third body.

A sixth principle, concerning the necessity of which some doubt may be entertained, is that, the law presented by space being perfectly general, every motion must admit of receiving the same kind of changes as every other. From this, if it be admitted, it certainly follows, though the demonstration is far too long to give, that space has either 1, 2 or 4 dimensions. Hence, since 1 and 2 dimensionality have been already excluded, the number of dimensions ought to be just 4.

I will now mention the postponed corollaries from the third principle. Since space has only the being of a law, its places cannot have distinct identities in themselves, for distinct identity belongs only to existent things. Hence place is only relative. But since, at the same time, different motions must be comparable in quantity, and this comparison cannot be effected by the moving and reacting particles themselves, it follows that another object must be placed in space to which all motion is referred. And since this object compares generally and thus partakes of the nature of law, it must unlike the moving and reacting bodies be continuous. It is a corrected equivalent of that which has been called the body *alpha*. It is the firmament, or Cayley's absolute.* Since this is to determine every motion, it follows that it is a locus which every straight line cuts, and because space is a law of

* Cf. 4.145.

twoness only, and for other reasons, every straight line must cut it in two points. It is therefore a real quadratic locus, severing space into two parts, and the space of existence must be infinite and limited in every direction.

83. I have thus briefly stated one side of my theory of space. That is, without touching upon the question of the derivation of space and its properties, or how accurately it may be supposed to *fulfill its ideal conditions*, I have given a hypothesis from which those ideal properties may be deduced. Many of the properties so deduced are known to be true, at least approximately. Others, I am happy to say, are extremely doubtful. I say I am happy because this gives them the character of predictions and renders the hypothesis capable of experiential confirmation or refutation. One of the doubtful properties, the last mentioned, I have succeeded I think in proving to be true by calculations from the proper motions of the stars. Another, that about atoms attracting differently in different directions, I have succeeded in making highly probable, from chemical facts. Still others have some evidence in their favor. The consequence most opposed to observation is the doubtful one of 4 dimensions.

84. Endeavoring to generalize the results that have been obtained, we may say that the continuity of space so acts as to cause an object to be affected by modes of existence not its own, not as participating in them but as being opposite to them. For instance, an isolated particle is at any instant at one point; that is its actual state. But it is so affected by the state which is not actual, but belongs to it by a date differing from the actual [in] one way, that, at a date differing from the actual the other way, it takes a state differing in the opposite way from its actual state. So again, when a force acts upon a body the effect of it is that the mean of the states of the body not actual, but indefinitely approximating to the actual, differs from its actual state. So in the action and reaction of bodies, each body is affected by the other body's motion, not as participating in it but as being opposite to it. But if you carefully note the nature of this generalized formula you will see that it is but an imperfect, somewhat particularized restatement of the principle that space presents the law of the reciprocal reactions of existents. Various other such imperfect formulæ might be mentioned.

85. Let us now consider non-conservative actions. These are all distinguished by asymptotic approach to a definite state of relative rest. Conservative force can never bring about any state of rest except for an instant. It can only produce, I believe, three permanent changes. Namely, it can permanently change the direction [of] motion of a body, and this it does because the body moves away out of the range of the force, or it can cause one body to rotate round another in an inward spiral, more and more rapidly. And third, a planet like Jupiter may turn the motion of a small body and then move away and leave the small body performing permanently, or quasi-permanently, an orbit round the sun. In course of time, however, Jupiter will come round again in such a way as to throw it out. This is a very curious case. Chance is an important factor of it. But all the non-conservative quasi-forces produce states of relative rest. Such, for example, is the effect of viscosity. These states of relative rest are states of uniform distribution which upon minuter inspection turn out to be really states of fortuitous distribution. They betray their real nature by the probability curve, or some modification of it, playing a part in the phenomenon. Such, for example, is the case in the conduction of heat.

§6. TIME

86. When we ask why chance produces permanent effects, the natural answer which escapes from our lips is that it is because of the independence of different instants of time. A change having been made, there is no particular reason why it should ever be unmade. If a man has won a napoleon at a gaming table he is no more likely to lose it than he was to lose a napoleon at the outset. But we have no sooner let slip the remark about the independence of the instants of time than we are shocked by it. What can be less independent than the parts of the continuum *par excellence*, through the spectacles of which we envisage every other continuum? And although it may be said that continuity consists in a binding together of things that are different and remain different, so that they are in a measure dependent on one another and yet in a measure independent, yet this is only true of finite parts of the continuum, not of the ultimate elements nor even of the

infinitesimal parts. Yet it undoubtedly is true that the permanence of chance effects is due to the independence of the instants of time. How are we to resolve this puzzle? The solution of it lies in this, that time has a point of discontinuity at the present. This discontinuity appears in one form in conservative actions where the actual instant differs from all other instants absolutely, while those others only differ in degree; and the same discontinuity appears in another form in all non-conservative action, where the past is broken off from the future as it is in our consciousness. Thus, although the other instants of time are not independent of one another, independence does appear at the actual instant. It is not an utter, complete independence, but it is absolute independence in certain respects. Perhaps all fortuitous distribution originates from a fortuitous distribution of events in time; and this alone has no other explanation than the Law of Sufficient Reason, that is, is an absolute First. It is a truth well worthy of rumination that all the intellectual development of man rests upon the circumstance that all our action is subject to error. *Errare est humanum* is of all commonplaces the most familiar. Inanimate things do not err at all; and the lower animals very little. Instinct is all but unerring; but reason in all vitally important matters is a treacherous guide.* This tendency to error, when you put it under the microscope of reflection, is seen to consist of fortuitous variations of our actions in time. But it is apt to escape our attention that on such fortuitous variation our intellect is nourished and grows. For without such fortuitous variation, habit-taking would be impossible; and intellect consists in a plasticity of habit.

87. What is time?† Shall we say that it is the form under which the law of logical dependence presents itself to intuition? But what is logical dependence objectively considered? It is nothing but a necessitation which, instead of being brute, is governed by law. Our hypothesis therefore amounts to this, that time is the form under which logic presents itself to objective intuition; and the signification of the discontinuity at the actual instant is that here new premisses, not logically derived by Firsts, are introduced.

* See I.652ff.

† Cf. I.489ff.

CHAPTER 4

VARIETY AND UNIFORMITY

§1. VARIETY*

88. . . . The question, what are the shares of uniformity and variety in the phenomena of the universe, is a question which has never been agitated in any public dispute that has attracted general attention. The consequence is that everybody in a semi-unconscious way forms his own opinion about it, usually a pretty vague opinion; and he has the impression that all his neighbors think as he does about it. But, on questioning people closely, it will be found that there are no less than *five* different opinions that are widely spread on this subject.† I will briefly state them and point out just how much arbitrariness each supposes.

89. Beginning with the middling one, in the degree of arbitrariness that it allows, which is, no doubt, the opinion of the largest party among those who know enough of dynamics to entertain such a conception, this view is that the material universe is composed of particles of some kind, each having at any one instant its position in space, and also its velocity, determinate in direction and in amount; and it is held that physical laws are of such a nature that according to the positions of the particles at any instant their velocities are, at that instant, changing at perfectly determinate rates and in perfectly determinate directions. This party holds that, if this statement were rendered definite by indicating just what these accelerations are in each position of the particles, it would be the perfect *résumé* of all the laws of nature. As for consciousness, these persons hold that its states are rigidly dependent upon the instantaneous states of the physical universe, and that it need not be taken into account in saying what will happen in that universe.

This theory makes the uniformity to be perfectly exact and

* From the sixth Lowell Lecture of 1903.

† Cf. 101.

inflexible. It is such that, given the positions and velocities of all the particles at any one instant, the positions and velocities at all other instants are precisely determined and with these the exact phenomena of all consciousness and feeling. But it supposes the positions and velocities of all the particles at one instant to be entirely arbitrary. It further regards the law itself, although as a law it is general, [as] yet arbitrary in respect to what its requirements are.

90. If we designate the five classes of minds who entertain the five opinions by the first five letters of the alphabet, the *A*'s being the persons who admit the least arbitrariness and the *E*'s being those who admit the most, then the opinion just formulated is that of the *C*'s. If you should be out walking on a fine starlit night in company with a *B* and a *C*, and were to point up to the heavens and ask your companions whether they supposed there was any law determining the arrangement of the stars, *C* would smile and would remark that not a single law of that description had ever been discovered yet. Thereupon *B* would exclaim, "What! Do you mean to say there is no regularity in the arrangement of the stars when there is the Milky Way before your eyes!" "Oh," *C* would reply, "there is a rough and irregular compression of the cluster in which we happen to find ourselves. But, assuming the Nebular Hypothesis to be true, that could hardly escape coming about in consequence of the cluster being very much condensed from a former state in which its velocity happened to be a little greater on one side than on the other, which constituted a rotation. But however it came about, the fact that the arrangement is so excessively rough shows at once that it is due to some accident and not to law, since the effects of law are rigidly exact." To this *B* might perhaps reply, "I do not think your explanation very satisfactory. You suppose that a manifest regularity of arrangement among millions of stars is the effect of an accident. It seems much easier to suppose that the regularity of arrangement was once perfect, but that the motions of the separate stars have deranged it." While this dialogue has been going on an adherent of the sect of *A*'s has joined the group. He now says, "But you surely will admit that if the original perfect symmetry of arrangement has been broken up, probably in its passage into some dif-

ferent form of symmetry, the present apparently irregular arrangement must have been fully intended by the Creator." *B* replies, "I do not quite know that I am prepared to admit that the world ever was created. But even if it was, while the positive intentions of the Creator must have been fulfilled, we need not suppose that he expressly intended every relation between facts. If the Dowager Empress of China happens to have a fit of coughing and just at that moment I, on the other side of the globe, happen to take a piece of hoarhound candy, we need not suppose that this coincidence was any part of the Creator's plan." *A* replies, "I believe that Providence overrules every fact and relation however trivial; and even if I were in your state of scepticism, I should still hold it to be inconceivable that any state of facts should fail to conform to some law. You cannot shuffle a pack of cards so that there is no mathematically exact relation between the arrangement before shuffling and the arrangement after shuffling."

So there you have the three commonest forms of necessitarianism. *A* holds that every feature of all facts conforms to some law. *B* holds that the law fully determines every fact, but thinks that some relations of facts are accidental. *C* holds that uniformity within its jurisdiction is perfect, but confines its application to certain elements of phenomena.

91. The party of the *D*'s, of which I am myself a member, holds that uniformities are never absolutely exact, so that the variety of the universe is forever increasing. At the same time we hold that even these departures from law are subject to a certain law of probability, and that in the present state of the universe they are far too small to be detected by our observations. We adopt this hypothesis as the only possible escape from making the laws of nature monstrous arbitrary elements. We wish to make the laws themselves subject to law. For that purpose that law of laws must be a law capable of developing itself. Now the only conceivable law of which that is true is an evolutionary law. We therefore suppose that all law is the result of evolution, and to suppose this is to suppose it to be imperfect.

92. Finally, there are those who suppose nature to be subject to freaks, who believe in miracles not simply as manifestations of superhuman power but as downright violations

of the laws of nature, absolutely abnormal. Professor Newcomb, for example, in a series of articles which he contributed to the *Independent*, suggests that the human will has a power of deflecting the motions of particles, in plain violation of the third law of motion. I do not think, by the way, that it is generally known that some of the early Fathers of the Church refused to believe in physical miracles; and apparently attributed them to a superhuman hypnotic power, reminding one of what the Hindoo jugglers have made British officers think they saw. St. Augustine,* on the contrary, while holding it impious to think them to be violations of Nature's Laws, regards them apparently as occurrences that are to us what the reading of a letter by a man might seem to a dog to be, namely, a manifestation of some higher mastery of things than would be compatible with his nature.

93. One fallacy into which the necessitarians of class C generally fall is that they imagine that they can disprove that anything happens by chance by showing that the *event* has a cause. Thus Boëthius, at the beginning of the fifth book of his *Consolations*, after citing Aristotle as a necessitarian,† which is enough to take one's breath away, so monstrous is the blunder or the impudence of it, has a little ode of twelve lines which Mr. Henry Roshier James translates in 24,‡ that imitate the swing of the original very well, but miss the point. By a geographical fiction Boëthius represents that the Tigris and the Euphrates flow from a common lake. Now suppose a boat to be wrecked in that lake and one part of it is carried down the Tigris, the other part down the Euphrates, and where these rivers, after being separate for hundreds of miles, flow together again those two parts of the boats are dashed against one another. There is a fortuitous event if there ever was one; and yet, says Boëthius, the currents forced them to move just as they did so that there was no chance about it. True, the existential events were governed by law. But when we speak of *chance*, it is a question of *cause*. Now it is the ineluctable blunder of a nominalist, as Boëthius was, to

* *De Trinitate*, bk. III, ch. 10.

† Boëthius, *De Consolatione Philosophiae*, Liber v, 1, cites Aristotle's *Physica*, II, 5, 196b.

‡ *Consolations of Boëthius*, translated by H. R. James, pp. 229-230, London (1897).

talk of the cause of an event. But it is not an existential *event* that has a cause. It is the *fact*, which is the reference of the event to a general relation, that has a cause.* The *event*, it is true, was governed by the law of the current. But the *fact* which we are considering is that the two pieces that were dashed together had long before belonged together. That is a fact that would not happen once in ten thousand times, although when you join to this fact various circumstances of the actual event, and so contemplate quite *another* fact, it would happen every time, no doubt. That is to say, nobody can doubt it but an adherent of the *E*'s sect. The example is a very good one as showing that the causal necessitation of more concrete *fact* does not prevent a more prescinded,† or general, *fact* of the same event from being quite fortuitous. The position of Aristotle in this matter is altogether right, and not “*veri propinqua ratione*” as Boëthius says; but it is a position that nobody can understand who is completely immersed in the state of mind of modern philosophy. Zeller,‡ for example, does not seize it at all.

94. But let us drop metaphysics and return to logic. It was Hobbes§ who first said, referring to and combating Aristotle's doctrine, “Men commonly call that *casual* whereof they do not perceive the necessary cause,” for Hobbes was a typical stoic in his philosophy. Leibnitz¶ emphatically agrees with Hobbes. “Fort bien,” he says. “J'y consens, si l'on entend parler d'un hasard réel. Car la fortune et le hasard ne sont que des apparences, qui viennent de l'ignorance des causes, ou de l'abstraction qu'on en fait.” This has been said a thousand times since with an air as if it explained the whole thing. I do not doubt that that is the impression of almost everybody in this hall. But I am quite sure that most of you will be glad to reëxamine the question with me. I will just give you the headings of some thoughts about it, which, if it is not too great a liberty, I would suggest that you take note of and carefully pursue by yourselves when you find leisure. I wish in the latter part of this lecture to make some

* Cf. 67.

† See 1.549n and 2.428 for a definition of this term.

‡ See his *Die Philosophie der Griechen*, 2^{te} Auf., pp. 252-55.

§ *Elements of Philosophy*, Pt. II, ch. 10.

¶ See the 2^{me} Appendice to his *Théodicée*, §5.

remarks of great importance in many reasonings; and in order to get any time for those remarks I shall be obliged to make my statement of this part so brief that only the most thorough student of philosophy could fully grasp the meaning of it at the single hearing.

95. The first thing to be taken into consideration is the general upshot of Kant's *Critic of the Pure Reason*. The first step of Kant's thought — the first *moment* of it, if you like that phraseology — is to recognize that all our knowledge is, and forever must be, relative to human experience and to the nature of the human mind. That conception being well digested, the second moment of the reasoning becomes evident, namely, that as soon as it has been shown concerning any conception that it is essentially involved in the very forms of logic or other forms of knowing, from that moment there can no longer be any rational hesitation about fully accepting that conception as valid for the universe of our possible experience. To repeat an example I have given before, you look at an object and say "That is red." I ask you how you prove that. You tell me you see it. Yes, you see *something*; but you do not see *that it is red*; because *that it is red* is a proposition; and you do not see a proposition. What you see is an image and has no resemblance to a proposition, and there is no logic in saying that your proposition is proved by the image. For a proposition can only be logically based on a premiss and a premiss is a proposition. To this you very properly reply, with Kant's aid, that my objections allege what is perfectly true, but that instead of showing that you have no right to say the thing is red they conclusively prove that you are logically justified in doing so. At this point, the idealist appears before the tribunal of your reason with the suggestion that since these metaphysical conceptions, that repose upon their being involved in the forms of logic, are only valid for experience and since all our knowledge is relative to the human mind, they are not valid for things as they objectively are; and since the conception of *existence* is pre-eminently a conception of that description, it is a mere fairy tale to say that outward objects *exist*, the only objects of possible experience being our own ideas. Hereupon comes the third moment of Kant's thought, which was only made prom-

inent in the second edition, not, as Kant truly says, that it was not already in the book, but that it was an idea in which Kant's mind was so completely immersed that he failed to see the necessity of making an explicit statement of it, until Fichte misinterpreted him. It is really a most luminous and central element of Kant's thought. I may say that it is the very sun round which all the rest revolves. This third moment consists in the flat denial that the metaphysical conceptions do not apply to things in themselves. Kant *never* said that. What he said is that these conceptions do not apply beyond the limits of possible experience. But we have *direct experience of things in themselves*.* Nothing can be more completely false than that we can experience only our own ideas. That is indeed without exaggeration the very epitome of *all* falsity. Our knowledge of things in themselves is entirely *relative*, it is true; but all experience and all knowledge is knowledge of that which is, independently of being represented. Even lies invariably contain this much truth, that they represent themselves to be referring to something whose mode of being is independent of its being represented.† This is true even if the proposition relates to an object of representation as such. At the same time, no proposition can relate, or even thoroughly pretend to relate, to any object otherwise than as that object is represented. These things are utterly unintelligible as long as your thoughts are mere dreams. But as soon as you take into account that Secondness that jabs you perpetually in the ribs, you become awake to their truth. Duns Scotus and Kant are the great assertors of this doctrine, for which Thomas Reid deserves some credit too. But Kant failed to work out all the consequences of this third moment of thought and considerable retractions are called for, accordingly, from some of the positions of his Transcendental Dialectic. Nor in other respects must it be supposed that I assent to everything either in Scotus or in Kant. We all commit our blunders.

96. To this first consideration, it is necessary to add, in the second place, that of the great difference in the logical

* Cf. 108.

† Cf. 5.340.

status of the future and the past, which Aristotle* stated with great emphasis without finding anybody in modern times to comprehend what he said, not even Trendelenburg,† who comes the nearest to it. Aristotle is understood by modern critics to be in a childish naïve state of mind on this subject. Now it is quite true that Aristotle was almost the first pioneer in logic and just stood at its threshold. It is also true that there are some monumental follies in his physical books; but the worst of these may fairly be presumed to be insertions made by different students during the thirty years when his manuscripts lay on the shelves of his school for general use. But Aristotle was by many lengths the greatest intellect that human history has to show; and it was precisely in such fields of thought, as this distinction of past and future time, that his mind was the most thoroughly trained. So gigantic is his power of thought that those critics may almost be excused who hold it to be impossible that all of the books that have come down to us as his should all have been produced by one man. I am ashamed to have to confess that I shared the general opinion of Aristotle's childish naïveté in those passages, until the further progress of my own studies forced me to the very substance of what Aristotle says. The past is ended and done; the future is endless and can never have been done. To be sure, if we regard past time as having had no beginning, then, when we make general assertions concerning it, we can only be talking of it as an object of possible experience, that is, of what future researches may bring to light. Hence it might be inferred that the contrast Aristotle speaks of between the past and the future might be merely subjective, having to do with our different attitude toward them. But even a moderate appreciation of the Kantian argument will show that, besides being true in regard to our knowledge of time, it must also be regarded as true of *real* time; and time *is* real, whether we accept Kant's dubious view of it, which he is certainly far from making evident, as the form of the internal sense, or not. I do not question Time's being a *form*, that is, being of the nature of a Law, and not an Existence; nor its being an Intuition, that is, being at the same time a single object; nor

* *De Interpretatione*, 18a, 28–19b, 4.

† See *Historische Beiträge zur Philosophie*, 2^{te} Bd., S. 168, Berlin (1855).

its having a special connection with the internal world. But I doubt very much whether Kant has succeeded in rightly stating the connection between those three features of Time.

97. Now there are three characters which mark the universe of our experience in a way of their own. They are Variety, Uniformity, and the passage of Variety into Uniformity. By the Passage of Variety into Uniformity, I mean that variety upon being multiplied almost in every department of experience shows a tendency to form *habits*. These habits produce statistical uniformities. When the number of instances entering into the statistics are small compared with the degree of their variation, the law will be extremely rough, but when the number runs up into the trillions, that is to say cubes of millions, or much higher, as in the case of molecules, there are no departures from the law that our senses can take cognizance of.

§2. UNIFORMITY*

98. (1) A fact consisting in this: that, of a certain genus of facts, a proportion approaching unity (the whole) belongs, in the course of experience, to a certain species; so that, though of itself the knowledge of this uniformity gives no information concerning a certain thing or character, yet it will strengthen any inductive conclusion of a certain kind.

It is, therefore, a high objective probability concerning an objective probability. There are, in particular, four classes of uniformities, the knowledge of any of which, or of its falsity, may deductively strengthen or weaken an inductive conclusion. These four kinds of uniformity are as follows:

i. The members of a class may present an extraordinary resemblance to one another in regard to a certain line of characters. Thus, the Icelanders are said to resemble one another most strikingly in their opinions about general subjects. Knowing this, we should not need to question many Icelanders, if we found that the first few whom we met all shared a common superstition, in order to conclude with considerable confidence that nearly all Icelanders were of the same way

* *Baldwin's Dictionary*, vol. 2, pp. 727-731, The Macmillan Co., New York (1902).

of thinking. Philodemus* insists strongly upon this kind of uniformity as a support of induction.

ii. A character may be such that, in whatever genus it occurs at all, it almost always belongs to all the species of that genus; or this uniformity may be lacking. Thus, when only white swans were known, it would have been hazardous to assert that all swans were white, because whiteness is not usually a generic character. It is considerably more safe to assert that all crows are black, because blackness is oftener a generic character. This kind of uniformity is especially emphasized by J. S. Mill as important in inductive inquiries.†

iii. A certain set of characters may be intimately connected so as to be usually all present or all absent from certain kinds of objects. Thus, the different chemical reactions of gold are so inseparable that a chemist need only to succeed in getting, say, the purple of Cassius to be confident that the body under examination will show every reaction of gold.

iv. Of a certain object it may be known that its characteristic is that when it possesses one of a set of characters within a certain group of such sets, it possesses the rest. Thus, it may be known of a certain man that to whatever party he belongs, he is apt to embrace without reserve the entire creed of that party. We shall not, then, need to know many of his opinions, say in regard to politics, in order to infer with great confidence his position upon other political questions.

99. (2) The word "uniformity" plays such a singular and prominent rôle in the logic of J. S. Mill that it is proper to note it.‡ He was apt to be greatly influenced by Ockham's razor in forming theories which he defended with great logical acumen; but he differed from other men of that way of thinking in that his natural candour led to his making many admissions without perceiving how fatal they were to his negative theories. In addition to that, perhaps more than other philosophers, in endeavouring to embrace several ideas under a common term, he often leaves us at a loss to find any other character common and peculiar to those notions except that of their having received from him that common designation.

* See Theodor Gomperz, *Herculaniſche Studien*, Pt. I (1865). Cf. 2.741, 2.761.

† *System of Logic*, bk. III, ch. 4, §2.

‡ Cf. 2.761f.

In one passage* of his *System of Logic* (1842), he declares, in reference to the difference in strength between two inductive conclusions, that whoever shall discover the cause of that difference will have discovered the secret of inductive reasoning. When, therefore, he shortly afterwards† points out that the distinction between those two inductions is that one of them is supported by a uniformity of the second of the above four classes, while the other is met by a distinct diversity of the same kind, and when he himself gives to that uniformity this designation when he afterwards declares that the validity of induction depends upon uniformity, his reader naturally supposes he means uniformity in that sense. But we find that he employs the word for quite another purpose. Namely, he does not like the word *law*, as applied to an inductive generalization of natural facts — such as the “law” of gravitation — because it implies an element in nature, the reality of a general, which no nominalist can admit. He, therefore, desires to call the reality to which a true universal proposition about natural phenomena corresponds a “uniformity.”‡

The implication of the word, thus used, is that the facts are, in themselves, entirely disconnected, and that it is the mind alone which unites them. One stone dropping to the earth has no real connection with another stone dropping to the earth. It is, surely, not difficult to see that this theory of uniformities, far from helping to establish the validity of induction, would be, if consistently admitted, an insuperable objection to such validity. For if two facts, *A* and *B*, are entirely independent in their real nature, then the truth of *B* cannot follow, either necessarily or probably, from the truth of *A*. If I have tried the experiment with a million stones and have found that every one of them fell when allowed to drop, it may be very natural for me to believe that almost any stone will act in the same way. But if it can be proved that there is no real connection between the behaviour of different stones, then there is nothing for it but to say that it was a chance coincidence that those million stones all behaved in the same way; for if there was any *reason* for it, and they

* *Op. cit.*, bk. III, ch. 3, §3.

† *Ibid.*, bk. III, ch. 4, §2.

‡ *Ibid.*, bk. III, ch. 4, §1.

really dropped, there was a *real reason*, that is, a real general. Now, if it is mere chance that they all dropped, that affords no more reason for supposing that the next will drop than my throwing three double sixes successively with a pair of dice is a reason for thinking that the next throw will be double sixes.

100. (3) But now we find that Mill's good sense and candour will not allow him to take the course which a Hobbes would have taken, and utterly deny the validity of induction; and this leads to a new use of the word *uniformity*, in which he speaks of the "uniformity of nature." Before asking exactly what this phrase means, it may be noted that, whatever it means, the assertion of it is an assent to scholastic realism, except for a difference of emphasis. For to say that throughout the whole course of experience, events always, or even only usually, happen alike under the same conditions (what is usually called the "invariability" of nature) is to assert an agreement (complete or partial) which could not be ascribed to chance without self-contradiction. For chance is merely the possible discrepancy between the character of the limited experience to which it belongs and the whole course of experience. Hence, to say that of the *real*, objective facts some *general* character can be predicated, is to assert the reality of a general. It only differs from scholastic realism in that Mill and his followers treat this aspect of the matter lightly — that is to say, the objective reality of the general — while the Scholastics regarded it as a great and vital feature of the universe. Instead of "uniformity" now importing that what others call "laws" are fabrications of the human mind, this "uniformity of nature" is erected by Mill into the greatest of laws and absolutely objective and real.

Let us now inquire what the "uniformity of nature," with its synonymous expressions that "the future resembles the past," and so forth, can mean. Mill* says that it means that if all the circumstances attending two phenomena are the same, they will be alike. But taken strictly this means absolutely nothing, since no two phenomena ever can happen in circumstances precisely alike, nor are two phenomena precisely alike. It is, therefore, necessary to modify the statement in order to give it any meaning at all; and it will be

* *Op. cit.*, bk. III, ch. 3, §1.

found that, however it may be so modified, the moment it begins to carry a definite meaning, one of three things results: it becomes either, first, grossly false, or, second, an assertion which there is really no good reason to believe even approximately true, or, thirdly, it becomes a quasi-subjective truth, not lending any colour of validity to induction proper. If, for example, we were to say that, under any given species of circumstances presenting any similarity, phenomena of any given genus would be found to have a specific general resemblance in contrast with the specific character of phenomena of the same genus occurring under a different species of circumstances of the same genus, this would be monstrously false, whether intended as an absolutely universal proposition or merely as one approximately true. Let, for example, the genus of phenomena be the values of the throws of a pair of dice in a given series of successive throws indefinitely continued. Let the first species of circumstances be that the ordinal number of a throw in the series is *prime*. It is pretty certain that there would be no general character in the corresponding values of throws to distinguish them from those which would result when the ordinal number is divisible by 2, or by 3, or by any other prime. It thus appears that when we take *any* genus of circumstances, the law turns out false. Suppose, then, that we modify it by saying that, taking any genus of phenomena and separating this into two species, there will be found in the discoverable circumstances *some* general resemblance for all those attending phenomena of the same species in contrast to those attending phenomena of the other species. This is a proposition which there is not the slightest reason to believe. Take, for example, as the genus of phenomena, the many thousands of Latin descriptions of American species of plants by Asa Gray and his scholars. Now consider the species of this genus of phenomena which agree in this respect, that the two first words of the description have their first vowels the same. There is no reason to suppose that there was any general respect in which the circumstances of that species of the genus of phenomena agree with one another and differ from others, either universally or usually. It is a mere chance result. It is true that some persons will not be inclined to assent to this judgment;

but they cannot prove it otherwise. It can afford no adequate basis for induction. We see, then, that when we consider *all* phenomena, there is no way of making the statement sufficiently definite and certain. Suppose, then, that we attempt still another modification of the law, that, of *interesting* resemblances and differences between phenomena, some considerable proportion are accompanied by corresponding resemblances and differences between those of the circumstances which appear to us to be *pertinent*. The proposition is now rather psychological than metaphysical. It would be impossible, with any evidentiary basis, to strengthen the expression "some considerable proportion"; and in other respects the statement is vague enough. Still, there is sufficient truth in it, perhaps, to warrant the presumptive adoption of hypotheses, provided this adoption merely means that they are taken as sufficiently reasonable to justify some expense in experimentation to test their truth by induction; but it gives no warrant at all to induction itself. For, in the first place, induction needs no such dubious support, since it is mathematically certain that the general character of a limited experience will, as that experience is prolonged, approximate to the character of what will be true in the long run, if anything is true in the long run. Now all that induction infers is what would be found true in the usual course of experience, if it were indefinitely prolonged. Since the method of induction must generally approximate to that truth, that is a sufficient justification for the use of that method, although no definite probability attaches to the inductive conclusion. In the second place, the law, as now formulated, neither helps nor hinders the validity of induction proper; for induction proper consists in judging of the relative frequency of a character among all the individuals of a class by the relative frequency of that character among the individuals of a random sample of that class. Now the law, as thus formulated, may tend to make our hypothesis approximately true; but that advantage has been gained before the operation of induction, which merely tests the hypothesis, begins. This inductive operation is just as valid when the hypothesis is bad as when it is good, when the character dealt with is trivial as when it is interesting. The ratio which induction ascertains

may be nearer $\frac{1}{2}$, and more remote from 1 or 0, when the characters are uninteresting; and in that case a larger number of instances will usually be requisite for obtaining the ratio with any given degree of precision (for if the ratio is really 1 or 0, it will be almost a miracle if in the sample it is far from that ratio, although this will not be impossible, if the whole class is infinite), but the essential validity of the process of induction remains unaffected by that circumstance.

What is usually meant by the uniformity of nature probably is that in proportion as the circumstances are alike or unlike, so are any phenomena connected with them alike or unlike. It may be asked to what degree nature is uniform in that sense. The only tenable answer is that it is as little uniform as it possibly could be imagined to be; for were any considerable proportion of existing uniformities, or laws, of nature destroyed, others would necessarily thereby result.

In fact, the great characteristic of nature is its diversity. For every uniformity known, there would be no difficulty in pointing out thousands of non-uniformities; but the diversities are usually of small use to us, and attract the attention of poets mainly, while the uniformities are the very staff of life. Hence, the higher and wider are our desires the greater will be the general impression of uniformity produced upon us by the contemplation of nature as it interests us.

101. (4) There are senses in which nature may not irrationally be held to be uniform; but opinions differ very widely as to the extent and nature of this uniformity. The chief of these are as follows:

(a) The majority of physicists, at least of the older generation, hold, with regard to the physical universe, that its elements are masses, their positions, and the variations of these positions with time. It is believed that every motion exactly obeys certain laws of attraction and repulsion; and there is no other kind of law, except that each atom or corpuscle is a centre of energy arranged in equipotential surfaces about it, which follow a regular law; and that this is a permanency. But the equations of motion are differential equations of the second order, involving, therefore, two arbitrary constants for each moving atom or corpuscle, and there is no uniformity connected with these constants. At least, no such

uniformity is, with the least probability, discoverable. As for the distribution of potential about an atom or corpuscle, it is regular; but there is no ulterior reason for that regularity, or, at least, none is probably discoverable. What is absolutely beyond discovery, whether direct and specific or indirect and general, may be considered to be non-existent.

From this usual and in some sense standard opinion there are many divergences in both directions. First, in the direction of greater uniformity.

(b) Some hold that there is some exact uniformity in the arbitrary constants of the motion of the atoms, so that, for example, perhaps at some initial instant they all had some symmetrical or regular arrangement, like a pack of cards unshuffled; and that the velocities at that instant were regular also. But this regularity being of a purely aesthetic or formal kind, and the laws of motion equally formal and unrelated to any purpose, it follows that all kinds of arrangements will be produced, ungoverned by any uniformity, but mere effects of chance. Three stars may, for example, at some instant form an equilateral triangle; but there would be no particular reason for this: it would be merely a casual coincidence.

(c) Others go farther and maintain that the constants of position and velocity are subject to a law not merely formal, but are governed by final causes in such a way that there is no arrangement or coincidence whatever which was not specially intended by the Creator. To this theory, such words as *providence* and *fore-knowledge* are ill adapted; because the two constants which each atom or corpuscle has remain constant throughout all time, and ought not to be considered as having been fixed at any particular epoch. The very idea is that the arrangement is determined by what would be the result of different arrangements at each period of time. If, for example, a given prayer effects rain, it must be supposed that, in view of that prayer, and as its consequence, the different atoms had the appropriate constants; but that these were not given to the atoms at any particular epoch, being permanent values. Any intentional action on the part of a free agent is to be explained in the same way. If an agent is to be supposed really free, it is difficult to see what other physical explanation is compatible with the exactitude of law. This seems to be sub-

stantially the notion of most of those who have supported free will.

On the other hand, many philosophers suppose a less degree of uniformity in nature than is supposed in opinion (a). Of these the following have come to the present writer's notice as being actually defended.

(d) Some suppose that while law is absolute, yet there are constantly arising cases analogous to unstable equilibrium in which, owing to a passage of a velocity through infinity or otherwise, the law does not determine what the motion shall be. Thus if one Boscovichian point attracts another inversely as the square of the distance, and they move in one straight line, then when they come together they may move through one another, or move backwards on the same line, or may separate along any other line, without violating the differential equation. Such "singularities," as the mathematicians say, are theoretically possible; and may be supposed to occur very often. But to suppose that free action becomes possible in such a way is very illogical. In the first place, it supposes a direct interaction between "mind" and matter; infinitesimal, no doubt, but none the less real. Why not better suppose a slight but finite action of this kind, and so avoid the following objections? Namely, in the second place, this is to put faith, not scientific credence, in the inductive laws of matter infinitely beyond what induction can ever warrant. We know very well that mind, in some sense, acts on matter, and matter on mind: the question is *how*. It is not in speculations of this fanciful kind that the true answer is likely to be found. In the third place, although this speculation wanders so far beyond all present knowledge, it nevertheless comes into conflict with a legitimate induction, namely, the supposition of any real "singularity" or breach of continuity in nature is in as distinct conflict with all our knowledge as is a miracle.

(e) Sundry far less tenable hypotheses of lacunae between inviolable laws have often been proposed. One opinion frequently met with is that the law of energy does not prescribe the direction of velocity, but only its amount; so that the mind may cause atoms to "swerve," in regular Lucretian fashion.* This singular notion has even been embraced by

* See *De rerum natura*, bk. II, ll. 284-293.

mathematicians, who are thinking of a projectile shot into a curved tube, or other case of an equation of condition. Of course, if mind can construct absolute constraints, it can much easier exert force that is finite. Other writers suppose lacunae, without telling us of what particular description they are; they seem to think law is absolute as far as it goes, but that its jurisdiction is limited.

(f) Much more philosophical and less logically objectionable is the notion of St. Augustine and others (it is near to the opinion of Aristotle) that the only fundamental kind of causation is the action of final causes, and that efficient causation is, in all cases, secondary. Accordingly, when a miracle occurs there is no violation of the real *cursus naturae*, but only of the apparent course of things.

(g) The hypothesis suggested by the present writer is that all laws are results of evolution; that underlying all other laws is the only tendency which can grow by its own virtue, the tendency of all things to take habits. Now since this same tendency is the one sole fundamental law of mind, it follows that the physical evolution works towards ends in the same way that mental action works towards ends, and thus in one aspect of the matter it would be perfectly true to say that final causation is alone primary. Yet, on the other hand, the law of habit is a simple formal law, a law of efficient causation; so that either way of regarding the matter is equally true, although the former is more fully intelligent. Meantime, if law is a result of evolution, which is a process lasting through all time, it follows that no law is absolute. That is, we must suppose that the phenomena themselves involve departures from law analogous to errors of observation. But the writer has not supposed that this phenomenon had any connection with free will. In so far as evolution follows a law, the law of habit, instead of being a movement from homogeneity to heterogeneity, is growth from difformity to uniformity. But the chance divergences from law are perpetually acting to increase the variety of the world, and are checked by a sort of natural selection and otherwise (for the writer does not think the selective principle sufficient), so that the general result may be described as "organized heterogeneity," or, better, rationalized variety. In view of the principle of con-

tinuity, the supreme guide in framing philosophical hypotheses, we must, under this theory, regard matter as mind whose habits have become fixed so as to lose the powers of forming them and losing them, while mind is to be regarded as a chemical genus of extreme complexity and instability. It has acquired in a remarkable degree a habit of taking and laying aside habits. The fundamental divergences from law must here be most extraordinarily high, although probably very far indeed from attaining any directly observable magnitude. But their effect is to cause the laws of mind to be themselves of so fluid a character as to simulate divergences from law. All this, according to the writer, constitutes a hypothesis capable of being tested by experiment.

Literature: Besides most treatises on LOGIC (q.v., especially inductive) see Renouvier and Prat, *La nouvelle Monadologie* (1899).

B. Synechism and Agapism

CHAPTER 5

THE LAW OF MIND*

§1. INTRODUCTION^E

102. In an article published in *The Monist* for January, 1891,† I endeavored to show what ideas ought to form the warp of a system of philosophy, and particularly emphasized that of absolute chance. In the number of April, 1892,‡ I argued further in favor of that way of thinking, which it will be convenient to christen *tychism* (from τύχη, chance). A serious student of philosophy will be in no haste to accept or reject this doctrine; but he will see in it one of the chief attitudes which speculative thought may take, feeling that it is not for an individual, nor for an age, to pronounce upon a fundamental question of philosophy. That is a task for a whole era to work out. I have begun by showing that *tychism* must give birth to an evolutionary cosmology, in which all the regularities of nature and of mind are regarded as products of growth, and to a Schelling-fashioned idealism which holds matter to be mere specialized and partially deadened mind. I may mention, for the benefit of those who are curious in studying mental biographies, that I was born and reared in the neighborhood of Concord — I mean in Cambridge — at the time when Emerson, Hedge, and their friends were disseminating the ideas that they had caught from Schelling, and Schelling from Plotinus, from Boehm, or from God knows what minds stricken with the monstrous mysticism of the East. But the atmosphere of Cambridge held many an anti-septic against Concord transcendentalism; and I am not conscious of having contracted any of that virus. Nevertheless, it is probable that some cultured bacilli, some benignant form

* *The Monist*, vol. II, pp. 533-559 (1892); the third paper of a series.

† See ch. 1.

‡ See ch. 2.

of the disease was implanted in my soul, unawares, and that now, after long incubation, it comes to the surface, modified by mathematical conceptions and by training in physical investigations.

103. The next step in the study of cosmology must be to examine the general law of mental action. In doing this, I shall for the time drop my tychism out of view, in order to allow a free and independent expansion to another conception signalized in my first *Monist* paper as one of the most indispensable to philosophy, though it was not there dwelt upon; I mean the idea of continuity*. The tendency to regard continuity, in the sense in which I shall define it, as an idea of prime importance in philosophy may conveniently be termed *synechism*. The present paper is intended chiefly to show what synechism is, and what it leads to. I attempted, a good many years ago, to develop this doctrine in the *Journal of Speculative Philosophy* (Vol. II)†; but I am able now to improve upon that exposition, in which I was a little blinded by nominalistic prepossessions. I refer to it, because students may possibly find that some points not sufficiently explained in the present paper are cleared up in those earlier ones.

§2. WHAT THE LAW IS

104. Logical analysis applied to mental phenomena shows that there is but one law of mind, namely, that ideas tend to spread continuously and to affect certain others which stand to them in a peculiar relation of affectibility. In this spreading they lose intensity, and especially the power of affecting others, but gain generality and become welded with other ideas.

I set down this formula at the beginning, for convenience, and now proceed to comment upon it.

§3. INDIVIDUALITY OF IDEAS

105. We are accustomed to speak of ideas as reproduced, as passed from mind to mind, as similar or dissimilar to one another, and, in short, as if they were substantial things; nor

* See 31.

† See 5.263, 5.311ff.

can any reasonable objection be raised to such expressions. But taking the word "idea" in the sense of an event in an individual consciousness, it is clear that an idea once past is gone forever, and any supposed recurrence of it is another idea. These two ideas are not present in the same state of consciousness, and therefore cannot possibly be compared. To say, therefore, that they are similar can only mean that an occult power from the depths of the soul forces us to connect them in our thoughts after they are both no more. We may note, here, in passing, that of the two generally recognized principles of association, contiguity and similarity, the former is a connection due to a power without, the latter a connection due to a power within.*

106. But what can it mean to say that ideas wholly past are thought of at all, any longer? They are utterly unknowable. What distinct meaning can attach to saying that an idea in the past in any way affects an idea in the future, from which it is completely detached? A phrase between the assertion and the denial of which there can in no case be any sensible difference is mere gibberish.

I will not dwell further upon this point, because it is a commonplace of philosophy.

§4. CONTINUITY OF IDEAS†

107. We have here before us a question of difficulty, analogous to the question of nominalism and realism. But when once it has been clearly formulated, logic leaves room for one answer only. How can a past idea be present? Can it be present vicariously? To a certain extent, perhaps, but not merely so; for then the question would arise how the past idea can be related to its vicarious representation. The relation, being between ideas, can only exist in some consciousness: now that past idea was in no consciousness but that past consciousness that alone contained it; and that did not embrace the vicarious idea.

108. Some minds will here jump to the conclusion that a past idea cannot in any sense be present. But that is hasty

* See 1.383, 5.7, 5.288f, 5.307.

† Cf. 182.

and illogical. How extravagant, too, to pronounce our whole knowledge of the past to be mere delusion! Yet it would seem that the past is as completely beyond the bounds of possible experience as a Kantian thing-in-itself.*

109. How can a past idea be present? Not vicariously. Then, only by direct perception. In other words, to be present, it must be *ipso facto* present. That is, it cannot be wholly past; it can only be going, infinitesimally past, less past than any assignable past date. We are thus brought to the conclusion that the present is connected with the past by a series of real infinitesimal steps.

110. It has already been suggested by psychologists that consciousness necessarily embraces an interval of time. But if a finite time be meant, the opinion is not tenable. If the sensation that precedes the present by half a second were still immediately before me, then, on the same principle, the sensation preceding that would be immediately present, and so on *ad infinitum*. Now, since there is a time, say a year, at the end of which an idea is no longer *ipso facto* present, it follows that this is true of any finite interval, however short.

But yet consciousness must essentially cover an interval of time; for if it did not, we could gain no knowledge of time, and not merely no veracious cognition of it, but no conception whatever. We are, therefore, forced to say that we are immediately conscious through an infinitesimal interval of time.

111. This is all that is requisite. For, in this infinitesimal interval, not only is consciousness continuous in a subjective sense, that is, considered as a subject or substance having the attribute of duration, but also, because it is immediate consciousness, its object is *ipso facto* continuous. In fact, this infinitesimally spread-out consciousness is a direct feeling of its contents as spread out. This will be further elucidated below. In an infinitesimal interval we directly perceive the temporal sequence of its beginning, middle, and end — not, of course, in the way of recognition, for recognition is only of the past, but in the way of immediate feeling. Now upon this interval follows another, whose beginning is the middle of the former, and whose middle is the end of the former. Here, we have an im-

* Cf. 95.

mediate perception of the temporal sequence of its beginning, middle, and end, or say of the second, third, and fourth instants. From these two immediate perceptions, we gain a mediate, or inferential, perception of the relation of all four instants. This mediate perception is objectively, or as to the object represented, spread over the four instants; but subjectively, or as itself the subject of duration, it is completely embraced in the second moment. (The reader will observe that I use the word *instant* to mean a point of time, and *moment* to mean an infinitesimal duration.) If it is objected that, upon the theory proposed, we must have more than a mediate perception of the succession of the four instants, I grant it; for the sum of the two infinitesimal intervals is itself infinitesimal, so that it is immediately perceived. It is immediately perceived in the whole interval, but only mediately perceived in the last two-thirds of the interval. Now, let there be an indefinite succession of these inferential acts of comparative perception, and it is plain that the last moment will contain objectively the whole series. Let there be, not merely an indefinite succession, but a continuous flow of inference through a finite time, and the result will be a mediate objective consciousness of the whole time in the last moment. In this last moment, the whole series will be recognized, or known as known before, except only the last moment, which of course will be absolutely unrecognizable to itself. Indeed, even this last moment will be recognized like the rest, or, at least, be just beginning to be so. There is a little *elenchus*, or appearance of contradiction, here, which the ordinary logic of reflection quite suffices to resolve.

§5. INFINITY AND CONTINUITY, IN GENERAL

112. Most of the mathematicians who during the last two generations have treated the differential calculus have been of the opinion that an infinitesimal quantity is an absurdity; although, with their habitual caution, they have often added "or, at any rate, the conception of an infinitesimal is so difficult, that we practically cannot reason about it with confidence and security." Accordingly, the doctrine of limits has been invented to evade the difficulty, or, as some say, to explain

the signification of the word "infinitesimal."* This doctrine, in one form or another, is taught in all the textbooks, though in some of them only as an alternative view of the matter; it answers well enough the purposes of calculation, though even in that application it has its difficulties.

113. The illumination of the subject by a strict notation for the logic of relatives had shown me clearly and evidently that the idea of an infinitesimal involves no contradiction,† before I became acquainted with the writings of Dr. Georg Cantor (though many of these had already appeared in the *Mathematische Annalen* and in *Borchardt's Journal*, if not yet in the *Acta Mathematica*, all mathematical journals of the first distinction), in which the same view is defended with extraordinary genius and penetrating logic.‡

114. The prevalent opinion is that finite numbers are the only ones that we can reason about, at least, in any ordinary mode of reasoning, or, as some authors express it, they are the only numbers that can be reasoned about mathematically. But this is an irrational prejudice. I long ago§ showed that finite collections are distinguished from infinite ones only by one circumstance and its consequences, namely that to them is applicable a peculiar and unusual mode of reasoning called by its discoverer, De Morgan, the "syllogism of transposed quantity."¶

Balzac, in the introduction of his *Physiologie du mariage*, remarks that every young Frenchman boasts of having seduced some French woman. Now, as a woman can only be seduced once, and there are no more French women than Frenchmen, it follows, if these boasts are true, that no French women escape seduction. If their number be finite, the reasoning holds. But since the population is continually increasing, and the seduced are on the average younger than the seducers, the conclusion need not be true. In like manner, De Morgan, as an actuary, might have argued that if an insurance company pays to its insured on an average more than they have ever

* See 4.118, 4.125.

† See 3.565ff.

‡ *Gesammelte Abhandlungen*, S. 139-140.

§ See 3.286f.

¶ See his *Formal Logic* (1847), pp. 165ff.

paid it, including interest, it must lose money. But every modern actuary would see a fallacy in that, since the business is continually on the increase. But should war, or other cataclysm, cause the class of insured to be a finite one, the conclusion would turn out painfully correct, after all. The above two reasonings are examples of the syllogism of transposed quantity.

The proposition that finite and infinite collections are distinguished by the applicability to the former of the syllogism of transposed quantity ought to be regarded as the basal one of scientific arithmetic.

115. If a person does not know how to reason logically, and I must say that a great many fairly good mathematicians — yea, distinguished ones — fall under this category, but simply uses a rule of thumb in blindly drawing inferences like other inferences that have turned out well, he will, of course, be continually falling into error about infinite numbers. The truth is such people do not reason at all. But for the few who do reason, reasoning about infinite numbers is easier than about finite numbers, because the complicated syllogism of transposed quantity is not called for. For example, that the whole is greater than its part is not an axiom, as that eminently bad reasoner, Euclid, made it to be. It is a theorem readily proved by means of a syllogism of transposed quantity, but not otherwise. Of finite collections it is true, of infinite collections false. Thus, a part of the whole numbers are even numbers. Yet the even numbers are no fewer than all the numbers; an evident proposition, since if every number in the whole series of whole numbers be doubled, the result will be the series of even numbers.

1, 2, 3, 4, 5, 6, etc.

2, 4, 6, 8, 10, 12, etc.

So for every number there is a distinct even number. In fact, there are as many distinct doubles of numbers as there are of distinct numbers. But the doubles of numbers are all even numbers.

116. In truth, of infinite collections there are but two grades of magnitude, the *endless* and the *innumerable*.* Just as a finite collection is distinguished from an infinite one by the applicability to it of a special mode of reasoning, the syllogism

* Cf. 4.113ff.

of transposed quantity, so, as I showed in the paper last referred to,* a numerable collection is distinguished from an innumerable one by the applicability to it of a certain mode of reasoning, the Fermatian inference, or, as it is sometimes improperly termed, "mathematical induction."†

As an example of this reasoning, Euler's demonstration of the binomial theorem for integral powers may be given. The theorem is that $(x+y)^n$, where n is a whole number, may be expanded into the sum of a series of terms of which the first is $x^n y^0$ and each of the others is derived from the next preceding by diminishing the exponent of x by 1 and multiplying by that exponent and at the same time increasing the exponent of y by 1 and dividing by that increased exponent. Now, suppose this proposition to be true for a certain exponent, $n = M$, then it must also be true for $n = M + 1$. For let one of the terms in the expansion of $(x+y)^M$ be written $Ax^p y^q$. Then, this term with the two following will be

$$Ax^p y^q + A \frac{p}{q+1} x^{p-1} y^{q+1} + A \frac{p}{q+1} \frac{p-1}{q+2} x^{p-2} y^{q+2}$$

Now, when $(x+y)^M$ is multiplied by $x+y$ to give $(x+y)^{M+1}$, we multiply first by x and then by y instead of by x and add the two results. When we multiply by x , the second of the above three terms will be the only one giving a term involving $x^p y^{q+1}$ and the third will be the only one giving a term in $x^{p-1} y^{q+2}$; and when we multiply by y the first will be the only term giving a term in $x^p y^{q+1}$, and the second will be the only term giving a term in $x^{p-1} y^{q+2}$. Hence, adding like terms, we find that the coefficient of $x^p y^{q+1}$ in the expansion of $(x+y)^{M+1}$ will be the sum of the coefficients of the first two of the above three terms, and that the coefficient of $x^{p-1} y^{q+2}$ will be the sum of the coefficients of the last two terms. Hence, two successive terms in the expansion of $(x+y)^{M+1}$ will be

$$\begin{aligned} & A \left[1 + \frac{p}{q+1} \right] x^p y^{q+1} + A \frac{p}{q+1} \left[1 + \frac{p-1}{q+2} \right] x^{p-1} y^{q+2} \\ & = A \frac{p+q+1}{q+1} x^p y^{q+1} + A \frac{p+q+1}{q+1} \frac{p}{q+2} x^{p-1} y^{q+2}. \end{aligned}$$

* See 3.258f.

† See Fermat, *Opera Omnia* (Leipzig, 1911), vol. 1, §§ 340-351.

It is thus seen that the succession of terms follows the rule. Thus if any integral power follows the rule, so also does the next higher power. But the first power obviously follows the rule. Hence, all powers do so.

Such reasoning holds good of any collection of objects capable of being ranged in a series which, though it may be endless, can be numbered so that each member of it receives a definite integral number. For instance, all the whole numbers constitute such a numerable collection. Again, all numbers resulting from operating according to any definite rule with any finite number of whole numbers form such a collection. For they may be arranged in a series thus. Let F be the symbol of operation. First operate on 1, giving $F(1)$. Then, operate on a second 1, giving $F(1,1)$. Next, introduce 2, giving 3d, $F(2)$; 4th, $F(2,1)$; 5th, $F(1,2)$; 6th, $F(2,2)$. Next use a third variable giving 7th, $F(1,1,1)$; 8th, $F(2,1,1)$; 9th, $F(1,2,1)$; 10th, $F(2,2,1)$; 11th, $F(1,1,2)$; 12th, $F(2,1,2)$; 13th, $F(1,2,2)$; 14th, $F(2,2,2)$. Next introduce 3, and so on, alternately introducing new variables and new figures; and in this way it is plain that every arrangement of integral values of the variables will receive a numbered place in the series.¹

117. The class of endless but numerable collections (so called because they can be so ranged that to each one corresponds a distinct whole number) is very large. But there are collections which are certainly innumerable. Such is the collection of all numbers to which endless series of decimals are capable of approximating. It has been recognized since the time of Euclid that certain numbers are surd or incommensurable, and are not exactly expressible by any finite series of decimals, nor by a circulating decimal. Such is the ratio of the circumference of a circle to its diameter, which we know is nearly 3.1415926. The calculation of this number has been carried to over 700 figures without the slightest appearance of regularity in their sequence. The demonstrations that this and many other numbers are incommensurable are perfect. That the entire collection of incommensurable numbers is innumerable has been clearly proved by Cantor.* I omit the

¹ This proposition is substantially the same as a theorem of Cantor [*Gesammelte Abhandlungen*, S. 115ff], though it is enunciated in a much more general form.

* *Gesammelte Abhandlungen*, S. 278.

demonstration;* but it is easy to see that to discriminate one from some other would, in general, require the use of an endless series of numbers. Now if they cannot be exactly expressed and discriminated, clearly they cannot be ranged in a linear series.

118. It is evident that there are as many points on a line or in an interval of time as there are of real numbers, in all. These are, therefore, innumerable collections. Many mathematicians have incautiously assumed that the points on a surface or in a solid are more than those on a line. But this has been refuted by Cantor.† Indeed, it is obvious that for every set of values of coördinates there is a single distinct number. Suppose, for instance, the values of the coördinates all lie between 0 and +1. Then if we compose a number by putting in the first decimal place the first figure of the first coördinate, in the second the first figure of the second coördinate, and so on, and when the first figures are all dealt out go on to the second figures in like manner, it is plain that the values of the coördinates can be read off from the single resulting number, so that a triad or tetrad of numbers, each having innumerable values, has no more values than a single incommensurable number.

Were the number of dimensions infinite, this would fail; and the collection of infinite sets of numbers, having each innumerable variations, might, therefore, be greater than the simple innumerable collection, and might be called *endlessly infinite*. The single individuals of such a collection could not, however, be designated, even approximately, so that this is indeed a magnitude concerning which it would be possible to reason only in the most general way, if at all.

119. Although there are but two grades of magnitudes of infinite collections, yet when certain conditions are imposed upon the order in which individuals are taken, distinctions of magnitude arise from that cause. Thus, if a simply endless series be doubled by separating each unit into two parts, the successive first parts and also the second parts being taken in the same order as the units from which they are derived, this double endless series will, so long as it is taken in that order,

* See 4.639.

† *Op. cit.*, S. 289 (13) and (14).

appear as twice as large as the original series. In like manner the product of two innumerable collections, that is, the collection of possible pairs composed of one individual of each, if the order of continuity is to be maintained, is, by virtue of that order, infinitely greater than either of the component collections.

120. We now come to the difficult question, What is continuity?* Kant† confounds it with infinite divisibility, saying that the essential character of a continuous series is that between any two members of it a third can always be found. This is an analysis beautifully clear and definite; but, unfortunately, it breaks down under the first test. For according to this, the entire series of rational fractions arranged in the order of their magnitude would be an infinite series, although the rational fractions are numerable, while the points of a line are innumerable. Nay, worse yet, if from that series of fractions any two with all that lie between them be excised, and any number of such finite gaps be made, Kant's definition is still true of the series, though it has lost all appearance of continuity.

121. Cantor defines a continuous series as one which is *concatenated* and *perfect*.‡ By a concatenated series, he means such a one that if any two points are given in it, and any finite distance, however small, it is possible to proceed from the first point to the second through a succession of points of the series each at a distance, from the preceding one, less than the given distance. This is true of the series of rational fractions ranged in the order of their magnitude. By a perfect series, he means one which contains every point such that there is no distance so small that this point has not an infinity of points of the series within that distance of it. This is true of the series of numbers between 0 and 1 capable of being expressed by decimals in which only the digits 0 and 1 occur.

It must be granted that Cantor's definition includes every series that is continuous; nor can it be objected that it includes any important or indubitable case of a series not continuous. Nevertheless, it has some serious defects. In the first place,

* See 174ff., 4.121, 4.642.

† *Kritik der Reinen Vernunft*, A 169, B 211; cf. 168.

‡ *Gesammelte Abhandlungen*, S. 194.

it turns upon metrical considerations; while the distinction between a continuous and a discontinuous series is manifestly non-metrical. In the next place, a perfect series is defined as one containing "every point" of a certain description. But no positive idea is conveyed of what all the points are: that is definition by negation, and cannot be admitted. If that sort of thing were allowed, it would be very easy to say, at once, that the continuous linear series of points is one which contains every point of the line between its extremities. Finally, Cantor's definition does not convey a distinct notion of what the components of the conception of continuity are. It ingeniously wraps up its properties in two separate parcels, but does not display them to our intelligence.

122. Kant's definition expresses one simple property of a continuum; but it allows of gaps in the series. To mend the definition, it is only necessary to notice how these gaps can occur. Let us suppose, then, a linear series of points extending from a point, A , to a point, B , having a gap from B to a third point, C , and thence extending to a final limit, D ; and let us suppose this series conforms to Kant's definition. Then, of the two points, B and C , one or both must be excluded from the series; for otherwise, by the definition, there would be points between them. That is, if the series contains C , though it contains all the points up to B , it cannot contain B . What is required, therefore, is to state in non-metrical terms that if a series of points up to a limit is included in a continuum the limit is included. It may be remarked that this is the property of a continuum to which Aristotle's attention seems to have been directed when he defines a continuum as something whose parts have a common limit.* The property may be exactly stated as follows: If a linear series of points is continuous between two points, A and D , and if an endless series of points be taken, the first of them between A and D and each of the others between the last preceding one and D , then there is a point of the continuous series between all that endless series of points and D , and such that every other point of which this is true lies between this point and D . For example, take any number between 0 and 1, as 0.1; then, any number between 0.1 and 1, as 0.11; then any number between 0.11 and 1, as

* See his *Physica*, 227a, 10; *Metaphysica*, 1069a, 5f.

0.111; and so on, without end. Then, because the series of real numbers between 0 and 1 is continuous, there must be a *least* real number, greater than every number of that endless series. This property, which may be called the Aristotelicity of the series, together with Kant's property, or its Kanticity, completes the definition of a continuous series.*

123. The property of Aristotelicity may be roughly stated thus: a continuum contains the end point belonging to every endless series of points which it contains. An obvious corollary is that every continuum contains its limits. But in using this principle it is necessary to observe that a series may be continuous except in this, that it omits one or both of the limits.

124. Our ideas will find expression more conveniently if, instead of points upon a line, we speak of real numbers. Every real number is, in one sense, the limit of a series, for it can be indefinitely approximated to. Whether every real number is a limit of a *regular* series may perhaps be open to doubt. But the series referred to in the definition of Aristotelicity must be understood as including all series whether regular or not. Consequently, it is implied that between any two points an innumerable series of points can be taken.

125. Every number whose expression in decimals requires but a finite number of places of decimals is commensurable. Therefore, incommensurable numbers suppose an infinitieth place of decimals. The word infinitesimal is simply the Latin form of infinitieth; that is, it is an ordinal formed from *infinitum*, as centesimal from *centum*. Thus, continuity supposes infinitesimal quantities.† There is nothing contradictory about the idea of such quantities. In adding and multiplying them the continuity must not be broken up, and consequently they are precisely like any other quantities, except that neither the syllogism of transposed quantity, nor the Fermatian inference applies to them.

If A is a finite quantity and i an infinitesimal, then in a certain sense we may write $A+i=A$. That is to say, this is so for all purposes of measurement. But this principle must not be applied except to get rid of *all* the terms in the highest order of infinitesimals present. As a mathematician, I prefer

* Cf. 4.121f.

† See 3.568, 4.674.

the method of infinitesimals to that of limits, as far easier and less infested with snares.* Indeed, the latter, as stated in some books, involves propositions that are false; but this is not the case with the forms of the method used by Cauchy,† Duhamel,‡ and others. As they understand the doctrine of limits, it involves the notion of continuity, and therefore contains in another shape the very same ideas as the doctrine of infinitesimals.

126. Let us now consider an aspect of the Aristotelical principle which is particularly important in philosophy. Suppose a surface to be part red and part blue; so that every point on it is either red or blue, and, of course, no part can be both red and blue. What, then, is the color of the boundary line between the red and the blue? The answer is that red or blue, to exist at all, must be spread over a surface; and the color of the surface is the color of the surface in the immediate neighborhood§ of the point. I purposely use a vague form of expression. Now, as the parts of the surface in the immediate neighborhood of any ordinary point upon a curved boundary are half of them red and half blue, it follows that the boundary is half red and half blue. In like manner, we find it necessary to hold that consciousness essentially occupies time; and what is present to the mind at any ordinary instant is what is present during a moment in which that instant occurs. Thus, the present is half past and half to come. Again, the color of the parts of a surface at any finite distance from a point has nothing to do with its color just at that point; and, in the parallel, the feeling at any finite interval from the present has nothing to do with the present feeling, except vicariously. Take another case: the velocity of a particle at any instant of time is its mean velocity during an infinitesimal instant in which that time is contained. Just so my immediate feeling is my feeling through an infinitesimal duration containing the present instant.

* See 3.563f, 4.113ff, 4.118n.

† See his *Leçons sur les applications du calcul infinitésimal à la géométrie*, Paris (1826).

‡ See his *Eléments de calcul infinitésimal*, Paris (1856).

§ See 4.125ff for a discussion of this concept.

§6. ANALYSIS OF TIME

127. One of the most marked features about the law of mind is that it makes time to have a definite direction of flow from past to future. The relation of past to future is, in reference to the law of mind, different from the relation of future to past. This makes one of the great contrasts between the law of mind and the law of physical force, where there is no more distinction between the two opposite directions in time than between moving northward and moving southward.

128. In order, therefore, to analyze the law of mind, we must begin by asking what the flow of time consists in. Now, we find that in reference to any individual state of feeling, all others are of two classes, those which affect this one (or have a tendency to affect it, and what this means we shall inquire shortly),* and those which do not. The present is affectible by the past but not by the future.

129. Moreover, if state *A* is affected by state *B*, and state *B* by state *C*, then *A* is affected by state *C*, though not so much so. It follows, that if *A* is affectible by *B*, *B* is not affectible by *A*.

130. If, of two states, each is absolutely unaffected by the other, they are to be regarded as parts of the same state. They are contemporaneous.

131. To say that a state is *between* two states means that it affects one and is affected by the other. Between any two states in this sense lies an innumerable series of states affecting one another; and if a state lies between a given state and any other state which can be reached by inserting states between this state and any third state, these inserted states not immediately affecting or being affected by either, then the second state mentioned immediately affects or is affected by the first, in the sense that in the one the other is *ipso facto* present in a reduced degree.

These propositions involve a definition of time and of its flow. Over and above this definition they involve a doctrine, namely, that every state of feeling is affectible by every earlier state.

* See 135ff.

§7. THAT FEELINGS HAVE INTENSIVE CONTINUITY*

132. Time with its continuity logically involves some other kind of continuity than its own.† Time, as the universal form of change, cannot exist unless there is something to undergo change and to undergo a change continuous in time there must be a continuity of changeable qualities. Of the continuity of intrinsic qualities of feeling we can now form but a feeble conception. The development of the human mind has practically extinguished all feelings, except a few sporadic kinds, sound, colors, smells, warmth, etc., which now appear to be disconnected and disparate.‡ In the case of colors, there is a tridimensional spread of feelings. Originally, all feelings may have been connected in the same way, and the presumption is that the number of dimensions was endless. For development essentially involves a limitation of possibilities. But given a number of dimensions of feeling, all possible varieties are obtainable by varying the intensities of the different elements. Accordingly, time logically supposes a continuous range of intensity in feeling. It follows, then, from the definition of continuity, that when any particular kind of feeling is present, an infinitesimal continuum of all feelings differing infinitesimally from that is present.

§8. THAT FEELINGS HAVE SPATIAL EXTENSION§

133. Consider a gob of protoplasm, say an amœba or a slime-mould. It does not differ in any radical way from the contents of a nerve-cell, though its functions may be less specialized. There is no doubt that this slime-mould, or this amœba, or at any rate some similar mass of protoplasm, feels. That is to say, it feels when it is in its excited condition. But note how it behaves. When the whole is quiescent and rigid, a place upon it is irritated. Just at this point, an active motion

* Cf. 197.

† See 1.170, 4.172.

‡ Cf. 197, 1.312.

§ Cf. 264.

is set up, and this gradually spreads to other parts. In this action, no unity nor relation to a nucleus, or other unitary organ can be discerned. It is a mere amorphous continuum of protoplasm, with feeling passing from one part to another. Nor is there anything like a wave-motion. The activity does not advance to new parts just as fast as it leaves old parts. Rather, in the beginning, it dies out at a slower rate than that at which it spreads. And while the process is going on, by exciting the mass at another point, a second quite independent state of excitation will be set up. In some places, neither excitation will exist, in others each separately, in still other places, both effects will be added together. Whatever there is in the whole phenomenon to make us think there is feeling in such a mass of protoplasm — *feeling*, but plainly no *personality* — goes logically to show that that feeling has a subjective, or substantial, spatial extension, as the excited state has. This is, no doubt, a difficult idea to seize, for the reason that it is a subjective, not an objective, extension. It is not that we have a feeling of bigness; though Professor James,* perhaps rightly, teaches that we have. It is that the feeling, as a subject of inhesion, is big. Moreover, our own feelings are focused in attention to such a degree that we are not aware that ideas are not brought to an absolute unity; just as nobody not instructed by special experiment has any idea how very, very little of the field of vision is distinct. Still, we all know how the attention wanders about among our feelings; and this fact shows that those feelings that are not coördinated in attention have a reciprocal externality, although they are present at the same time. But we must not tax introspection to make a phenomenon manifest which essentially involves externality.

134. Since space is continuous, it follows that there must be an immediate community of feeling between parts of mind infinitesimally near together. Without this, I believe it would have been impossible for minds external to one another ever to become coördinated, and equally impossible for any coördination to be established in the action of the nerve-matter of one brain.

* See his *Principles of Psychology*, vol. 2, ch. 20 (1890).

§9. AFFECTIONS OF IDEAS

135. But we are met by the question, what is meant by saying that one idea affects another. The unravelment of this problem requires us to trace out phenomena a little further.

Three elements go to make up an idea. The first is its intrinsic quality as a feeling. The second is the energy with which it affects other ideas, an energy which is infinite in the here-and-nowness of immediate sensation, finite and relative in the recency of the past. The third element is the tendency of an idea to bring along other ideas with it.

136. As an idea spreads, its power of affecting other ideas gets rapidly reduced; but its intrinsic quality remains nearly unchanged. It is long years now since I last saw a cardinal in his robes; and my memory of their color has become much dimmed. The color itself, however, is not remembered as dim. I have no inclination to call it a dull red. Thus, the intrinsic quality remains little changed; yet more accurate observation will show a slight reduction of it. The third element, on the other hand, has increased. As well as I can recollect, it seems to me the cardinals I used to see wore robes more scarlet than vermilion is, and highly luminous. Still, I know the color commonly called cardinal is on the crimson side of vermilion and of quite moderate luminosity, and the original idea calls up so many other hues with it, and asserts itself so feebly, that I am unable any longer to isolate it.

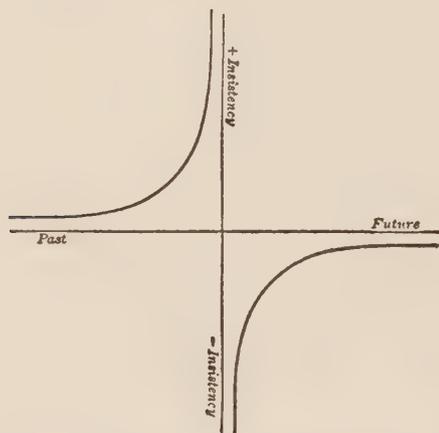
137. A finite interval of time generally contains an innumerable series of feelings; and when these become welded together in association, the result is a general idea. For we have just seen how by continuous spreading an idea becomes generalized.

138. The first character of a general idea so resulting is that it is living feeling. A continuum of this feeling, infinitesimal in duration, but still embracing innumerable parts, and also, though infinitesimal, entirely unlimited, is immediately present. And in its absence of boundedness a vague possibility of more than is present is directly felt.

139. Second, in the presence of this continuity of feeling, nominalistic maxims appear futile. There is no doubt about one idea affecting another, when we can directly perceive the one gradually modified and shaping itself into the other. Nor

can there any longer be any difficulty about one idea resembling another, when we can pass along the continuous field of quality from one to the other and back again to the point which we had marked.

140. Third, consider the insistency of an idea. The insistency of a past idea with reference to the present is a quantity which is less the further back that past idea is, and rises to infinity as the past idea is brought up into coincidence with the present. Here we must make one of those inductive applications of the law of continuity which have produced such great results in all the positive sciences. We must extend the law of insistency into the future. Plainly, the insistency of a future idea with reference to the present is a quantity affected by the minus sign; for it is the present that affects the future, if there be any effect, not the future that affects the present. Accordingly, the curve of insistency is a sort of equilateral hyperbola.



Such a conception is none the less mathematical, that its quantification cannot now be exactly specified.

141. Now consider the induction which we have here been led into. This curve says that feeling which has not yet emerged into immediate consciousness is already affectible and already affected. In fact, this is habit, by virtue of which an idea is brought up into present consciousness by a bond that had already been established between it and another idea while it was still *in futuro*.

142. We can now see what the affection of one idea by another consists in. It is that the affected idea is attached as a logical predicate to the affecting idea as subject. So when a feeling emerges into immediate consciousness, it always appears as a modification of a more or less general object already in the mind. The word suggestion is well adapted to expressing this relation. The future is suggested by, or rather is influenced by the suggestions of, the past.

§10. IDEAS CANNOT BE CONNECTED EXCEPT BY CONTINUITY

143. That ideas can nowise be connected without continuity is sufficiently evident to one who reflects upon the matter. But still the opinion may be entertained that after continuity has once made the connection of ideas possible, then they may get to be connected in other modes than through continuity. Certainly, I cannot see how anyone can deny that the infinite diversity of the universe, which we call chance, may bring ideas into proximity which are not associated in one general idea. It may do this many times. But then the law of continuous spreading will produce a mental association; and this I suppose is an abridged statement of the way the universe has been evolved. But if I am asked whether a blind *ἀνάγκη* cannot bring ideas together, first I point out that it would not remain blind. There being a continuous connection between the ideas, they would infallibly become associated in a living, feeling, and perceiving general idea. Next, I cannot see what the mustness or necessity of this *ἀνάγκη* would consist in. In the absolute uniformity of the phenomenon, says the nominalist. Absolute is well put in; for if it merely happened so three times in succession, or three million times in succession, in the absence of any reason, the coincidence could only be attributed to chance. But absolute uniformity must extend over the whole infinite future; and it is idle to talk of that except as an idea. No, I think we can only hold that wherever ideas come together they tend to weld into general ideas; and wherever they are generally connected, general ideas govern the connection; and these general ideas are living feelings spread out.

§11. MENTAL LAW FOLLOWS THE FORMS OF LOGIC*

144. The three main classes of logical inference are Deduction, Induction, and Hypothesis. These correspond to three chief modes of action of the human soul. In deduction the mind is under the dominion of a habit or association by virtue of which a general idea suggests in each case a corresponding reaction. But a certain sensation is seen to involve that idea. Consequently, that sensation is followed by that reaction. That is the way the hind legs of a frog, separated from the rest of the body, reason, when you pinch them. It is the lowest form of psychical manifestation.

145. By induction, a habit becomes established. Certain sensations, all involving one general idea, are followed each by the same reaction; and an association becomes established, whereby that general idea gets to be followed uniformly by that reaction.

Habit is that specialization of the law of mind whereby a general idea gains the power of exciting reactions. But in order that the general idea should attain all its functionality, it is necessary, also, that it should become suggestible by sensations. That is accomplished by a psychical process having the form of hypothetic inference. By hypothetic inference, I mean, as I have explained in other writings,† an induction from qualities. For example, I know that the kind of man known and classed as a “mugwump” has certain characteristics. He has a high self-respect and places great value upon social distinction. He laments the great part that rowdyism and unrefined good fellowship play in the dealings of American politicians with their constituency. He thinks that the reform which would follow from the abandonment of the system by which the distribution of offices is made to strengthen party organizations and a return to the original and essential conception of office-filling would be found an unmixed good. He holds that monetary considerations should usually be the decisive ones in questions of public policy. He respects the principle of individualism and of *laissez-faire* as the greatest

* Cf. 2.643, 2.711f, 3.154ff, 5.223.

† See 2.514f, 2.632.

agency of civilization. These views, among others, I know to be obtrusive marks of a "mugwump." Now, suppose I casually meet a man in a railway train, and falling into conversation find that he holds opinions of this sort; I am naturally led to suppose that he is a "mugwump." That is hypothetic inference. That is to say, a number of readily verifiable marks of a mugwump being selected, I find this man has these, and infer that he has all the other characters which go to make a thinker of that stripe. Or let us suppose that I meet a man of a semi-clerical appearance and a sub-pharisaical sniff, who appears to look at things from the point of view of a rather wooden dualism. He cites several texts of Scripture and always with particular attention to their logical implications; and he exhibits a sternness, almost amounting to vindictiveness, towards evil doers in general. I readily conclude that he is a minister of a certain denomination. Now the mind acts in a way similar to this, every time we acquire a power of coördinating reactions in a peculiar way, as in performing any act requiring skill. Thus, most persons have a difficulty in moving the two hands simultaneously and in opposite directions through two parallel circles nearly in the medial plane of the body. To learn to do this, it is necessary to attend, first, to the different actions in different parts of the motion, when suddenly a general conception of the action springs up and it becomes perfectly easy. We think the motion we are trying to do involves this action, and this, and this. Then the general idea comes which unites all those actions, and thereupon the desire to perform the motion calls up the general idea. The same mental process is many times employed whenever we are learning to speak a language or are acquiring any sort of skill.

146. Thus, by induction, a number of sensations followed by one reaction become united under one general idea followed by the same reaction; while, by the hypothetic process, a number of reactions called for by one occasion get united in a general idea which is called out by the same occasion. By deduction, the habit fulfills its function of calling out certain reactions on certain occasions.

§12. UNCERTAINTY OF MENTAL ACTION

147. The inductive and hypothetic forms of inference are essentially probable inferences, not necessary; while deduction may be either necessary or probable.

148. But no mental action seems to be necessary or invariable in its character. In whatever manner the mind has reacted under a given sensation, in that manner it is the more likely to react again; were this, however, an absolute necessity, habits would become wooden and ineradicable and, no room being left for the formation of new habits, intellectual life would come to a speedy close. Thus, the uncertainty of the mental law is no mere defect of it, but is on the contrary of its essence. The truth is, the mind is not subject to "law" in the same rigid sense that matter is. It only experiences gentle forces which merely render it more likely to act in a given way than it otherwise would be. There always remains a certain amount of arbitrary spontaneity in its action, without which it would be dead.

149. Some psychologists think to reconcile the uncertainty of reactions with the principle of necessary causation by means of the law of fatigue. Truly for a *law*, this law of fatigue is a little lawless. I think it is merely a case of the general principle that an idea in spreading loses its insistency. Put me tarragon into my salad, when I have not tasted it for years, and I exclaim, "What nectar is this!" But add it to every dish I taste for week after week, and a habit of expectation has been created; and in thus spreading into habit, the sensation makes hardly any more impression upon me; or, if it be noticed, it is on a new side, from which it appears as rather a bore. The doctrine that fatigue is one of the primordial phenomena of mind I am much disposed to doubt.* It seems a somewhat little thing to be allowed as an exception to the great principle of mental uniformization. For this reason, I prefer to explain it in the manner here indicated, as a special case of that great principle. To consider it as something distinct in its nature, certainly somewhat strengthens the necessitarian position; but even if it be distinct, the hypothesis that all the variety and apparent arbitrariness of mental action ought to be explained away in favor of absolute determinism

* See 275, 1.390.

does not seem to me to recommend itself to a sober and sound judgment, which seeks the guidance of observed facts and not that of prepossessions.

§13. RESTATEMENT OF THE LAW

150. Let me now try to gather up all these odds and ends of commentary and restate the law of mind, in a unitary way.

First, then, we find that when we regard ideas from a nominalistic, individualistic, sensualistic way, the simplest facts of mind become utterly meaningless. That one idea should resemble another or influence another, or that one state of mind should so much as be thought of in another, is, from that standpoint, sheer nonsense.

151. Second, by this and other means we are driven to perceive, what is quite evident of itself, that instantaneous feelings flow together into a continuum of feeling, which has in a modified degree the peculiar vivacity of feeling and has gained generality. And in reference to such general ideas, or continua of feeling, the difficulties about resemblance and suggestion and reference to the external cease to have any force.

152. Third, these general ideas are not mere words, nor do they consist in this, that certain concrete facts will every time happen under certain descriptions of conditions; but they are just as much, or rather far more, living realities than the feelings themselves out of which they are concreated. And to say that mental phenomena are governed by law does not mean merely that they are describable by a general formula; but that there is a living idea, a conscious continuum of feeling, which pervades them, and to which they are docile.

153. Fourth, this supreme law, which is the celestial and living harmony, does not so much as demand that the special ideas shall surrender their peculiar arbitrariness and caprice entirely; for that would be self-destructive. It only requires that they shall influence and be influenced by one another.

154. Fifth, in what measure this unification acts, seems to be regulated only by special rules; or, at least, we cannot in our present knowledge say how far it goes. But it may be said that, judging by appearances, the amount of arbitrariness in the phenomena of human minds is neither altogether trifling nor very prominent.

§14. PERSONALITY

155. Having thus endeavored to state the law of mind, in general, I descend to the consideration of a particular phenomenon which is remarkably prominent in our own consciousnesses, that of personality. A strong light is thrown upon this subject by recent observations of double and multiple personality. The theory, which at one time seemed plausible, that two persons in one body corresponded to the two halves of the brain will, I take it, now be universally acknowledged to be insufficient. But that which these cases make quite manifest is that personality is some kind of coördination or connection of ideas. Not much to say, this, perhaps. Yet when we consider that, according to the principle which we are tracing out, a connection between ideas is itself a general idea, and that a general idea is a living feeling, it is plain that we have at least taken an appreciable step toward the understanding of personality. This personality, like any general idea, is not a thing to be apprehended in an instant. It has to be lived in time; nor can any finite time embrace it in all its fullness. Yet in each infinitesimal interval it is present and living, though specially colored by the immediate feelings of that moment. Personality, so far as it is apprehended in a moment, is immediate self-consciousness.

156. But the word coördination implies somewhat more than this; it implies a teleological harmony in ideas, and in the case of personality this teleology is more than a mere purposive pursuit of a predeterminate end; it is a developmental teleology. This is personal character. A general idea, living and conscious now, it is already determinative of acts in the future to an extent to which it is not now conscious.

157. This reference to the future is an essential element of personality. Were the ends of a person already explicit, there would be no room for development, for growth, for life; and consequently there would be no personality. The mere carrying out of predetermined purposes is mechanical. This remark has an application to the philosophy of religion. It is that a genuine evolutionary philosophy, that is, one that makes the principle of growth a primordial element of the universe, is so far from being antagonistic to the idea of a personal creator

that it is really inseparable from that idea;* while a necessitarian religion is in an altogether false position and is destined to become disintegrated. But a pseudo-evolutionism which enthrones mechanical law above the principle of growth is at once scientifically unsatisfactory, as giving no possible hint of how the universe has come about, and hostile to all hopes of personal relations to God.

§15. COMMUNICATION

158. Consistently with the doctrine laid down in the beginning of this paper, I am bound to maintain that an idea can only be affected by an idea in continuous connection with it. By anything but an idea, it cannot be affected at all. This obliges me to say, as I do say, on other grounds, that what we call matter is not completely dead, but is merely mind hidebound with habits. It still retains the element of diversification; and in that diversification there is life. When an idea is conveyed from one mind to another, it is by forms of combination of the diverse elements of nature, say by some curious symmetry, or by some union of a tender color with a refined odor. To such forms the law of mechanical energy has no application. If they are eternal, it is in the spirit they embody; and their origin cannot be accounted for by any mechanical necessity. They are embodied ideas; and so only can they convey ideas. Precisely how primary sensations, as colors and tones, are excited, we cannot tell, in the present state of psychology. But in our ignorance, I think that we are at liberty to suppose that they arise in essentially the same manner as the other feelings, called secondary. As far as sight and hearing are in question, we know that they are only excited by vibrations of inconceivable complexity; and the chemical senses are probably not more simple. Even the least psychical of peripheral sensations, that of pressure, has in its excitation conditions which, though apparently simple, are seen to be complicated enough when we consider the molecules and their attractions. The principle with which I set out requires me to maintain that these feelings are communicated to the nerves by continuity, so that there must be something like them in the excitants themselves. If this seems

* See 553, 613f, 5.536.

extravagant, it is to be remembered that it is the sole possible way of reaching any explanation of sensation, which otherwise must be pronounced a general fact, absolutely inexplicable and ultimate. Now absolute inexplicability is a hypothesis which sound logic refuses under any circumstances to justify.

159. I may be asked whether my theory would be favorable or otherwise to telepathy.* I have no decided answer to give to this. At first sight, it seems unfavorable. Yet there may be other modes of continuous connection between minds other than those of time and space.

160. The recognition by one person of another's personality takes place by means to some extent identical with the means by which he is conscious of his own personality. The idea of the second personality, which is as much as to say that second personality itself, enters within the field of direct consciousness of the first person, and is as immediately perceived as his ego, though less strongly. At the same time, the opposition between the two persons is perceived, so that the externality of the second is recognized.

161. The psychological phenomena of intercommunication between two minds have been unfortunately little studied. So that it is impossible to say, for certain, whether they are favorable to this theory or not. But the very extraordinary insight which some persons are able to gain of others from indications so slight that it is difficult to ascertain what they are is certainly rendered more comprehensible by the view here taken.

162. A difficulty which confronts the synechistic philosophy is this. In considering personality, that philosophy is forced to accept the doctrine of a personal God; but in considering communication, it cannot but admit that if there is a personal God, we must have a direct perception of that person and indeed be in personal communication with him. Now, if that be the case, the question arises how it is possible that the existence of this being should ever have been doubted by anybody. The only answer that I can at present make is that facts that stand before our face and eyes and stare us in the face are far from being, in all cases, the ones most easily discerned. That has been remarked from time immemorial.

* See 559.

§16. CONCLUSION

163. I have thus developed as well as I could in a little space the *synechistic* philosophy, as applied to mind. I think that I have succeeded in making it clear that this doctrine gives room for explanations of many facts which without it are absolutely and hopelessly inexplicable; and further that it carries along with it the following doctrines: first, a logical realism of the most pronounced type; second, objective idealism; third, tychism, with its consequent thorough-going evolutionism. We also notice that the doctrine presents no hindrances to spiritual influences, such as some philosophies are felt to do.

CHAPTER 6

THE CONTINUUM

§1. KANT'S DEFINITION*

164. [*Continuous* means] in mathematics and philosophy a connection of points (or other elements) as intimate as that of the instants or points of an interval of time: thus, the *continuity* of space consists in this, that a point can move from any one position to any other so that at each instant it shall have a definite and distinct position in space. This statement is not, however, a proper definition of *continuity*, but only an exemplification drawn from time. The old definitions — the fact that adjacent parts have their limits in common (Aristotle), infinite divisibility (Kant), the fact that between any two points there is a third (which is true of the system of rational numbers) — are inadequate.† The less unsatisfactory definition is that of G. Cantor, that continuity is the *perfect concatenation* of a system of points — words which must be understood in special senses.‡ Cantor calls a system of points *concatenated* when any two of them being given, and also any finite distance, however small, it is always possible to find a finite number of other points of the system through which by successive steps, each less than the given distance, it would be possible to proceed from one of the given points to the other. He terms a system of points *perfect* when, whatever point belonging to the system be given, it is not possible to find a finite distance so small that there are not an infinite number of points of the system within that distance of the given point. As examples of a concatenated system not perfect, Cantor gives the rational and also the irrational numbers in any interval. As an example of a perfect system not concatenated, he gives all the numbers whose ex-

* 164 is from the *Century Dictionary* (1889). 165–167 is a marginal note dated September 18, 1903, in Peirce's personal copy of the *Dictionary*, now in the Treasure Room at the Widener Library, Cambridge, Mass.

† See 120f and 166.

‡ See 121.

pression in decimals, however far carried out, would contain no figures except 0 and 9.

165. Cantor's definition of continuity is unsatisfactory as involving a vague reference to *all* the points, and one knows not what that may mean. It seems to me to point to this: that it is impossible to get the idea of continuity without two dimensions. An oval line is continuous, because it is impossible to pass from the inside to the outside without passing a point of the curve.

166. Subsequent to writing the above [164] I made a new definition, according to which continuity consists in *Kanticity* and *Aristotelicity*.* The Kanticity is having a point between any two points. The Aristotelicity is having every point that is a limit to an infinite series of points that belong to the system.

167. I here slightly modify Cantor's definition of a perfect system. Namely, he defines it as such that it contains every point in the neighborhood of an infinity of points and no other. But the latter is a character of a concatenated system; hence I omit it as a character of a perfect system.

168. But further study of the subject has proved that this definition is wrong. It involves a misunderstanding of Kant's definition which *he himself* likewise fell into. Namely he defines a continuum as that all of whose parts have parts of the same kind.† He himself, and I after him, understood that to mean infinite divisibility, which plainly is not what constitutes continuity since the series of rational fractional values is infinitely divisible but is not by anybody regarded as continuous. Kant's real definition implies that a continuous line contains no points. Now if we are to accept the common sense idea of continuity (after correcting its vagueness and fixing it to mean something) we must either say that a continuous line contains no points or we must say that the principle of excluded middle does not hold of these points. The principle of excluded middle only applies to an individual (for it is not true that "Any man is wise" nor that "Any man is not wise"‡). But places, being mere possibles without actual existence, are not individuals.

* See 120-124.

† *Kritik der Reinen Vernunft*, A 169; B 211.

‡ See 1.434, 3.612, 5.448, 5.505.

Hence a point or indivisible place really does not exist unless there actually be something there to mark it, which, if there is, interrupts the continuity. I, therefore, think that Kant's definition correctly defines the common sense idea, although there are great difficulties with it. I certainly think that on any line whatever, on the common sense idea, there is room for any multitude of points however great. If so, the *analytical continuity* of the theory of functions, which implies there is but a single point for each distance from the origin, defined by a quantity expressible to indefinitely close approximation by a decimal carried out to an indefinitely great number of places, is certainly not the continuity of common sense, since the whole multitude of such quantities is only the first abnumeral multitude, and there is an infinite series of higher grades.* On the whole, therefore, I think we must say that continuity is the relation of the parts of an unbroken space or time. The precise definition is still in doubt; but Kant's definition, that a continuum is that of which every part has itself parts of the same kind, seems to be correct. This must not be confounded (as Kant himself confounded it) with infinite divisibility, but implies that a line, for example, contains no points until the continuity is broken by marking the points. In accordance with this it seems necessary to say that a continuum, where it *is* continuous and unbroken, contains no definite parts; that its parts are created in the act of defining them and the precise definition of them breaks the continuity. In the calculus and theory of functions it is assumed that between any two rational points (or points at distances along the line expressed by rational fractions) there are rational points and that further for every convergent series of such fractions (such as 3.1, 3.14, 3.141, 3.1415, 3.14159, etc.) there is just one limiting point; and such a collection of points is called *continuous*. But this does not seem to be the common sense idea of continuity. It is only a collection of independent points. Breaking grains of sand more and more will only make the sand more broken. It will not weld the grains into unbroken continuity.

* See 4.213ff, 4.639, 4.654.

§2. SYNECHISM*

169. [Synechism is] that tendency of philosophical thought which insists upon the idea of continuity as of prime importance in philosophy and, in particular, upon the necessity of hypotheses involving true continuity.

170. A true continuum is something whose possibilities of determination no multitude of individuals can exhaust. Thus, no collection of points placed upon a truly continuous line can fill the line so as to leave no room for others, although that collection had a point for every value towards which numbers, endlessly continued into the decimal places, could approximate; nor if it contained a point for every possible permutation of all such values. It would be in the general spirit of synechism to hold that time ought to be supposed truly continuous in that sense. The term was suggested and used by C. S. Peirce in 1892.† (Cf. Pragmatism, passim.‡)

171. The general motive is to avoid the hypothesis that this or that is inexplicable. For the synechist maintains that the only possible justification for so much as entertaining a hypothesis is that it affords an explanation of the phenomena. Now, to suppose a thing inexplicable is not only to fail to explain it, and so to make an unjustifiable hypothesis, but, much worse, it is to set up a barrier across the road of science, and to forbid all attempt to understand the phenomenon.

172. To be sure, the synechist cannot deny that there is an element of the inexplicable and ultimate, because it is directly forced upon him; nor does he abstain from generalizing from this experience. True generality is, in fact, nothing but a rudimentary form of true continuity. Continuity is nothing but perfect generality of a law of relationship.

173. It would, therefore, be most contrary to his own principle for the synechist not to generalize from that which experience forces upon him, especially since it is only so far as facts can be generalized that they can be understood; and the very reality, in his way of looking at the matter, is nothing else than the way in which facts must ultimately come to be understood.

* Baldwin's *Dictionary of Philosophy and Psychology*, vol. 2, p. 657, The Macmillan Co., New York (1902).

† See 103.

‡ See 5.3.

There would be a contradiction here, if this ultimacy were looked upon as something to be absolutely realized; but the synechist cannot consistently so regard it. Synechism is not an ultimate and absolute metaphysical doctrine; it is a regulative principle of logic, prescribing what sort of hypothesis is fit to be entertained and examined. The synechist, for example, would never be satisfied with the hypothesis that matter is composed of atoms, all spherical and exactly alike. If this is the only hypothesis that the mathematicians are as yet in condition to handle, it may be supposed that it may have features of resemblance with the truth. But neither the eternity of the atoms nor their precise resemblance is, in the synechist's view, an element of the hypothesis that is even admissible hypothetically. For that would be to attempt to explain the phenomena by means of an absolute inexplicability. In like manner, it is not a hypothesis fit to be entertained that any given law is absolutely accurate. It is not, upon synechist principles, a question to be asked, whether the three angles of a triangle amount precisely to two right angles, but only whether the sum is greater or less. So the synechist will not believe that some things are conscious and some unconscious, unless by consciousness be meant a certain grade of feeling. He will rather ask what are the circumstances which raise this grade; nor will he consider that a chemical formula for protoplasm would be a sufficient answer. In short, synechism amounts to the principle that inexplicabilities are not to be considered as possible explanations; that whatever is supposed to be ultimate is supposed to be inexplicable; that continuity is the absence of ultimate parts in that which is divisible; and that the form under which alone anything can be understood is the form of generality, which is the same thing as continuity.

§3. CONTINUITY REDEFINED*^E

174. I feel that I ought to make amends for my blundering treatment of Continuity in a paper entitled "The Law of Mind," in Vol. II of *The Monist*,† by here redefining it after close and long study of the question. Whatever is continuous has *material parts*.

* From "The Bedrock beneath Pragmatism," 1906; continuing 4.561n.

† See 120f.

I begin by defining these thus: The *material parts* of a thing or other object, *W*, that is composed of such parts, are whatever things are, firstly, each and every one of them, other than *W*; secondly, are all of some one internal nature (for example, are all places, or all times, or all spatial realities, or are all spiritual realities, or are all ideas, or are all characters, or are all relations, or are all external representations, etc.); thirdly, form together a collection of objects in which no one occurs twice over and, fourthly, are such that the Being of each of them together with the modes of connexion between all sub-collections of them, constitute the being of *W*. Almost everything which has material parts has different sets of such parts, often various *ad libitum*. Nothing which has an Essence (such as an essential purpose or use, like the jackknife of the celebrated poser) has any material parts in the strict sense just defined. But the term "material parts" may, without confusion (if a little care be exerted), be used in a somewhat looser sense. Namely, if the Being (generally, a Concept) of an object, *T*, essentially involves something *C* which prevents it from having any material parts in the strict sense, and if there be something, *W*, which differs from *T* only in the absence of *C* and of any other such hindrances, so that *W* has material parts, then the material parts of *W* may loosely be termed material parts of *T*; but in such case the concept of *W* so derived from *T* is nearly or quite always somewhat vague, so that either the material parts will be so too, or else they must be conceived as merely the parts of some *state* of it, and very likely of an instantaneous state that is an *ens rationis* closely approximating to the nature of a fiction. It will be seen that the definition of Material Parts involves the concept of *Connexion*, even if there be no other connexion between them than co-being; and in case no other connexion be essential to the concept of *W*, this latter is called a *Collection*, concerning which I have merely to say that my reflexions on Mr. Alfred Bray Kempe's invaluable, very profound, and marvellously strong contribution to the science of Logic in the *Philosophical Transactions* [of the Royal Society, v. 177] for 1886 (which, by the way, seems to have proved too strong food for the mewling, etc., creatures who write the treatises on the science) have led me to believe it to be indecomposable. But I dare not be positive thereanent.

175. I must here give the substance of a far-famed definition of *equality in multitude* which was originally due to Bernardo Bolzano.* This writer was a Catholic priest in Buda-Pesth who published a treatise on Logic in four volumes, and a work entitled *Paradoxes of the Infinite*. In one or other of these he certainly laid the foundations of the great modern *exact logic of quantity*, which has so far been developed under the lead of the immortal Dr. Georg Cantor. Though I have never seen either work I do not hesitate to say that Bolzano put Human Reason under an eternal debt by laying the foundation of this science, since his definition of equality sufficed of itself to do that; and I need hardly say that the Catholic Church, which carries consistency as far as is consistent with any life at all, visited condign punishment upon the priest for such outrageous violation of loyalty to Her as the giving of aid and comfort to Human Reason — and most traitorous of all to Reasoning about Infinity!— was felt to be by Her and by all the world except the poor simple soul who committed that foul offense. I gave the substance of the definition in a former paper,† going on to other matters of importance which I need not here touch upon. But owing to my having then a very imperfect understanding of graphs, I expressed the definition in the insufficiently analytic language of my Algebra of Dyadic Relations (the same that is mainly employed in Schröder's third volume). I am continually obliged to make elementary explanations owing to the disgracefully unscientific state of Logic, which is quite as much behind its condition six centuries ago in some particulars as it is in advance of that state in others. As for contemporary text-books in our language, they are the merest rubbish on the whole. The very best that can be said of them is that a few have merits in particular directions. They are all amateurish and encourage amateurish views of the universe and of life. In comparison with the state of all the non-philosophical sciences, they are downright puerile; and a green scum grows over them year by year. If our people were at all aware of this blot upon our civilization, it would be possible for a scientific student of the subject of some real strength to put forth at least a primer of the science. But it is a condition of

* *Paradoxien des Unendlichen*, §22, Leipzig (1851). Cf. 651.

† See 3.537.

the success of any such student in penetrating to the true science that he should make himself a recluse. He is thus out of the swim, and is crowded out of all opportunities to be of much service; whereby Spencerism, Agnosticism, and other amateurisms, whose professors lose precious little time in arduous research, are able to gain the exclusive ear of the ignorant persons whom they court. In the fourteenth century Nominalism was rendered a respectable opinion by the halting realism of Scotus and by the extravagant unpragmatism of his followers. But after physical science has discovered so many general principles in Nature, nominalism becomes a disgraceful habitude of thought.

176. But now I define a *pseudo-continuum* as that which modern writers on the theory of functions call a *continuum*. But this is fully represented by, and according to G. Cantor stands in one-to-one correspondence with, the totality of real values, rational and irrational; and these are iconized, in their turn, according to these writers [by the] entire body of decimal expressions carried out to the right to all finite powers of $\frac{1}{10}$ without going on to Cantor's ω th place of decimals.

For it is a principle continually employed in the reasoning of the universally accepted "doctrine of limits" that two values, that differ at all, differ by a *finite value*, which would not be true if the ω th place of decimals were supposed to be included in their exact expressions; and indeed the whole purpose of the doctrine of limits is to avoid acknowledging that that place is concerned. Consequently the denumeral rows of figures which, by virtue of a simple general principle, are in one-to-one correspondence with the values, have relations among themselves, quite regardless of their denoting those values that perfectly agree in form with the relations between the values; and consequently these unlimited decimal fractions themselves, apart from their significations, constitute a pseudo-continuum. This consideration renders it easy to define a pseudo-continuum. It is in the first place a collection of objects absolutely distinct from one another. Now from the fact that Cantor and others call it a "continuum," as well as from other things they say about it, I am led to suspect that they do not regard the pseudo-continuum of unlimited decimal expressions as [having members] all absolutely distinct from any other, for the reason that, taking any one of

them, it does not possess any one elementary and definite non-relative character which is not possessed by any other of them. But this is not what I mean, nor what is generally meant, by a collection of absolutely independent members. What I mean by that expression is that every member is distinguished from every other by possessing some one or another elementary and definite non-relative character which that other does not possess; and that this is the usual acceptation of the expression is evidenced by the fact that the majority of logicians are in the habit of conceiving of a universe of absolutely distinct individual objects, by which they only mean that every individual is in every respect, of a certain universe of respects, determined in one or other of two ways and that every individual is differently determined from every other in *some* of those respects; and they do not generally conceive that every individual object has a determination in any one elementary and definite respect, while all the other individuals are determined in the opposite way.

§4. ACHILLES AND THE TORTOISE*

177. . . . Three times in my life it has happened to me to receive visits from writers, each of them illustrious as compared with myself (and one of them was certainly one of the most famous men of his time), who came to talk with me about the paradox of Achilles and the Tortoise. Now since this ridiculous little catch presents no difficulty at all to a mind adequately trained in mathematics and in logic, but is one of those which is very apt to excite minds of a certain class to an obstinate determination to believe a given proposition — if a high degree of courtesy, not to say veneration (hard for an unsocial student to observe with veracity) has ever been found wanting in those who have endeavoured to set them right — I will make use of my experience gained in those three interviews to illustrate the danger of mistaking an accidental and temporary inability to doubt a proposition for such an absolute inability as can safely be considered an excuse for allowing oneself to become wedded to a belief.

178. All three of my interviewers entered upon the subject of the paradox by asking me to state my view of it; and I

* From "A Sketch of Logical Critic," c. 1911.

answered each of them more or less as follows: "A uniform speed is a quantity which multiplied into a time will give, as the product, the distance which an object moving uniformly with that speed will pass over in that time. So, if we use a capital L to denote the adopted unit of length, a capital T for that of time, and the lower case italics n , m , l , k , etc., for any abstract numbers whole or fractional, of which it may be convenient to speak without specifying their values, we can denote a uniform speed that would cover any number, n , of units of length, in any number, m , of units of time, by (n/m) (L/T) , or $(nL)/(mT)$, or $L/\left(\frac{m}{n}T\right)$, etc.

This speed kept up for the time kT will result in covering a space of $(n/m)(L/T) \times kT = \frac{nxk}{m} L$; and the same speed will cover l units of length in the time $lL/(n/m)(L/T) = \frac{lm}{n} T$, or $l \div \frac{n}{m}$ units of time.

Now the start, allowed to the tortoise before the race begins, may be measured, say, by sL or a number, s , of units of length. If we express the uniform speeds of the two runners during the race by the numbers of units of length they respectively run in each unit of time, writing their initials, a for Achilles and t for tortoise to express this number, their speeds will be aL/T and tL/T . It cannot be doubted that this famous race was run in southern Thessaly, say in latitude 39° where, by the rotation of the earth, everything is moving due east at a rate of nearly $6\frac{3}{4}$ miles a minute. Nevertheless, the point of the compass toward which they ran is not stated; so that it is to be assumed that it would make no difference, as, indeed, common sense would have testified that it could not, if that guide had not been dismissed in the very act of taking up the consideration of this problem. If, then, a velocity of 6.71 miles a minute makes no difference in the result, we may safely assume that it would make none if the race were run on a deck which was floating from the front to the back of the runners at the same rate as the tortoise was running forward. The effect of this would be to diminish the resultant velocity of each runner by tL/T , so that the resultant speed of Achilles would be $(a-t)L/T$, while that of the tortoise would disappear

entirely: he would really be at rest. Since then at the instant when the race began Achilles was sL behind the tortoise, the time required for him to reach that stationary racer must have been $sL/[(a-t)L/T] = \frac{s}{a-t}T$, or $\frac{s}{a-t}$ units of time. Zeno's method of approximating to the time required for Achilles to overtake the tortoise manifests a want of arithmetical skill that was inevitable at his time. Yet, after all, it coincides in principle, and in many cases in the arithmetical result, with the method of long division. Namely, he calculates the quantity that is really $\frac{s}{a-t}$, where t is much smaller than a , by taking as his first approximation $\frac{s}{a}$, or the time which would be correct if $t=0$, that is, if the tortoise did not move. But since during this time the tortoise moves over the distance $\frac{s}{a}t$, he adds to his first approximation the time required for Achilles to run this distance, which is $\frac{s}{a^2}t$, and so gets his second approximation $\frac{s}{a} + \frac{s}{a^2}t$. Proceeding in this way he obtains, as his final result, the endless series $\frac{s}{a} + \frac{s}{a^2}t + \frac{s}{a^3}t^2 + \frac{s}{a^4}t^3 +$ etc. . . . Now let us calculate $\frac{s}{a-t}$ by long division.

Here is the work: $a-t \overline{)s} \quad \left(\frac{s}{a} + \frac{s}{a^2}t + \frac{s}{a^3}t^2 + \frac{s}{a^4}t^3 + \text{etc.} \right)$

$$\begin{array}{r}
 s - \frac{s}{a}t \\
 \hline
 \frac{s}{a}t \\
 \hline
 \frac{s}{a}t - \frac{s}{a^2}t^2 \\
 \hline
 \frac{s}{a^2}t^2 \\
 \hline
 \frac{s}{a^2}t^2 - \frac{s}{a^3}t^3 \\
 \hline
 \frac{s}{a^3}t^3
 \end{array}$$

Arithmetically, of course, long division will come to an end, in case the divisor has no other factor, than the dividend has not, than such as are products of powers of factors of the base of numeration; and indeed, it may *always* be brought to an end in several ways. One of these is by adopting a smaller and appropriate unit of time. Another is by adopting a different and appropriate base of numeration. These devices show how entirely the *nodus* of the paradox of Achilles and the tortoise is a difficulty of the arithmetician who is awkward in finding an appropriate *expression* of that which Achilles does without the least embarrassment.

179. I now at length come to the ways in which different writers on this paradox have mistaken an impotence of thought, really due to their own insufficient study, for an impossibility of human thought universal. Zeno himself concluded that motion was altogether inconceivable, in spite of the fact that all men, himself included — the very babe in the cradle included — conceive it well enough, though they may become occasionally a little confused about it. Others have thought it inconceivable that Achilles should pass through a series of points essentially endless. One of my interviewers raised this point; and I am inclined to admit, though I do not feel absolutely sure of it, that a man could not, in a finite time, make an endless series of distinct volitions. But this does not embarrass Achilles the least in the world, for his final effort carries him through a whole infinity of the points into which Zeno's unskillful method would (could it be carried out) divide the space which that last bound of the hero covered. It seemed to me that when I showed my interviewer, by a comparison, that a series might be endless in respect to its succession of members and yet very short in another respect, that this simple reflexion took him by surprise and was quite a new idea to him, though he quickly exercised a will to continue believing in the inconceivability of passing over an endless succession in a finite time, and determined not to be shaken from it. My illustration was simply a succession of points on squared paper, so that the *x*-coördinates should be 4, 5, 6, 7, 8, 9, 10, etc., and supposed to extend endlessly while the *y*-coördinates were

$y=16/x$; and so the series would be endless, if it were completed, yet the whole measure of its y s would be only 4.



180. The difficulty of another of my interviewers seemed to me less silly. He said, "Is not every one of the parts into which Zeno cuts up the time finite?" "Certainly," said I. "And are they not infinite in number?" "In multitude, yes." "Well, to me, it is perfectly inconceivable that an infinite multitude of objects, each finite, should not be infinite!" I told him it was *next* to inconceivable to me that the thing should remain inconceivable to him much longer. "Do you not fully agree that the sum of a lot of lengths is equal to their number multiplied into their average length?" I asked. "Yes," he said, "but what is the average length of these parts?" It was, however, easy to prove to him that fixing upon any definite value, however small, this value must be much greater than the average of all the successive terms of Zeno's series. For with each term of that series that is larger than the assumed value (the total number of which will be finite) one might associate a million less one of terms, each less than the quotient assumed value, divided by a billion times the number of all the terms greater than the assumed value; and this could evidently be done without using any term twice. Thus, we should find that, of each of the lots of terms each including one of terms larger than the assumed value, the average value would be less than the assumed value; and consequently the average value of all would be less than that value. So I proved that the average value of all the terms would be less than *any* assumed value; and consequently the fact that their multitude is infinite is no proof that their sum is infinite. It will be observed that I felt obliged to reason in the inelegant and awkward way I did, instead of directly proving the rule for the summation of a geometrical progression because I was dealing with one of those minds who, not detecting the fallacy (which always consists in their not being able to conceive

of something which is, however, true) of a certain reasoning, directly opposed to a sound mathematical demonstration, passionately take the former to their bosoms, and not only regard all who trust to the latter as criminals, but think no act that tends to suppress such criminals is wrong. Those who have not had to do with this class of persons will think my statement exaggerated. I can only say to them, "Consult some other person who has had experience, before you rashly argue with these persons as you would with others." For that reason I felt I must avoid bringing in the rule for the summation of a geometrical series, and so condemned myself to the awkward argument I used. But all reasoning is quite thrown away upon a person who has once set his teeth and has resolved to believe in a definite proposition.

181. There is one intellectual habit which I have laboured very seriously to cultivate, and of which I have a number of times experienced advantages enough, each one of them, to repay all the work I have done toward acquiring it: I mean the habit, when I have been upon the point of assenting, in my own mind, to some conclusion, [and when] I knew that some other mind (whose ways of thinking were very unlike my own, but whom I had known to have reached, in his way, truths not easy to reach) had considered the matter and had reached a conclusion inconsistent with the one that was recommending itself to me, of pausing, endeavoring to put myself in that other's point of view, reconsidering more minutely my whole reasoning, seeking to weld it to other reasonings and reflexions which all sound thinkers would approve, and doing my best to find weak points in the reasoning I came so near to embracing. I should not venture to recommend the cultivation of this habit to any of those who set up their own accidental impossibility of conceiving, as a permanent and essential one, before which all other men ought to crook the knee; since the very essence of their mental malady consists in an exaggerated loyalty to their own principles, i.e. a heart-felt and rather intolerant religion whose divinity is their past mental selves. Those who are really acquainted with this folk will recognize the portrait.

182. No man could be closer to the antipode of their model than America's and the world's highest respected and closest

beloved philosophic soul, William James. Nobody has a better right to testify to the morality of his attitude toward his own thoughts than I, who knew and loved him for forty-nine or fifty years. But owing to his almost unexampled incapacity for mathematical thought, combined with intense hatred for logic — probably for its pedantry, its insistence on minute exactitude — the *gêne* of its barbarous formulations, etc. rendered him an easy victim to Zeno and the Achilles; and he had, I fear, a right to be offended at the contemptuous language that I thought it my duty to use when talking of this paradox to the young men; though if he did feel offended, he never showed it to me. In what I have said here on the subject, I have endeavoured to substitute serious and courteous remonstrance for the tone I used at Harvard.*

Although he is now gone from us, I thoroughly believe he is looking over my shoulder this minute as I write; and I hope he will be able to guide my pen to greater delicacy than I am capable of. He thought that the Achilles disproved Dedekind's theory of continuity, which I take to be generally believed by mathematicians, though it is beyond the jurisdiction of Pure Mathematics, which deals exclusively with the consequences deducible from hypotheses arbitrarily posited.† Personally, I agree entirely with James, against Dedekind's view; and hold that there would be no actually existent points in an existent continuum, and that if a point were placed in a continuum it would constitute a breach of the continuity. Of course, there is a possible, or potential, point-place wherever a point might be placed; but that which only *may be* is necessarily thereby *indefinite*, and as such, and in so far, and in those respects, as it is such, it is not subject to the principle of contradiction, just as the negation of a may-be, which is of course a *must-be*, (I mean that if "S *may be* P" is untrue, then "S *must be* non-P" is true), in those respects in which it is such, is not subject to the principle of excluded middle.‡ This renders may-be's and must-be's very delicate objects for thought to handle, and propositions concerning them that sound absurd sometimes express plain facts. This, however, is a matter that I cannot

* In the Pragmatism Lectures of 1903? See 5.181, 5.202.

† See 4.229ff.

‡ See 168.

pretend to have got to the bottom of; and logic here seems to touch metaphysics. But while I am in full accord with James's conclusion, and indeed am inclined to think that it was I who first drew his attention to Kant's sometimes speaking, in the *C. d. r. V.*,* as if this was his opinion, though other of his expressions are against it, I cannot in the least agree with him that the Achilles argument proves that it is so. What seems to me to prove that it cannot do so is that the whole state of things supposed in that paradox might perfectly well be true if, in place of time and space, there were a series of instants and a series of points corresponding to all the values of (mathematically speaking) real and rational quantities. That is to say, if all those places in space were abolished whose distances from a fixed point are not expressible as some fraction, proper or improper, of an inch — that is to say, whose distances from a selected point, the same for all, did not stand to the inch in the same ratio as that of one whole number to another — and the same work of destruction had been done to time (and we have absolutely no evidence, as far as I see, that such is not the actual truth as to space and time both), then the race between Achilles and Tortoise could have taken place exactly as it did, and no one the wiser. Yet it could not be said *then* that there were no points in space; for it would be nothing but points without the least continuity. In fact, in order to prove that such is not in fact the constitution of actual time, at least (for rotation might introduce strictly infinitesimal difficulties about space), it seems to me that we should be driven to considerations of the same nature as some I introduced in perhaps the crudest of my struggles with such subjects, a paper (regretted as soon as published) entitled "The Law of Mind."† William James, in one of his last talks with me, expressed the opinion that that paper was, perhaps, the best I had ever written. I mention this in the hope that it may lead to somebody's using what truth there may be in it, in new and far better treatment of the continuity of time and of consciousness. My notion is that we directly perceive the continuity of consciousness; and if anybody objects, that which is not really continuous may *seem* so, I reply, "Aye, but it could not *seem*

* A 169, B 211.

† See ch. 5.

so, if there were not *some* consciousness that *is* so.”* I should like to see a good criticism of that reply.

I am not, at present, prepared to believe, as William James did, that he was, permanently and as a finality, incapable of conceiving that Achilles could traverse an infinite succession of points, [although Achilles] certainly would have no notion that there were any such points there. (There were doubtless a lot of pebbles and grains of sand along his path, judging from the little I saw, in passing in a braganza over a road in Phthiotis in the night. Now I do not think that if each pebble were broken into a million pieces the difficulty of getting over the road would necessarily have been increased; and I don't see why it should if one of those millions — or all of them — had been multiplied into an infinity.)

183. After studying William James on the intellectual side for half a century — for I was not acquainted with him as a boy — I must testify that I believe him to be, and always to have been during my acquaintance with him, about as perfect a lover of truth as it is possible for a man to be; and I do not believe there is any definite limit to man's capacity for loving the truth. If you ask me what that ugly word “about” signifies in my statement of James's love of truth, as I believe that love to have been, I reply that I conceive the imperfection of man's devotion to anything — at any rate to any such perfect ideal as Truth — to be very different from his incapacity to attain exactitude in reproducing a metre or a kilo, inasmuch as in these latter cases, what he is liable to do is to make his copy either too large or too small, with an equal liability — after making a constant allowance, one way or the other, for his tendency to make it a bit different from “nature” (as the artists call the real thing they aim to imitate, at least to a certain difference, *près*) — I repeat, after [we have made] such allowances [for] an equal liability, to err in excess and in defect, in such a case we are just as likely, and indeed a little likelier, to hit the truth as near as our last place of decimals goes, as we are to make a small error one way or the other. Indeed we are infinitesimally likelier to do so. But when it comes to efforts to attain an ideal that it would be an absurdity to talk of surpassing and an impossibility actually to reach, we ought to

* Cf. 1.36ff.

measure our shortcomings by the logarithms of [our] mechanical, blockhead, measures of those shortcomings. Exactly of what nature these "blockhead measures" would be, it would be a study to ascertain; but all measurement of the errors that are only known through those erroneous measurements are pretty rough; and a slight error in the mode of measuring is very unlikely to be of serious consequence.

184. In speaking, then, of William James as I do, I am saying the most that I could of any man's intellectual morality; and with him this was but one of a whole diadem of virtues. Though it is entirely out of place in this connexion, and I must beg the reader's pardon for so wandering from the point under consideration, I really lack the self-command to repress my reflexions when I have once set down his name. Though his lectures were delightful, they not at all exhibited the man at his best. It was his unstudied common behaviour that did so by the perfection of his manners, in their perfect freedom from expressing flattery or anything else false or inappropriate to the occasion. He did not express himself very easily, because rhetoric was his antipathy and logic an inconvenience to him. One always felt that the pencil, not the pen, was the lever with which he ought to have moved the world; and yet no! it was not the externals of things but their souls he could have pictured.

His comprehension of men to the very core was most wonderful. Who, for example, could be of a nature so different from his as I? He so concrete, so living; I a mere table of contents, so abstract, a very snarl of twine. Yet in all my life I found scarce any soul that seemed to comprehend, naturally, [not] my concepts, but the mainspring of my life better than he did. He was even greater [in the] practice than in the theory of psychology.

CHAPTER 7

THE LOGIC OF CONTINUITY^{P*}

§1. POTENTIAL AGGREGATES

185. By the *limit* of an endless series of successive objects we mean an object which comes after all the objects of that series, but so that every *other* object which comes after all those objects comes after the limit also. When I say that the series of abnumeral multitudes has no limit, I mean that it has no limit among multitudes of distinct individuals. It will have a limit if there is properly speaking, any meaning in saying that something that is *not* a multitude of distinct individuals is *more* than every multitude of distinct individuals. But, you will ask, can there be any sense in that? I answer, yes, there can, in this way. That which is possible is in so far *general* and, as general, it ceases to be individual. Hence, remembering that the word "potential" means *indeterminate yet capable of determination in any special case*, there may be a *potential* aggregate of all the possibilities that are consistent with certain general conditions; and this may be such that given any collection of distinct individuals whatsoever, out of that potential aggregate there may be actualized a more multitudinous collection than the given collection. Thus the potential aggregate is, with the strictest exactitude, greater in multitude than any possible multitude of individuals. But being a potential aggregate only, it does not contain any individuals at all. It only contains general conditions which *permit* the determination of individuals.

186. The logic of this may be illustrated by considering an analogous case. You know very well that $\frac{2}{3}$ is not a whole number. In the whole collection of whole numbers you will not find $\frac{2}{3}$. That you know. Therefore, you know something about the entire collection of whole numbers. But what is the nature of your conception of this collection? It is general. It

* The last of a proposed set of eight lectures, 1898. See 212n. Cf. also Preface and ch. 8.

is potential. It is vague, but yet with such a vagueness as permits of its accurate determination in regard to any particular object proposed for examination. Very well, that being granted, I proceed to the analogy with what we have been saying. Every whole number considered as a multitude is capable of being completely counted. Nor does its being aggregated with or added to any other whole number in the least degree interfere with the completion of the count. Yet the aggregate of *all* whole numbers cannot be completely counted. For the completion would suppose the *last* whole number was included, whereas there is no last whole number. But though the aggregate of all whole numbers cannot be completely counted, that does not prevent our having a distinct idea of the multitude of all whole numbers. We have a conception of the entire collection of whole numbers. It is a *potential* collection, indeterminate yet determinable. And we see that the entire collection of whole numbers is more multitudinous than any whole number.

187. In like manner the potential aggregate of all the abnumeral multitudes is more multitudinous than any multitude. This potential aggregate cannot be a multitude of distinct individuals any more than the aggregate of all the whole numbers can be completely counted. But it is a distinct general conception for all that — a conception of a potentiality.

188. A potential collection, more multitudinous than any collection of distinct individuals can be, cannot be entirely vague. For the potentiality supposes that the individuals are determinable in every multitude. That is, they are determinable as distinct. But there cannot be a distinctive quality for each individual; for these qualities would form a collection too multitudinous for them to remain distinct. It must therefore be by means of relations that the individuals are distinguishable from one another. . . . No perfect continuum can be defined by a [asymmetrical] dyadic relation [since the origin and terminus would be points of discontinuity].* But if we take instead a triadic relation, and say *A* is *r* to *B* for *C*, say, to fix our ideas, that proceeding from *A* in a particular way, say to the right, you reach *B* before *C*, it is quite evident that a con-

* A symmetrical dyadic relation, for Peirce, does not enable one to distinguish the individuals related.

tinuum will result like a self-returning line with no discontinuity whatever. . . .

§2. THE LOGIC OF THE UNIVERSE

189. Every attempt to understand anything — every research — supposes, or at least *hopes*, that the very objects of study themselves are subject to a logic more or less identical with that which we employ.

That the logic of the universe is more rudimentary than our subjective logic is a hypothesis which may be worth examination in some stage of culture, but it is too violently at war with all the lessons which this age has learned for any man nowadays to embrace it with that ardor with which a man must embrace the theory which he is to devote his best powers to developing and bringing to the test of experience. Whatever else may be said for or against that hypothesis, that which we of these times ought to try is rather the hypothesis that the logic of the universe is one to which our own aspires, rather than attains.

190. Now continuity is shown by the logic of relations to be nothing but a higher type of that which we know as generality. It is relational generality.

191. How then can a continuum have been derived? Has it for example been put together? Have the separated points become welded, or what?

Looking upon the course of logic as a whole we see that it proceeds from the question to the answer — from the vague to the definite. And so likewise all the evolution we know of proceeds from the vague to the definite. The indeterminate future becomes the irrevocable past. In Spencer's phrase the undifferentiated differentiates itself. The homogeneous puts on heterogeneity. However it may be in special cases, then, we must suppose that as a rule the continuum has been derived from a more general continuum, a continuum of higher generality.

192. From this point of view we must suppose that the existing universe, with all its arbitrary secondness, is an offshoot from, or an arbitrary determination of, a world of ideas, a Platonic world; not that our superior logic has enabled us to

reach up to a world of forms to which the real universe, with its feebler logic, was inadequate.

193. If this be correct, we cannot suppose the process of derivation, a process which extends from before time and from before logic, we cannot suppose that it began elsewhere than in the utter vagueness of completely undetermined and dimensionless potentiality.

194. The evolutionary process is, therefore, not a mere evolution of the *existing universe*, but rather a process by which the very Platonic forms themselves have become or are becoming developed.

195. We shall naturally suppose, of course, that existence is a stage of evolution. *This existence* is presumably but a *special* existence. We need not suppose that every form needs for its evolution to emerge into this world, but only that it needs to enter into *some* theatre of reactions, of which this is one.

196. The evolution of forms begins or, at any rate, has for an early stage of it, a vague potentiality; and that either is or is followed by a continuum of forms having a multitude of dimensions too great for the individual dimensions to be distinct. It must be by a contraction of the vagueness of that potentiality of everything in general, but of nothing in particular, that the world of forms comes about.

197. We can hardly but suppose that those sense-qualities that we now experience, colors, odors, sounds, feelings of every description, loves, griefs, surprise, are but the relics of an ancient ruined continuum of qualities, like a few columns standing here and there in testimony that here some old-world forum with its basilica and temples had once made a magnificent *ensemble*. And just as that forum, before it was actually built, had had a vague underexistence in the mind of him who planned its construction, so too the cosmos of sense-qualities, which I would have you to suppose in some early stage of being was as real as your personal life is this minute, had in an antecedent stage of development a vaguer being, before the relations of its dimensions became definite and contracted.

198. The sense-quality is a feeling. Even if you say it is a *slumbering* feeling, that does not make it less intense; per-

haps the reverse. For it is the absence of *reaction* — of feeling *another* — that constitutes slumber, not the absence of the immediate feeling that is all that it is in its immediacy. Imagine a magenta color. Now imagine that all the rest of your consciousness — memory, thought, everything except this feeling of magenta — is utterly wiped out, and with that is erased all possibility of comparing the magenta with anything else or of estimating it as more or less bright. That is what you must think the pure sense-quality to be. Such a definite potentiality can emerge from the indefinite potentiality only by its own vital Firstness and spontaneity. Here is this magenta color. What originally made such a quality of feeling possible? Evidently nothing but itself. It is a First.

199. Yet we must not assume that the qualities arose separate and came into relation afterward. It was just the reverse. The general indefinite potentiality became limited and heterogeneous. Those who express the idea to themselves by saying that the Divine Creator determined so and so may be incautiously clothing the idea in a *garb* that is open to criticism, but it is, after all, substantially the only philosophical answer to the problem. Namely, they represent the ideas as springing into a preliminary stage of being by their own inherent firstness. But so springing up, they do not spring up isolated; for if they did, nothing could unite them. They spring up in reaction upon one another, and thus into a kind of existence. This reaction and this existence these persons call the mind of God. I really think there is no objection to this except that it is wrapped up in figures of speech, instead of having the explicitness that we desire in science. For all you know of “minds” is from the actions of animals with brains or ganglia like yourselves, or at furthest like a cockroach. To apply such a word to *God* is precisely like the old pictures which show him like an aged man leaning over to look out from above a cloud. Considering the *vague intention* of it, as conceived by the *non-theological* artist, it cannot be called false, but rather ludicrously figurative.

200. In short, if we are going to regard the universe as a result of evolution at all, we must think that not merely the existing universe, that locus in the cosmos to which our reactions are limited, but the whole Platonic world, which in itself

is equally real, is evolutionary in its origin, too. And among the things so resulting are time and logic. The very first and most fundamental element that we have to assume is a Freedom, or Chance, or Spontaneity, by virtue of which the general vague nothing-in-particular-ness that preceded the chaos took a thousand definite qualities. The *second* element we have to assume is that there could be accidental reactions between those qualities. The qualities themselves are mere eternal possibilities. But these reactions we must think of as *events*. Not that *Time* was. But still, they had all the here-and-nowness of events. I really do not see how the metaphysician can explain either of these elements as results, further than this, that it may be said that the accidental reaction was, at first, one of the special determinations that came about by pure spontaneity or chance.

201. Let me here say one word about Tychism, or the doctrine that absolute chance is a factor of the universe. There is one class of objectors to it who are so impressed with what they have read in popular books about the triumphs of science that they really imagine that science has *proved* that the universe is regulated by law down to every detail. Such men are theologians, perhaps, or perhaps they have been brought up in surroundings where everything was so minutely regulated that they have come to believe that every tendency that exists at all in Nature must be carried to its furthest limit. Or, there is I know not what other explanation of their state of mind; but I do know one thing: they cannot be real students of physical science — they cannot be *chemists*, for example. They are wrong in their logic. But there is *another* class of objectors for whom I have more respect. They are shocked at the atheism of Lucretius and his great master. They do not perceive that that which offends them is not the Firstness in the swerving atoms, because they themselves are just as much advocates of Firstness as the ancient Atomists were. But what they cannot accept is the attribution of this firstness to things perfectly dead and material. Now I am quite with them there. I think too that whatever is First is *ipso facto* sentient. If I make atoms swerve — as I do — I make them swerve but very very little, because I conceive they are not absolutely dead. And by that I do not mean exactly that I hold them to be phys-

ically such as the materialists hold them to be, only with a small dose of sentiency superadded. For that, I grant, would be feeble enough. But what I mean is, that all that there is, is First, Feelings; Second, Efforts; Third, Habits — all of which are more familiar to us on their psychical side than on their physical side; and that dead matter would be merely the final result of the complete induration of habit reducing the free play of feeling and the brute irrationality of effort to complete death. Now I would suppose that that result of evolution is not quite complete even in our beakers and crucibles. Thus, when I speak of chance, I only employ a mathematical term to express with accuracy the characteristics of freedom or spontaneity.

202. Permit me further to say that I object to having my metaphysical system as a whole called Tychism. For although tychism does enter into it, it only enters as subsidiary to that which is really, as I regard it, the characteristic of my doctrine, namely, that I chiefly insist upon continuity, or Thirdness, and, in order to secure to thirdness its really commanding function, I find it indispensable fully [to] recognize that it is a third, and that Firstness, or chance, and Secondness, or Brute reaction, are other elements, without the independence of which Thirdness would not have anything upon which to operate. Accordingly, I like to call my theory Synechism, because it rests on the study of continuity. I would not object to Tritism. And if anybody can prove that it is *trite*, that would delight me [in] the chiefest degree.

203. All that I have been saying about the beginnings of creation seems wildly confused enough. Now let me give you such slight indication, as brevity permits, of the clue to which I trust to guide us through the maze.

Let the clean blackboard be a sort of diagram of the original vague potentiality, or at any rate of some early stage of its determination. This is something more than a figure of speech; for after all continuity is generality. This blackboard is a continuum of two dimensions, while that which it stands for is a continuum of some indefinite multitude of dimensions. This blackboard is a continuum of possible points; while that is a continuum of possible dimensions of quality, or is a continuum of possible dimensions of a continuum of possible

dimensions of quality, or something of that sort. There are no points on this blackboard. There are no dimensions in that continuum. I draw a chalk line on the board. This discontinuity is one of those brute acts by which alone the original vagueness could have made a step towards definiteness. There is a certain element of continuity in this line. Where did this continuity come from? It is nothing but the original continuity of the blackboard which makes everything upon it continuous. What I have really drawn there is an oval line. For this white chalk-mark is not a *line*, it is a plane figure in Euclid's sense — a *surface*, and the only line there, is the line which forms the *limit* between the black surface and the white surface. Thus the discontinuity can only be produced upon that blackboard by the reaction between two continuous surfaces into which it is separated, the white surface and the black surface. The whiteness is a Firstness — a springing up of something new. But the boundary between the black and white is neither black, nor white, nor neither, nor both. It is the pairedness of the two. It is for the white the active Secondness of the black; for the black the active Secondness of the white.

204. Now the clue, that I mentioned, consists in making our thought diagrammatic and mathematical, by treating generality from the point of view of geometrical continuity, and by experimenting upon the diagram.

We see the original generality like the ovum of the universe segmentated by this mark. However, the mark is a mere accident, and as such may be erased. It will not interfere with another mark drawn in quite another way. There need be no consistency between the two. But no further progress beyond this can be made, until a mark will *stay* for a little while; that is, until some beginning of a *habit* has been established by virtue of which the accident acquires some incipient staying quality, some tendency toward consistency.

This habit is a generalizing tendency, and as such a generalization, and as such a general, and as such a continuum or continuity. It must have its origin in the original continuity which is inherent in potentiality. Continuity, as generality, is inherent in potentiality, which is essentially general.

205. The whiteness or blackness, the Firstness, is essen-

tially indifferent as to continuity. It lends itself readily to generalization but is not itself general. The limit between the whiteness and blackness is essentially discontinuous, or antigeneral. It is insistently *this here*. The original potentiality is essentially continuous, or general.

206. Once the line will stay a little after it is marked, another line may be drawn beside it. Very soon our eye persuades us there is a *new* line, the envelope of those others.



This rather prettily illustrates the logical process which we may suppose takes place in things, in which the generalizing tendency builds up new habits from chance occurrences. The new curve, although it is new in its distinctive character, yet derives its continuity from the continuity of the blackboard itself. The original potentiality is the Aristotelian matter or indeterminacy from which the universe is formed. The straight lines as they multiply themselves under the habit of being tangent to the envelope gradually tend to lose their individuality. They become in a measure more and more obliterated and sink into mere adjuncts to the new cosmos in which they are individuals.

207. Many such reacting systems may spring up in the original continuum; and each of these may itself act as a first line from which a larger system may be built, in which it in turn will merge its individuality.

208. At the same time all this, be it remembered, is not of the order of the existing universe, but is merely a Platonic world, of which we are, therefore, to conceive that there are many, both coördinated and subordinated to one another; until finally out of one of these Platonic worlds is differentiated the particular actual universe of existence in which we happen to be.

209. There is, therefore, every reason in logic why this here universe should be replete with accidental characters, for each of which, in its particularity, there is no other reason than that it is one of the ways in which the original vague potentiality has happened to get differentiated.

But, for all that, it will be found that if we suppose the laws of nature to have been formed under the influence of a universal tendency of things to take habits, there are certain characters that those laws will necessarily possess.

As for attempting to set forth the series of deductions I have made upon this subject, that would be out of the question. All that I have any thought of doing is to illustrate, by a specimen or two, chosen among those which need the least explanation, some of the methods by which such reasoning may be conducted.

§3. CIRCULAR CONTINUA; TIME AND SPACE

210. Various continua, to which the inquirer's attention will be directed in the course of this investigation, must be assumed to be devoid of all topical singularities. For any such singularity is a locus of discontinuity; and from the nature of the continuum there may be no room to suppose any such secondness. But now, a continuum which is without singularities must, in the first place, return into itself. Here is a remarkable consequence.

Take, for example, Time. It makes no difference what singularities you may see reason to impose upon this continuum. You may, for example, say that all evolution began at this instant, which you may call the infinite past, and comes to a close at that other instant, which you may call the infinite future. But all this is quite extrinsic to time itself. Let it be, if you please, that evolutionary time, our section of time, *is* contained between those limits. Nevertheless, it cannot be denied that time itself, unless it be discontinuous, as we have every reason to suppose it is not, stretches on beyond those limits, infinite though they be, returns into itself, and begins again.* Your metaphysics must be shaped to accord with that.

211. Again, the lowest Listing number,† the number of separate pieces, cannot be *zero*; for such a hypothesis would annul the whole continuum. Nor can the highest Listing number‡ be *zero*, unless the continuum has singularities. But the

* See 1.274ff.

† Usually called *chorisis* by Peirce. See 4.222.

‡ Called *periphraxis* in Listing's *Census Räumlicher Complexe* (Göttingen, 1862), where it is described as "*Eigenschaft einer Fläche oder eines Raumes, wenn sie allseitig zusammenhängen u. einen Complex oder Complextheil rings umhüllen*" (p. 182). See also Peirce's definition of *Periphractic* in the *Century Dictionary* (1889). Peirce's terminology, which is largely that of Listing, has not been preserved in the development of topology. See Veblen, *Analysis Situs*, New York (1931); or Seifert and Threlfall, *Lehrbuch der Topologie*, Teubner (1934).

intermediate Listing numbers* may be *zero* or almost any numbers. If metaphysics is really to be made a definite science, and not child's play, the first inquiry concerning any general must be, first, what its dimensionality is, and secondly, what these intermediate Listing numbers are; and whatever your answer is, it will generally be found to lead you into those difficult but definite questions out of which we are accustomed in inductive science to think that the true theory is pretty sure to grow. It is one of the great merits of the method of thought, that the logic of relatives inculcates, that it leads to such definite questions.

For example, take the continuum of all possible sense qualities after this has been so far restricted that the dimensions are distinct. This is a continuum in which firstness is the prevailing character. It is also highly primitive; and therefore we ought to suppose, till the contrary is proved, that the intermediate Listing numbers are all *unity*. For *zero* is distinctly a dualistic idea. It is mathematically $A - A$, i.e. the result of the inverse process of subtraction. Now an inverse process is a *Second* process. It is true that there is another sort of zero which is a *limit*. Such is the vague zero of indeterminacy. But a limit involves Secondness prominently, and besides that, Thirdness. In fact, the *generality* of indeterminacy *marks* its Thirdness. Accordingly, *zero* being an idea of Secondness, we find, as we should expect, that any continuum whose intermediate Listing numbers are zero is equivalent to a pair of continua whose Listing numbers are 1. For instance, a perspective plane has a cyclosis equal to 1, while a ball has a cyclosis equal to 0. Now a ball is, topically speaking, of the same shape as two planes after the singularity of the pair has been removed. I will show you that this is true. Let the one plane be that of the blackboard, and let the other be oblique to it. Let this mark represent their ray of intersection. This ray is a singular line upon the two planes considered as one surface. In order to remove this singularity, we must split it down, so as to leave the right-hand side of the blackboard plane joined along the right-hand parts of the split

* Called *cyclosis* by Listing (*op. cit.*, Art. 9, p. 181), and paraphrased by him as "ringmässiger Zusammenhang, Anastomose." In modern terms, the connectivity minus one. See 4.225.

line to that part of the oblique plane that is in front, while the left-hand part of the blackboard plane is joined along the left-hand parts of the split line to the part of the oblique plane behind the blackboard. Thus the ray becomes two rays.

But two rays *intersect*. So that a singular point still remains. We must, then, cut through that singular point,



making two points of it; and leaving the right side of the blackboard plane joined to the forward part of the oblique plane and the left side joined to the other part. We now move apart those two hyperbolic branches, that the two rays have made, until they have made nearly a complete



circuit of the plane. They no longer cut the ray at infinity, and we have an egg-shaped solid which is topically just like a ball. Thus I have shown how *secondness* enters into the *zero* cyclosis. It is the same with



the other intermediate Listing numbers; and we must assume that all the Listing numbers of the continuum of sense-qualities are equal to 1.



This is confirmed by carrying the evolution of the continuum and its definiteness a step further. Namely, we will now suppose that each quality has acquired a settled identity in all its different degrees, so that the continuum is ready for the application of measurement. This measurement is a network figure imposed upon the blank continuum. It is true that it is in large measure arbitrary. It is *our* creation. Nevertheless, we shall adapt our creation as far as possible to the real properties of the continuum itself. Besides, there are certain modes of measurement which are impossible without breach of continuity in certain shapes of continua. For example, anybody can see that the same system of coördinates which could be applied to defining positions of points on a sphere, say latitude and longitude, would have to be modified in order to apply it to the definition of positions on an anchoring. On the sphere, longitude returns into itself after every 360° , and there are two points, the poles, whose longitudes are indeterminate; while latitude extends through 180° and then stops. But on the ring there will be one series of lines which will go round the bar of the ring without ever cutting one another, and another series going round the hole of the ring without cutting one another. This is a much simpler system

of measurement than any that is possible on the sphere. Now in the network figure of coördinates which conforms best to the properties of the continuum of pure quality there is a line for each quality, along which line that quality only varies in intensity. All these lines come together at the absolute zero of quality. For in the *zero* of intensity, quality is indistinguishable in its inmost nature. But those lines meet nowhere else. In the infinite degree qualities may dazzle our senses; but in themselves they are different. Hence, the continuum of quality is such that unlimited lines may cut one another an odd number of times; namely, *once* only. Now this would be impossible were the intermediate Listing numbers *even*, say zero. Our hypothesis that they are odd is therefore confirmed. (I must add that the measurement of quality is evidently hyperbolic, which weakens considerably the force of the last argument.)

212. As another example, consider the continuum of Space. In my lecture* on the subject I pointed out to you how though it is a continuum, and therefore a Thirdness, the whole nature and function of space refers to Secondness. It is the theatre of the reactions of particles, and reaction is Secondness in its purity. For this and other reasons, which I omit for the sake of brevity, we must, as our first retroduction, assume that the intermediate Listing numbers for space are all *zero*. When we come to consider the principles of hydrodynamics we find that view confirmed. I cannot enter into details; but the motions of a frictionless incompressible fluid is as though it were composed of interpenetrating parts, shot out in straight lines from sources and disappearing into sinks. But that implies that all the straight lines radiating from a single point will meet again in another single point which supposes the Cyclosis and Periphaxis of Space to be *zero*. There will be some difficulties connected with this view, but I do not think them serious; and at any rate this will serve as another illustration of the manner in which reasoning about continuity can be applied to give real vitality to metaphysical reasoning, and to cure it of its deathly impotency.

* Apparently not delivered; the series of lectures on "Detached Ideas on Vitally Important Topics" (see ch. 3) apparently having been given by request instead of the proposed eight lectures of which the present chapter and that on the continuity of space are parts.

213. I should have been glad if I could have set forth all this in greater detail; but that would have required more mathematics. I should have liked to interest you in a number of my scientifically important and philosophically significant results which I have been obliged to leave altogether unmentioned. I wish I could also have expounded some theories of other thinkers which, although I cannot accept them, seem to me to be well worthy of the most careful consideration. But to treat a theory like this, the whole life of which lies in minute diagrammatic reasoning, in eight lectures was inevitably to make it seem excessively abstruse and, at the same time, to do no more than exhibit a fragment here and there selected as being comparatively easy of presentation. The subject of mathematical metaphysics, or Cosmology, is not so very difficult, provided it be properly expanded and displayed. It deeply concerns both physicist and psychist. The physicist ought to direct his attention to it, in order that he may be led to contemplate the intellectual side of his own science. Especially the chemist, whose attention is forced to theory, needs above all to study the theory of theorizing. Psychologists have not yet dropped their excellent habit of studying philosophy; but I venture to think that they are not fully alive to all the value for their science of certain higher mathematics and to the virtues of mathematical thinking. The failure of Herbart, whose attempt was made before either Mathematics or Psychology was ripe for it, does not argue that no success can be attained in that line. I have presented—or no, I have not presented anything in these lectures, but I have talked about the most abstract parts of Cosmology; but the subject embraces many topics which have not that character, such as the question of the present state of the evidences of the Conservation of Energy and the question of the nature of the influences which hold together the constituent elements of chemical compounds. In short, there is a great variety of different ways in which Cosmology is both curious and useful for widely different classes of minds. We all know the kind of man who is warranted never to be interested in it, the man who lays out a system of ideas in his youth and stands on his platform with stalwart constancy like Casabianca on the burning deck. But if a mind is not absolutely argon and

helium, but is capable of being drawn by any means within an alien sphere of attraction, no study is more calculated to bring about that event than this. It is decidedly a difficult subject on which to break ground for oneself. Economy of time, avoidance of a terrible waste, requires the student to take counsel of the experience here of a mathematician, there of a logician, again of a physicist or chemist, and continually of a psychologist. It is, by the way, precisely in psychology where you are the strongest that I have to confess myself the weakest. For that reason, in these lectures I have touched as little as possible upon psychology, preferring to deal with topics of Cosmology where I should be more at home, although you were less so. Crabbed and confused as all these circumstances have caused these conferences to become, you have been kind enough to listen to them, and really I dare not acknowledge, as it is in my heart to do, the whole warmth of my thanks, for fear you might think it out of measure. But should it happen to any of you to select for his life's explorations a region very little trodden, he will, as a matter of course, have the pleasure of making a good many discoveries of more fundamental importance than at all remain to be made in any ground that has long been highly cultivated. But on the other hand, he will find that he has condemned himself to an isolation like that of Alexander Selkirk. He must be prepared for almost a lifetime of work with scarce one greeting, and I can assure him that if, as his day is sinking, a rare good fortune should bring a dozen men of real intellect, some men of great promise, others of great achievement, together to listen to so much of what he has learned as his long habit of silence shall have left him the power of expressing in the compass of eight lectures, he will know then an almost untasted joy and will comprehend then what gratitude I feel at this moment.

CHAPTER 8

OBJECTIVE LOGIC

§1. THE ORIGIN OF THE UNIVERSE*

214. Metaphysics has to account for the whole universe of being. It has, therefore, to do something like supposing a state of things in which that universe did not exist, and consider how it could have arisen. However, this statement needs amendment. For time is itself an organized something, having its law or regularity; so that time itself is a part of that universe whose origin is to be considered. We have therefore to suppose a state of things before time was organized. Accordingly, when we speak of the universe as "arising" we do not mean that literally. We mean to speak of some kind of sequence, say an objective logical sequence; but we do not mean in speaking of the first stages of creation before time was organized, to use "before," "after," "arising," and such words in the temporal sense. But for the sake of the commodity of speech we may avail ourselves of these words.

215. The initial condition, before the universe existed, was not a state of pure abstract being. On the contrary it was a state of just nothing at all, not even a state of emptiness, for even emptiness is something.

If we are to proceed in a logical and scientific manner, we must, in order to account for the whole universe, suppose an initial condition in which the whole universe was non-existent, and therefore a state of absolute nothing.

216. You must not let this interfere with or be interfered with by any religious belief. Religion is a practical matter. Its beliefs are formulae you will go upon. But a scientific proposition is merely something you take up provisionally as being the proper hypothesis to try first and endeavor to refute. The only belief you — as a purely scientific man — have about it is that it is adopted in accordance with a method which must lead to the truth in the long run. It is a damnable

* From "The Logic of Events," 1898, continuing 5.

absurdity indeed to say that one thing is true in theology and another in science. But it is perfectly true that the belief which I shall do well to embrace in my practical affairs, such as my religion, may not accord with the proposition which a sound scientific method requires me provisionally to adopt at this stage of my investigation. Later, both the one proposition and the other may very likely be modified; but how, or which comes nearer to the ultimate conclusion, not being a prophet or a magician, I cannot yet say.

217. We start, then, with nothing, pure zero. But this is not the nothing of negation. For *not* means *other than*, and *other* is merely a synonym of the ordinal numeral *second*. As such it implies a first; while the present pure zero is prior to every first. The nothing of negation is the nothing of death, which comes *second* to, or after, everything. But this pure zero is the nothing of not having been born. There is no individual thing, no compulsion, outward nor inward, no law. It is the germinal nothing, in which the whole universe is involved or foreshadowed. As such, it is absolutely undefined and unlimited possibility — boundless possibility. There is no compulsion and no law. It is boundless freedom.

So of *potential* being there was in that initial state no lack.

218. Now the question arises, what necessarily resulted from that state of things? But the only sane answer is that where freedom was boundless nothing in particular necessarily resulted.

In this proposition lies the prime difference between my objective logic and that of Hegel.* He says, if there is any sense in philosophy at all, the whole universe and every feature of it, however minute, is rational, and was constrained to be as it is by the logic of events, so that there is no principle of action in the universe but reason. But I reply, this line of thought, though it begins rightly, is not exact. A logical slip is committed; and the conclusion reached is manifestly at variance with observation. It is true that the whole universe and every feature of it must be regarded as rational, that is as brought about by the logic of events. But it does not follow that it is *constrained* to be as it is by the logic of events; for the logic of evolution and of life need not be supposed to be of

* Cf. 5.79.

that wooden kind that absolutely constrains a given conclusion. The logic may be that of the inductive or hypothetical inference.

This may-be is at once converted into must-be when we reflect that among the facts to be accounted for are such as that, for example, red things look red and not blue and *vice versa*. It is obvious that that cannot be a necessary consequence of abstract being.

The effect of this error of Hegel is that he is forced to deny [the] fundamental character of two elements of experience which cannot result from deductive logic. What these elements are will appear in the sequel.

219. I say that nothing *necessarily* resulted from the Nothing of boundless freedom. That is, nothing according to deductive logic. But such is not the logic of freedom or possibility. The logic of freedom, or potentiality, is that it shall annul itself. For if it does not annul itself, it remains a completely idle and do-nothing potentiality; and a completely idle potentiality is annulled by its complete idleness.

220. I do not mean that potentiality immediately results in actuality. Mediatly perhaps it does; but what immediately resulted was that unbounded potentiality became potentiality of this or that sort — that is, of some *quality*.

Thus the zero of bare possibility, by evolutionary logic, leapt into the *unit* of some quality. This was hypothetical inference. Its form was:

Something is possible,
Red is something;
∴ Red is possible.

221. Now a *quality* is a consciousness. I do not say a *waking* consciousness — but still, something of the nature of consciousness. A *sleeping* consciousness, perhaps.

A possibility, then, or potentiality, is a particular *tinge* of consciousness. I do not say the possibility is exactly a consciousness; but it is a *tinge* of consciousness, a potential consciousness. However, the distinction is little more than verbal.

But let us consider more closely what the *quale*-consciousness is.

§2. QUALE-CONSCIOUSNESS*

222. If a man is blind to the *red* and *violet* elements of light and only sees the *green* element, then all things appear of one color to him, and that color is a green of colorific intensity beyond anything that we with normal eyes can see or imagine. Such is the color that all things look to him. Yet since all things look alike in this respect, it never attracts his attention in the least. He may be said to be dead to it. If the man is at the same time deaf, without smell and taste, and devoid of skin sensations, then it is probable the green will be still more chromatic; for I suppose colors are for us somewhat diluted by skin sensations. But for the very reason that it is his own kind of sensation, he will only be the more completely oblivious of its *quale*. Yet for all that, that *is* the way things look to him, more intensely green than any scarlet or magenta is red to us.

This illustration puts into a high light the distinction between two kinds of consciousness, the *quale*-consciousness and that kind of consciousness which is intensified by attention, which objectively considered, I call *vividness*,† and as a faculty we may call *liveliness*.

223. The *quale*-consciousness is not confined to simple sensations. There is a peculiar *quale* to *purple*, though it be only a mixture of red and blue. There is a distinctive *quale* to every combination of sensations so far as it is really synthesized — a distinctive *quale* to every work of art — a distinctive *quale* to this moment as it is to me — a distinctive *quale* to every day and every week — a peculiar *quale* to my whole personal consciousness. I appeal to your introspection to bear me out in this.

224. Each *quale* is in itself what it is for itself, without reference to any other. It is absurd to say that one *quale* in itself considered is like or unlike another. Nevertheless, comparing consciousness does pronounce them to be alike. They are alike to the comparing consciousness, though neither alike nor unlike in themselves.

225. And now I enunciate a truth. It is this. In so far as

* "Notes for Eight Lectures," which Peirce specifically says are to follow the preceding.

† Cf. 1.308f.

qualia can be said to have anything in common, that which belongs to one and all is *unity*; and the various synthetical unities which Kant attributes to the different operations of the mind, as well as the unity of logical consistency, or *specific* unity, and also the unity of the individual object, all these unities* originate, not in the operations of the intellect, but in the *quale*-consciousness upon which the intellect operates.

226. But here the critic will interpose an objection based upon a dilemma. He will ask me whether I intend that "truth" which I have enunciated so pretentiously for a *logical* truth or a *psychological* truth. Because he will say, if you mean it for a logical truth then the only unity it can account for is the unity of non-contradiction, while if you intend it for a psychological truth it must depend upon the peculiar construction of the nervous system and consequently cannot be transferred to metaphysics, in general, which is the use to which you probably intend to put it.

This is a cunning objection. But it assumes that logic is purely subjective in a sense that is not only pre-Hegelian but pre-Kantian.

227. All those synthetic unities considered cerebrally are but the unity which comes out when association channels are closed and the inflowing excitation of a part of the brain is pent up and intensified.

But it ought to be evident that no *unity* can *originate* in concentration. If there is no unity in a mass of gas, it cannot acquire unity merely by being condensed to half its volume. But any unity there was there already may, in that way, be many times intensified.

If you say those unities are not all of this one species, then how unaccountable it is that so many different operations should give rise to one and the same character of *unity*.

228. Perhaps it may be thought that hypnotic phenomena show that subconscious feelings are not unified. But I maintain on the contrary that those phenomena exhibit the very opposite peculiarity. They *are* unified so far as they are brought into one *quale*-consciousness at all; and that is why different personalities are formed. Of course, each personality is based upon a "bundle of habits," as the saying is that a man

* Cf. 376f.

is a bundle of habits. But a bundle of habits would not have the unity of self-consciousness. That *unity* must be given as a centre for the habits.

229. The brain shows no central cell. The unity of consciousness is therefore not of physiological origin. It can only be metaphysical. So far as feelings have any continuity, it is the metaphysical nature of feeling to have a *unity*.

230. I say then that this unity is logical in this sense, that to feel, to be immediately conscious, so far as possible, without any action and reaction nor any reflection, logically supposes one consciousness and not two nor more.

To be conscious of scarlet and magenta at the same time is either to compare them or set them over against one another and so to introduce another kind of consciousness than the mere *quale*-consciousness, or it is to merge them into one general feeling in which the scarlet and magenta are not separately recognized, and thus preserve the unity of *quale*-consciousness.

This is so true that it is next to impossible to express it in language without appearing to utter a tautologous sentence. If I were to say any quality considered in itself is considered apart from anything else and is therefore without parts, since the parts of a sensation are really other sensations, my auditors would object that this was a mere identical proposition, since *in itself* means nothing but "apart from anything else." But the illustration of color-blindness shows that there is such a thing as a *quale*-consciousness, and when I describe this consciousness as the idea of a quality in itself, I merely, by the laws of speech, am forced to seize upon the character of separateness in order to let another person know what sort of consciousness I have in view.

231. My speech may be tautologous, but I have a positive meaning; and the very fact that it is so difficult to express this meaning without tautology is a mark of its veraciousness. I may express myself thus:

In *quale*-consciousness there is but one quality, but one element. It is entirely simple.

There are evidences of this on every hand.

Thus consciousness, so far as it can be contained in an instant of time, is an example of *quale*-consciousness. Now

everybody who has begun to think about consciousness at all has remarked that the present so conceived is absolutely severed from past and future. That is, the past and the future are utterly absent in the sense in which I am conscious of the *now*.

So I might express my truth by saying —

The Now is one, and but one.

The principle of contradiction may be regarded as a formalistic result of the same thing. Any object, *A*, cannot be blue and not blue *at once*.

It can be blue and hard, because blueness and hardness are not thought of as joined in *quale*-consciousness, one appealing to one experiment and the other to another. But *A* cannot be blue and yellow, because these would blend and so the color would cease to be blue or yellow either. Thus, the positive truth in the principle of contradiction is that *quale*-consciousness has but one element.

232. If *quale*-consciousness were double, it would be like a case of double consciousness. One might pronounce the object to be blue that the other said was not blue and the principle of contradiction would only assert that one judge must be set above those two. But where would be the strife requiring a judge if the *quale*-consciousness were double?

Our truth might therefore be expressed by saying:

The *quale*-consciousness is not a consciousness of strife, or duality.

The quality itself is nothing in the world but a *quale*-consciousness of a composite photograph or general average of experience.

And if the quality can be double, the principle of contradiction falls to the ground.

233. All the operations of the intellect consist in taking composite photographs of *quale*-consciousnesses. Instead of introducing any unity, they only introduce conflict that was not in the *quale*-consciousness itself.

Such unity as remains is nothing but the unity and simplicity of the *quale*-consciousness persisting in spite of all this multiplication and diversity.

234. Another expression of our truth is this:

Quality or *quale*-consciousness is all that it is in and for itself.

It is essentially solitary and celibate, a dweller in the desert.

235. Another expression of it is:

Quale-consciousness cannot blend with *quale*-consciousness without loss of its identity.

236. So much for the meaning of the proposition. I now call attention to a remarkable consequence of it. Namely it follows that there is no check upon the utmost variety and diversity of *quale*-consciousness as it appears to the comparing intellect. For if consciousness is to blend with consciousness, there must be common elements. But if it has nothing in itself but just itself, it is *sui generis* and is cut loose from all need of agreeing with anything. Whatever is absolutely simple must be absolutely free; for a law over it must apply to some common feature of it. And if it has no features, no law can seize upon it. It is *totus, teres, atque rotundus*.

And thus it is that that very same logical element of experience, the *quale*-element, which appears upon the inside as unity, when viewed from the outside is seen as variety.

237. This ought not to appear as a paradox. Suppose for example that one of you proposes to live by yourself and to suit yourself alone, away from all constraints of law and custom, according to your own whimseys, your simple plan of life being to do whatever came into your head. If you are disposed to do this, why should not thousands of others have similar views of life? They certainly will. Not by force of any logical *necessity*, but yet by a logic which is just as certain as if it were necessary, an analogical inference. If nothing prevents such a man as you from existing, nothing will prevent a million such men from existing.

Now if everyone acts really irrespective of all the rest, there will be no regularity nor common character in their behaviour. There will be a Babel of strange tongues and a Bedlam of strange deeds. The units, each *totus, teres, atque rotundus* will make a chaos of fortuitously wandering atoms.

This is the logic by which the unity of *quale*-consciousness, implying simplicity, and through simplicity, freedom, necessarily results in endless multiplicity and variety. All that is a perfectly ostensive result of logic and involves no paradox whatsoever. . . .

CHAPTER 9

MAN'S GLASSY ESSENCE*

§1. THE CONSTITUTION OF MATTER^E

238. In *The Monist* for January, 1891 † I tried to show what conceptions ought to form the brick and mortar of a philosophical system. Chief among these was that of absolute chance¹ for which I argued again in last April's number.‡ In July, § I applied another fundamental idea, that of continuity, to the law of mind. Next in order, I have to elucidate, from the point of view chosen, the relation between the psychical and physical aspects of a substance.

239. The first step towards this ought, I think, to be the framing of a molecular theory of protoplasm. But before doing that, it seems indispensable to glance at the constitution of matter in general. We shall, thus, unavoidably make a long detour; but, after all, our pains will not be wasted, for the problems of the papers that are to follow in the series will call for the consideration of the same question.¶

240. All physicists are rightly agreed the evidence is overwhelming which shows all sensible matter is composed of molecules in swift motion and exerting enormous mutual attractions, and perhaps repulsions, too. Even Sir William Thomson,|| Lord Kelvin, who wishes to explode action at a

* *The Monist*, vol. 3, pp. 1-22 (1892). The fourth paper of a series of five.

† Chapter 1.

¹ I am rejoiced to find, since my last paper was printed, that a philosopher as subtle and profound as Dr. Edmund Montgomery ["The Dependence of Quality on Specific Energies," *Mind*, O. S., vol. 5, pp. 1-29] has long been arguing for the same element in the universe. Other world-renowned thinkers, as M. Renouvier [see *Essais de Critique Générale*, appendice ix] and M. Delboeuf [see "Déterminisme et Liberté," *Revue Philosophique*, vol. 13, pp. 453-480, 608-638; vol. 14, pp. 158-189 (1882)], appear to share this opinion.

‡ Chapter 2.

§ Chapter 5.

¶ See Chapter 11.

|| See "The Size of Atoms," *Popular Lectures and Addresses*, p. 218, London (1889).

distance and return to the doctrine of a plenum, not only speaks of molecules, but undertakes to assign definite magnitudes to them. The brilliant Judge Stallo, a man who did not always rightly estimate his own qualities in accepting tasks for himself, declared war upon the atomic theory in a book* well worth careful perusal. To the old arguments in favor of atoms which he found in Fechner's† monograph, he was able to make replies of considerable force, though they were not sufficient to destroy those arguments. But against modern proofs he made no headway at all. These set out from the mechanical theory of heat. Rumford's experiments‡ showed that heat is not a substance. Joule§ demonstrated that it was a form of energy. The heating of gases under constant volume, and other facts instanced by Rankine,¶ proved that it could not be an energy of strain. This drove physicists to the conclusion that it was a mode of motion. Then it was remembered that John Bernoulli|| had shown that the pressure of gases could be accounted for by assuming their molecules to be moving uniformly in rectilinear paths. The same hypothesis was now seen to account for Avogadro's law, that in equal volumes of different kinds of gases exposed to the same pressure and temperature are contained equal numbers of molecules. Shortly after, it was found to account for the laws of diffusion and viscosity of gases, and for the numerical relation between these properties. Finally, Crookes's radiometer° furnished the last link in the strongest chain of evidence which supports any physical hypothesis.

241. Such being the constitution of gases, liquids must clearly be bodies in which the molecules wander in curvilinear paths, while in solids they move in orbits or quasi-orbits. (See my definition *solid* II, 1, in the *Century Dictionary*.)¹

* *The Concepts and Theories of Modern Physics*, Chapter 7, New York (1882).

† *Ueber die Physikalische und Philosophische Atomenlehre*, Leipzig (1864).

‡ See *Complete Works*, vol. 1, pp. 471-493ff; vol. 2, pp. 1-22, 166-187, 208-221.

§ See *Scientific Papers*, pp. 149ff, London (1884).

¶ See *Transactions of the Royal Society of Edinburgh*, vol. 20, p. 192.

|| See *Daniel Bernoulli, Hydrodynamica*, Section X.

° See *Philosophical Transactions of the Royal Society*, vol. 165, p. 519 (1875).

¹ SOLID — A body which throughout its mass (and not merely at its surface) resists for an indefinite time a sufficiently small force that tends to alter its equilibrium figure, always springing back into shape after the force is removed; a body possessing elasticity of figure. Every such body has limits of

242. We see that the resistance to compression and to interpenetration between sensible bodies is, by one of the prime propositions of the molecular theory, due in large measure to the kinetical energy of the particles, which must be supposed to be quite remote from one another, on the average, even in solids. This resistance is no doubt influenced by finite attractions and repulsions between the molecules. All the impenetrability of bodies which we can observe is, therefore, a limited impenetrability due to kinetic and positional energy. This being the case, we have no logical right to suppose that absolute impenetrability, or the exclusive occupancy of space, belongs to molecules or to atoms. It is an unwarranted hypothesis, not a *vera causa*.¹ Unless we are to give up the theory elasticity and if subjected to a strain exceeding these limits, it takes a set and does not return to its original shape on being let go. This property is called *plasticity*. The minimum energy required to give a set to a body of definite form and size measures its resilience. When the resilience of a body is small and masks its springiness the body is called *soft*. Even fluids transmit shearing forces if time be allowed and many substances will yield indefinitely to very small (but not indefinitely small) forces applied for great lengths of time. So solids that have received a small set will sometimes partially recover their figures after a long time. This property in fluids is called *viscosity*, in solids *after-effect* (German *nachwirkung*). The phenomenon is connected with a re-grouping of the molecules, and indicates the essential difference between a solid and a liquid. In fluids diffusion is continually active, and in gases it produces phenomena of viscosity. In liquids it is not rapid enough to give rise to sensible viscosity, but the free motion of the molecules makes the body fluid, while the tendency of sets of molecules to continue for a while associated makes the fluidity imperfect. In solids, on the other hand (at least when not under strain), there is no diffusion, and the molecules are consequently in stationary motion or describing quasi-orbits. They thus become grouped in the mode in which they have least positional energy consistent with their kinetic energy. When this grouping is slightly disturbed it tends to restore itself; but when the disturbance is greater, some of the molecules will tend to return to their old places and others to move on to new situations, and this may give rise to a new permanent grouping, and exhibit the phenomenon of plasticity. But if not quite sufficient for this, disturbances of the molecular motions somewhat similar to the secular perturbations of the planets will result, from which there will be no restoration for a very long time. Solid bodies are very strongly cohesive, showing that the molecules attract one another on the whole; and they are generally capable of crystallization, showing that the attractions of the molecules are different in different directions. — *Century Dictionary*, p. 5759, edition of 1889.

¹ By a *vera causa*, in the logic of science, is meant a state of things known to exist in some cases and supposed to exist in other cases, because it would account for observed phenomena.

of energy, finite positional attractions and repulsions between molecules must be admitted. Absolute impenetrability would amount to an infinite repulsion at a certain distance. No analogy of known phenomena exists to excuse such a wanton violation of the principle of continuity as such a hypothesis is. In short, we are logically bound to adopt the Boscovichian* idea that an atom is simply a distribution of component potential energy throughout space (this distribution being absolutely rigid) combined with inertia. The potential energy belongs to two molecules, and is to be conceived as different between molecules *A* and *B* from what it is between molecules *A* and *C*. The distribution of energy is not necessarily spherical. Nay, a molecule may conceivably have more than one center; it may even have a central curve, returning into itself. But I do not think there are any observed facts pointing to such multiple or linear centers. On the other hand, many facts relating to crystals, especially those observed by Voigt,¹ go to show that the distribution of energy is harmonical but not concentric. We can easily calculate the forces which such atoms must exert upon one another by considering² that they are equivalent to aggregations of pairs of electrically positive and negative points infinitely near to one another. About such an atom there would be regions of positive and of negative potential, and the number and distribution of such regions would determine the valency of the atom, a number which it is easy to see would in many cases be somewhat indeterminate. I must not dwell further upon this hypothesis, at present. In another paper, its consequences will be further considered.†

243. I cannot assume that the students of philosophy who read this magazine are thoroughly versed in modern molecular physics, and therefore it is proper to mention that the governing principle in this branch of science is Clausius's law of the virial. I will first state the law, and then explain the peculiar terms of the statement. This statement is that the total kinetic energy of the particles of a system in stationary motion

* See *Theoria Philosophicae Naturalis*, Sections 8ff, 81ff, 132ff.

¹ Wiedemann, *Annalen*, 1887-89. [Vol. 30, p. 190; 31, pp. 141, 544; 32, p. 526; 34, p. 981; 35, pp. 76, 370; 36, p. 743; 38, p. 573.]

² See Maxwell on Spherical Harmonics, in his *Electricity and Magnetism*. [Vol. 2, pt. I, ch. 9, p. 179.]

† This does not seem to have been done.

is equal to the total virial. By a *system* is here meant a number of particles acting upon one another.¹ Stationary motion is a quasi-orbital motion among a system of particles so that none of them are removed to indefinitely great distances nor acquire indefinitely great velocities. The kinetic energy of a particle is the work which would be required to bring it to rest, independently of any forces which may be acting upon it. The virial of a pair of particles is half the work which the force which actually operates between them would do if, being independent of the distance, it were to bring them together. The equation of the virial is

$$\frac{1}{2} \Sigma mv^2 = \frac{1}{2} \Sigma \Sigma Rr.$$

Here m is the mass of a particle, v its velocity, R is the attraction between two particles, and r is the distance between them. The sign Σ on the left-hand side signifies that the values of mv^2 are to be summed for all the particles, and $\Sigma \Sigma$ on the right-hand side signifies that the values of Rr are to be summed for all the pairs of particles. If there is an external pressure P (as from the atmosphere) upon the system, and the volume of vacant space within the boundary of that pressure is V , then the virial must be understood as including $\frac{2}{3}PV$, so that the equation is

$$\frac{1}{2} \Sigma mv^2 = \frac{2}{3}PV + \frac{1}{2} \Sigma \Sigma Rr.$$

There is strong (if not demonstrative) reason for thinking that the temperature of any body above the absolute zero (-273° C.) is proportional to the average kinetic energy of its molecules, or say $a\theta$, where a is a constant and θ is the absolute temperature. Hence, we may write the equation

$$a\theta = \frac{1}{2} \overline{mv^2} = \frac{2}{3} \overline{PV} + \frac{1}{2} \Sigma \overline{Rr}$$

where the heavy lines above the different expressions signify that the average values for single molecules are to be taken. In 1872, a student in the University of Leyden, Van der

¹ The word *system* has three peculiar meanings in mathematics. (A) It means an orderly exposition of the truths of astronomy, and hence a theory of the motions of the stars, as the Ptolemaic *system*, the Copernican *system*. This is much like the sense in which we speak of the Calvinistic *system* of theology, the Kantian *system* of philosophy, etc. (B) It means the aggregate of the planets considered as all moving in somewhat the same way, as the solar *system*, and hence any aggregate of particles moving under mutual forces. (C) It means a number of forces acting simultaneously upon a number of particles.

Waals,* propounded in his thesis for the doctorate a specialization of the equation of the virial which has since attracted great attention. Namely, he writes it

$$a\theta = \left(P + \frac{c}{V^2} \right) (V - b).$$

The quantity b is the volume of a molecule, which he supposes to be an impenetrable body, and all the virtue of the equation lies in this term which makes the equation a cubic in V , which is required to account for the shape of certain isothermal curves.¹ But if the idea of an impenetrable atom is illogical, that of an impenetrable molecule is almost absurd. For the kinetical theory of matter teaches us that a molecule is like a solar system or star-cluster in miniature. Unless we suppose that in all heating of gases and vapors internal work is performed upon the molecules, implying that their atoms are at considerable distances, the whole kinetical theory of gases falls to the ground. As for the term added to P , there is no more than a partial and roughly approximative justification for it. Namely, let us imagine two spheres described round a particle as their center, the radius of the larger being so great as to include all the particles whose action upon the center is sensible, while the radius of the smaller is so large that a good many molecules are included within it. The possibility of describing such a sphere as the outer one implies that the attraction of the particles varies at some distances inversely as some higher power of the distance than the cube, or, to speak more clearly, that the attraction multiplied by the cube of the distance diminishes as the distance increases; for the number of particles at a given distance from any one particle is proportionate to the square of that distance and each of these gives a term of the virial which is the product of the attraction into the distance. Consequently, unless the attraction multiplied by the cube of the distance diminished so rapidly with the distance as soon to become insensible, no

* "Over de continuïtet van den gas en vloeistof-toestand," *Academisch Proefschrift*, Leiden (1873).

¹ But, in fact, an inspection of these curves is sufficient to show that they are of a higher degree than the third. For they have the line $V=0$, or some line V a constant for an asymptote, while for small values of P , the values of $d^2P/(dV)^2$ are positive.

such outer sphere as is supposed could be described. However, ordinary experience shows that such a sphere is possible; and consequently there must be distances at which the attraction does thus rapidly diminish as the distance increases. The two spheres, then, being so drawn, consider the virial of the central particle due to the particles between them. Let the density of the substance be increased, say, N times. Then, for every term, Rr , of the virial before the condensation, there will be N terms of the same magnitude after the condensation. Hence, the virial of each particle will be proportional to the density, and the equation of the virial becomes

$$a\theta = P\bar{V} + \frac{c}{V}.$$

This omits the virial within the inner sphere, the radius of which is so taken that within that distance the number of particles is not proportional to the number in a large sphere. For Van der Waals this radius is the diameter of his hard molecules, which assumption gives his equation. But it is plain that the attraction between the molecules must to a certain extent modify their distribution, unless some peculiar conditions are fulfilled. The equation of Van der Waals can be approximately true, therefore, only for a gas. In a solid or liquid condition, in which the removal of a small amount of pressure has little effect on the volume, and where consequently the virial must be much greater than $P\bar{V}$, the virial must increase with the volume. For suppose we had a substance in a critical condition in which an increase of the volume would diminish the virial more than it would increase $\frac{3}{2}P\bar{V}$. If we were forcibly to diminish the volume of such a substance, when the temperature became equalized, the pressure which it could withstand would be less than before, and it would be still further condensed, and this would go on indefinitely until a condition were reached in which an increase of volume would increase $\frac{3}{2}P\bar{V}$ more than it would decrease the virial. In the case of solids, at least, P may be zero; so that the state reached would be one in which the virial increases with the volume or the attraction between the particles does not increase so fast with a diminution of their distance as it would if the attraction were inversely as the distance.

244. Almost contemporaneously with Van der Waals's paper, another remarkable thesis for the doctorate was presented at Paris by Amagat. It related to the elasticity and expansion of gases, and to this subject the superb experimenter, its author, has devoted his whole subsequent life. Especially interesting are his observations of the volumes of ethylene and of carbonic acid at temperatures from 20° to 100° and at pressures ranging from an ounce to five thousand pounds to the square inch.* As soon as Amagat had obtained these results, he remarked that the "coefficient of expansion at constant volume" as it is absurdly called, that is, the rate of variation of the pressure with the temperature, was very nearly constant for each volume. This accords with the equation of the virial, which gives

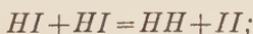
$$\frac{dp}{d\theta} = \frac{a}{\bar{V}} - \frac{d\Sigma\overline{Rr}}{d\theta}.$$

Now, the virial must be nearly independent of the temperature, and therefore the last term almost disappears. The virial would not be quite independent of the temperature because, if the temperature (i.e. the square of the velocity of the molecules) is lowered, and the pressure correspondingly lowered, so as to make the volume the same, the attractions of the molecules will have more time to produce their effects, and consequently, the pairs of molecules the closest together will be held together longer and closer; so that the virial will generally be increased by a decrease of temperature. Now, Amagat's experiments do show an excessively minute effect of this sort, at least, when the volumes are not too small. However, the observations are well enough satisfied by assuming the "coefficient of expansion at constant volume" to consist wholly of the first term, a/\bar{V} . Thus, Amagat's experiments enable us to determine the values of a and thence to calculate the virial; and this we find varies for carbonic acid gas nearly inversely to $\bar{V}^{0.9}$. There is, thus, a rough approximation to satisfying Van der Waals's equation. But the most interesting result of Amagat's experiments, for our purpose at any rate, is that the quantity a , though nearly constant for any one volume, differs considerably with the volume, nearly doubling

* See "Mémoire sur la compressibilité des gaz à des pressions élevées," *Annales de Chimie et de Physique*, vol. 19, pp. 345-385 (1880).

when the volume is reduced fivefold. This can only indicate that the mean kinetic energy of a given mass of the gas for a given temperature is greater the more the gas is compressed. But the laws of mechanics appear to enjoin that the mean kinetic energy of a moving particle shall be constant at any given temperature. The only escape from contradiction, then, is to suppose that the mean mass of a moving particle diminishes upon the condensation of the gas. In other words, many of the molecules are dissociated, or broken up into atoms or sub-molecules. The idea that dissociation should be favored by diminishing the volume will be pronounced by physicists, at first blush, as contrary to all our experience. But it must be remembered that the circumstances we are speaking of, that of a gas under fifty or more atmospheres pressure, are also unusual. That the "coefficient of expansion under constant volume" when multiplied by the volumes should increase with a decrement of the volume is also quite contrary to ordinary experience; yet it undoubtedly takes place in all gases under great pressure. Again, the doctrine of Arrhenius^{*1} is now generally accepted, that the molecular conductivity of an electrolyte is proportional to the dissociation of ions. Now the molecular conductivity of a fused electrolyte is usually superior to that of a solution. Here is a case, then, in which diminution of volume is accompanied by increased dissociation.

245. The truth is that several different kinds of dissociation have to be distinguished. In the first place, there is the dissociation of a chemical molecule to form chemical molecules under the regular action of chemical laws. This may be a double decomposition, as when iodhydric acid is dissociated, according to the formula



or it may be a simple decomposition, as when pentachloride of phosphorus is dissociated according to the formula



* "Ueber die Dissociation der in Wasser gelösten Stoffe," *Zeitschrift für Physikalische Chemie*, Bd. 1, pp. 631-648 (1887).

¹ Anticipated by Clausius ["Ueber die Elektricitätsleitung in Elektrolyten," *Poggendorff's Annalen*, Bd. 101, pp. 338-360], as long ago as 1857; and by Williamson ["Ueber die Theorie der Aetherbildung," *Annalen der Chemie und Pharmacie*, Bd. 77, pp. 37-49] in 1851.

All these dissociations require, according to the laws of thermochemistry, an elevated temperature. In the second place, there is the dissociation of a physically polymerous molecule, that is, of several chemical molecules joined by physical attractions. This I am inclined to suppose is a common concomitant of the heating of solids and liquids; for in these bodies there is no increase of compressibility with the temperature at all comparable with the increase of the expansibility. But, in the third place, there is the dissociation with which we are now concerned, which must be supposed to be a throwing off of unsaturated sub-molecules or atoms from the molecule. The molecule may, as I have said, be roughly likened to a solar system. As such, molecules are able to produce perturbations of one another's internal motions; and in this way a planet, i.e., a sub-molecule, will occasionally get thrown off and wander about by itself, till it finds another unsaturated sub-molecule with which it can unite. Such dissociation by perturbation will naturally be favored by the proximity of the molecules to one another.

§2. PROTOPLASM*^E

246. Let us now pass to the consideration of that special substance, or rather class of substances, whose properties form the chief subject of botany and of zoölogy, as truly as those of the silicates form the chief subject of mineralogy: I mean the life-slimes, or protoplasm. Let us begin by cataloguing the general characters of these slimes. They one and all exist in two states of aggregation, a solid or nearly solid state and a liquid or nearly liquid state; but they do not pass from the former to the latter by ordinary fusion. They are readily decomposed by heat, especially in the liquid state; nor will they bear any considerable degree of cold. All their vital actions take place at temperatures very little below the point of decomposition. This extreme instability is one of numerous facts which demonstrate the chemical complexity of protoplasm. Every chemist will agree that they are far more complicated than the albumens. Now, albumen is estimated to contain in each molecule about a thousand atoms; so that it is natural to suppose that the protoplasms contain several thousands. We

* Cf. 1.351, 1.386ff.

know that while they are chiefly composed of oxygen, hydrogen, carbon, and nitrogen, a large number of other elements enter into living bodies in small proportions; and it is likely that most of these enter into the composition of protoplasms. Now, since the numbers of chemical varieties increase at an enormous rate with the number of atoms per molecule, so that there are certainly hundreds of thousands of substances whose molecules contain twenty atoms or fewer, we may well suppose that the number of protoplasmic substances runs into the billions or trillions. Professor Cayley* has given a mathematical theory of "trees," with a view of throwing a light upon such questions; and in that light the estimate of trillions (in the English sense) seems immoderately moderate. It is true that an opinion has been emitted, and defended among biologists, that there is but one kind of protoplasm; † but the observations of biologists themselves have almost exploded that hypothesis, which from a chemical standpoint appears utterly incredible. The anticipation of the chemist would decidedly be that enough different chemical substances having protoplasmic characters might be formed to account, not only for the differences between nerve-slime and muscle-slime, between whale-slime and lion-slime, but also for those minuter pervasive variations which characterize different breeds and single individuals.

247. Protoplasm, when quiescent, is, broadly speaking, solid; but when it is disturbed in an appropriate way, or sometimes even spontaneously without external disturbance, it becomes, broadly speaking, liquid. A moner in this state is seen under the microscope to have streams within its matter; a slime-mould slowly flows by force of gravity. The liquefaction starts from the point of disturbance and spreads through the mass. This spreading, however, is not uniform in all directions; on the contrary, it takes at one time one course, at another another, through the homogeneous mass, in a manner that seems a little mysterious. The cause of disturbance being removed, these motions gradually (with higher kinds of protoplasm, quickly) cease, and the slime returns to its solid condition.

* "On the Theory of the Analytical Forms called Trees," *American Journal of Mathematics*, vol. 4, pp. 266-268 (1881).

† See 278n.

248. The liquefaction of protoplasm is accompanied by a mechanical phenomenon. Namely, some kinds exhibit a tendency to draw themselves up into a globular form. This happens particularly with the contents of muscle-cells. The prevalent opinion, founded on some of the most exquisite experimental investigations that the history of science can show, is undoubtedly that the contraction of muscle-cells is due to osmotic pressure; and it must be allowed that that is a factor in producing the effect. But it does not seem to me that it satisfactorily accounts even for the phenomena of muscular contraction; and besides, even naked slimes often draw up in the same way. In this case, we seem to recognize an increase of the surface-tension. In some cases, too, the reverse action takes place, extraordinary pseudopodia being put forth, as if the surface-tension were diminished in spots. Indeed, such a slime always has a sort of skin, due no doubt to surface-tension, and this seems to give way at the point where a pseudopodium is put forth.

249. Long-continued or frequently repeated liquefaction of the protoplasm results in an obstinate retention of the solid state, which we call fatigue.* On the other hand, repose in this state, if not too much prolonged, restores the liquefiability. These are both important functions.

250. The life-slimes have, further, the peculiar property of growing. Crystals also grow; their growth, however, consists merely in attracting matter like their own from the circumambient fluid. To suppose the growth of protoplasm of the same nature would be to suppose this substance to be spontaneously generated in copious supplies wherever food is in solution. Certainly, it must be granted that protoplasm is but a chemical substance, and that there is no reason why it should not be formed synthetically like any other chemical substance. Indeed, Clifford has clearly shown† that we have overwhelming evidence that it is so formed. But to say that such formation is as regular and frequent as the assimilation of food is quite another matter. It is more consonant with the facts of observation to suppose that assimilated protoplasm is formed at the instant of assimilation, under the influence of the protoplasm

* See 149, 275.

† *Lectures and Essays*, vol. 2, pp. 311-316 (1879).

already present. For each slime in its growth preserves its distinctive characters with wonderful truth, nerve-slime growing nerve-slime and muscle-slime, muscle-slime, lion-slime growing lion-slime, and all the varieties of breeds and even individual characters being preserved in the growth. Now it is too much to suppose there are billions of different kinds of protoplasm floating about wherever there is food.

251. The frequent liquefaction of protoplasm increases its power of assimilating food; so much so, indeed, that it is questionable whether in the solid form it possesses this power.

252. The life-slime wastes as well as grows; and this too takes place chiefly if not exclusively in its liquid phases.

253. Closely connected with growth is reproduction; and though in higher forms this is a specialized function, it is universally true that wherever there is protoplasm, there is, will be, or has been a power of reproducing that same kind of protoplasm in a separated organism. Reproduction seems to involve the union of two sexes; though it is not demonstrable that this is always requisite.

254. Another physical property of protoplasm is that of taking habits. The course which the spread of liquefaction has taken in the past is rendered thereby more likely to be taken in the future; although there is no absolute certainty that the same path will be followed again.

255. Very extraordinary, certainly, are all these properties of protoplasm; as extraordinary as indubitable. But the one which has next to be mentioned, while equally undeniable, is infinitely more wonderful. It is that protoplasm feels. We have no direct evidence that this is true of protoplasm universally, and certainly some kinds feel far more than others. But there is a fair analogical inference that all protoplasm feels. It not only feels but exercises all the functions of mind.

256. Such are the properties of protoplasm. The problem is to find a hypothesis of the molecular constitution of this compound which will account for these properties, one and all.

Some of them are obvious results of the excessively complicated constitution of the protoplasm molecule. All very complicated substances are unstable; and plainly a molecule of several thousand atoms may be separated in many ways into two parts, in each of which the polar chemical forces are very

nearly saturated. In the solid protoplasm, as in other solids, the molecules must be supposed to be moving as it were in orbits, or, at least, so as not to wander indefinitely. But this solid cannot be melted, for the same reason that starch cannot be melted; because an amount of heat insufficient to make the entire molecules wander is sufficient to break them up completely and cause them to form new and simpler molecules. But when one of the molecules is disturbed, even if it be not quite thrown out of its orbit at first, sub-molecules of perhaps several hundred atoms each are thrown off from it. These will soon acquire the same mean kinetic energy as the others, and therefore velocities several times as great. They will naturally begin to wander, and in wandering will perturb a great many other molecules and cause them in their turn to behave like the one originally deranged. So many molecules will thus be broken up that even those that are intact will no longer be restrained within orbits, but will wander about freely. This is the usual condition of a liquid, as modern chemists understand it; for in all electrolytic liquids there is considerable dissociation.

But this process necessarily chills the substance, not merely on account of the heat of chemical combination, but still more because the number of separate particles being greatly increased, the mean kinetic energy must be less. The substance being a bad conductor, this heat is not at once restored. Now the particles moving more slowly, the attractions between them have time to take effect, and they approach the condition of equilibrium. But their dynamic equilibrium is found in the restoration of the solid condition, which therefore takes place, if the disturbance is not kept up.

257. When a body is in the solid condition, most of its molecules must be moving at the same rate, or, at least, at certain regular sets of rates; otherwise the orbital motion would not be preserved. The distances of neighboring molecules must always be kept between a certain maximum and a certain minimum value. But if, without absorption of heat, the body be thrown into a liquid condition, the distances of neighboring molecules will be far more unequally distributed, and an effect upon the virial will result. The chilling of protoplasm upon its liquefaction must also be taken into account. The ordinary

effect will no doubt be to increase the cohesion and with that the surface-tension, so that the mass will tend to draw itself up. But in special cases, the virial will be increased so much that the surface-tension will be diminished at points where the temperature is first restored. In that case, the outer film will give way and the tension at other places will aid in causing the general fluid to be poured out at those points, forming pseudopodia.

258. When the protoplasm is in a liquid state, and then only, a solution of food is able to penetrate its mass by diffusion. The protoplasm is then considerably dissociated; and so is the food, like all dissolved matter. If then the separated and unsaturated sub-molecules of the food happen to be of the same chemical species as sub-molecules of the protoplasm, they may unite with other sub-molecules of the protoplasm to form new molecules, in such a fashion that when the solid state is resumed there may be more molecules of protoplasm than there were at the beginning. It is like the jackknife whose blade and handle, after having been severally lost and replaced, were found and put together to make a new knife.

§3. THE PHYSIOLOGY OF HABIT*^E

259. We have seen that protoplasm is chilled by liquefaction, and that this brings it back to the solid state, when the heat is recovered. This series of operations must be very rapid in the case of nerve-slime and even of muscle-slime, and may account for the unsteady or vibratory character of their action. Of course, if assimilation takes place, the heat of combination, which is probably trifling, is gained. On the other hand, if work is done, whether by nerve or by muscle, loss of energy must take place. In the case of the muscle, the mode by which the instantaneous part of the fatigue is brought about is easily traced out. If when the muscle contracts it be under stress, it will contract less than it otherwise would do, and there will be a loss of heat. It is like an engine which should work by dissolving salt in water and using the contraction during the solution to lift a weight, the salt being recovered afterwards by distillation. But the major part of fatigue has

* Cf. 23, 280f, 1.390.

nothing to do with the correlation of forces. A man must labor hard to do in a quarter of an hour the work which draws from him enough heat to cool his body by a single degree. Meantime, he will be getting heated, he will be pouring out extra products of combustion, perspiration, etc. and he will be driving the blood at an accelerated rate through minute tubes at great expense. Yet all this will have little to do with his fatigue. He may sit quietly at his table writing, doing practically no physical work at all, and yet in a few hours be terribly fagged. This seems to be owing to the deranged sub-molecules of the nerve-slime not having had time to settle back into their proper combinations. When such sub-molecules are thrown out, as they must be from time to time, there is so much waste of material.

260. In order that a sub-molecule of food may be thoroughly and firmly assimilated into a broken molecule of protoplasm, it is necessary not only that it should have precisely the right chemical composition, but also that it should be at precisely the right spot at the right time and should be moving in precisely the right direction with precisely the right velocity. If all these conditions are not fulfilled, it will be more loosely retained than the other parts of the molecule; and every time it comes round into the situation in which it was drawn in, relatively to the other parts of that molecule and to such others as were near enough to be factors in the action, it will be in special danger of being thrown out again. Thus, when a partial liquefaction of the protoplasm takes place many times to about the same extent, it will, each time, be pretty nearly the same molecules that were last drawn in that are now thrown out. They will be thrown out, too, in about the same way, as to position, direction of motion, and velocity, in which they were drawn in; and this will be in about the same course that the ones last before them were thrown out. Not exactly, however; for the very cause of their being thrown off so easily is their not having fulfilled precisely the conditions of stable retention. Thus, the law of habit is accounted for, and with it its peculiar characteristic of not acting with exactitude.

261. It seems to me that this explanation of habit, aside from the question of its truth or falsity, has a certain value as

an addition to our little store of mechanical examples of actions analogous to habit. All the others, so far as I know, are either statical or else involve forces which, taking only the sensible motions into account, violate the law of energy. It is so with the stream that wears its own bed. Here, the sand is carried to its most stable situation and left there. The law of energy forbids this; for when anything reaches a position of stable equilibrium, its momentum will be at a maximum, so that it can, according to this law, only be left at rest in an unstable situation. In all the statical illustrations, too, things are brought into certain states and left there. A garment receives folds and keeps them; that is, its limit of elasticity is exceeded. This failure to spring back is again an apparent violation of the law of energy; for the substance will not only not spring back of itself (which might be due to an unstable equilibrium being reached) but will not even do so when an impulse that way is applied to it. Accordingly, Professor James says, "the phenomena of habit . . . are due to the plasticity of the . . . materials."* Now, plasticity of materials means the having of a low limit of elasticity. (See the *Century Dictionary*, under *solid*.†) But the hypothetical constitution of protoplasm here proposed involves no forces but attractions and repulsions strictly following the law of energy. The action here, that is, the throwing of an atom out of its orbit in a molecule, and the entering of a new atom into nearly, but not quite the same orbit, is somewhat similar to the molecular actions which may be supposed to take place in a solid strained beyond its limit of elasticity. Namely, in that case certain molecules must be thrown out of their orbits, to settle down again shortly after into new orbits. In short, the plastic solid resembles protoplasm in being partially and temporarily liquefied by a slight mechanical force. But the taking of a set by a solid body has but a moderate resemblance to the taking of a habit, inasmuch as the characteristic feature of the latter, its inexactitude and want of complete determinacy, is not so marked in the former, if it can be said to be present there at all.

262. The truth is that, though the molecular explanation of habit is pretty vague on the mathematical side, there can

* *Principles of Psychology*, vol. 1, p. 105 (1890).

† See 241n.

be no doubt that systems of atoms having polar forces would act substantially in that manner, and the explanation is even too satisfactory to suit the convenience of an advocate of tychism. For it may fairly be urged that since the phenomena of habit may thus result from a purely mechanical arrangement, it is unnecessary to suppose that habit-taking is a primordial principle of the universe. But one fact remains unexplained mechanically, which concerns not only the facts of habit, but all cases of actions apparently violating the law of energy; it is that all these phenomena depend upon aggregations of trillions of molecules in one and the same condition and neighborhood; and it is by no means clear how they could have all been brought and left in the same place and state by any conservative forces. But let the mechanical explanation be as perfect as it may, the state of things which it supposes presents evidence of a primordial habit-taking tendency. For it shows us like things acting in like ways because they are alike. Now, those who insist on the doctrine of necessity will for the most part insist that the physical world is entirely individual. Yet law involves an element of generality. Now to say that generality is primordial, but generalization not, is like saying that diversity is primordial but diversification not. It turns logic upside down. At any rate, it is clear that nothing but a principle of habit, itself due to the growth by habit of an infinitesimal chance tendency toward habit-taking, is the only bridge that can span the chasm between the chance-medley of chaos and the cosmos of order and law.

263. I shall not attempt a molecular explanation of the phenomena of reproduction, because that would require a subsidiary hypothesis, and carry me away from my main object. Such phenomena, universally diffused though they be, appear to depend upon special conditions; and we do not find that all protoplasm has reproductive powers.

§4. TYCHISTIC IDEALISM*^E

264. But what is to be said of the property of feeling? If consciousness belongs to all protoplasm, by what mechanical constitution is this to be accounted for? The slime is nothing

* Cf. 24f.

but a chemical compound. There is no inherent impossibility in its being formed synthetically in the laboratory, out of its chemical elements; and if it were so made, it would present all the characters of natural protoplasm. No doubt, then, it would feel. To hesitate to admit this would be puerile and ultra-puerile. By what element of the molecular arrangement, then, would that feeling be caused? This question cannot be evaded or pooh-poohed. Protoplasm certainly does feel; and unless we are to accept a weak dualism, the property must be shown to arise from some peculiarity of the mechanical system. Yet the attempt to deduce it from the three laws of mechanics, applied to never so ingenious a mechanical contrivance, would obviously be futile. It can never be explained, unless we admit that physical events are but degraded or undeveloped forms of psychical events. But once grant that the phenomena of matter are but the result of the sensibly complete sway of habits upon mind, and it only remains to explain why in the protoplasm these habits are to some slight extent broken up, so that, according to the law of mind, in that special clause of it sometimes called the principle of accommodation,¹ feeling becomes intensified. Now the manner in which habits generally get broken up is this. Reactions usually terminate in the removal of a stimulus; for the excitation continues as long as the stimulus is present. Accordingly, habits are general ways of behaviour which are associated with the removal of stimuli. But when the expected removal of the stimulus fails to occur, the excitation continues and increases, and non-habitual reactions take place; and these tend to weaken the habit. If, then, we suppose that matter never does obey its ideal laws with absolute precision, but that there are almost insensible fortuitous departures from regularity, these will produce, in general, equally minute effects. But protoplasm is in an excessively unstable condition; and it is the characteristic of unstable equilibrium that near that point excessively minute causes may produce startlingly large effects. Here then, the usual departures from regularity will be followed by others that are very great; and the large fortuitous departures

¹ "Physiologically, . . . accommodation means the breaking up of a habit. . . . Psychologically, it means reviving consciousness." Baldwin, *Psychology*, Part III, ch. 1, §5.

from law so produced will tend still further to break up the laws, supposing that these are of the nature of habits. Now, this breaking up of habit and renewed fortuitous spontaneity will, according to the law of mind, be accompanied by an intensification of feeling. The nerve-protoplasm is, without doubt, in the most unstable condition of any kind of matter; and consequently there the resulting feeling is the most manifest.

265. Thus we see that the idealist has no need to dread a mechanical theory of life. On the contrary, such a theory, fully developed, is bound to call in a tychistic idealism as its indispensable adjunct. Wherever chance-spontaneity is found, there in the same proportion feeling exists. In fact, chance is but the outward aspect of that which within itself is feeling. I long ago showed that real existence, or thing-ness, consists in regularities.* So, that primeval chaos in which there was no regularity was mere nothing, from a physical aspect. Yet it was not a blank zero; for there was an intensity of consciousness there, in comparison with which all that we ever feel is but as the struggling of a molecule or two to throw off a little of the force of law to an endless and innumerable diversity of chance utterly unlimited.†

266. But after some atoms of the protoplasm have thus become partially emancipated from law, what happens next to them? To understand this we have to remember that no mental tendency is so easily strengthened by the action of habit as is the tendency to take habits. Now, in the higher kinds of protoplasm, especially, the atoms in question have not only long belonged to one molecule or another of the particular mass of slime of which they are parts; but before that, they were constituents of food of a protoplasmic constitution. During all this time they have been liable to lose habits and to recover them again; so that now, when the stimulus is removed, and the foregone habits tend to reassert themselves, they do so in the case of such atoms with great promptness. Indeed, the return is so prompt that there is nothing but the feeling to show conclusively that the bonds of law have ever been relaxed.

267. In short, diversification is the vestige of chance spon-

* Cf. 5.311.

† Cf. 215ff, 613.

taneity; and wherever diversity is increasing, there chance must be operative. On the other hand, wherever uniformity is increasing, habit must be operative. But wherever actions take place under an established uniformity, there, so much feeling as there may be, takes the mode of a sense of reaction. That is the manner in which I am led to define the relation between the fundamental elements of consciousness and their physical equivalents.

§5. THE NATURE OF PERSONALITY*^E

268. It remains to consider the physical relations of general ideas. It may be well here to reflect that if matter has no existence except as a specialization of mind, it follows that whatever affects matter according to regular laws is itself matter. But all mind is directly or indirectly connected with all matter, and acts in a more or less regular way; so that all mind more or less partakes of the nature of matter. Hence, it would be a mistake to conceive of the psychical and the physical aspects of matter as two aspects absolutely distinct. Viewing a thing from the outside, considering its relations of action and reaction with other things, it appears as matter. Viewing it from the inside, looking at its immediate character as feeling, it appears as consciousness. These two views are combined when we remember that mechanical laws are nothing but acquired habits, like all the regularities of mind, including the tendency to take habits, itself; and that this action of habit is nothing but generalization, and generalization is nothing but the spreading of feelings. But the question is, how do general ideas appear in the molecular theory of protoplasm?

269. The consciousness of a habit involves a general idea. In each action of that habit certain atoms get thrown out of their orbit, and replaced by others. Upon all the different occasions it is different atoms that are thrown off, but they are analogous from a physical point of view, and there is an inward sense of their being analogous. Every time one of the associated feelings recurs, there is a more or less vague sense that there are others, that it has a general character, and of about what this general character is. We ought not, I think, to hold that in protoplasm habit never acts in any other than the par-

* Cf. 135ff, 155ff.

ticular way suggested above. On the contrary, if habit be a primary property of mind, it must be equally so of matter, as a kind of mind. We can hardly refuse to admit that wherever chance motions have general characters, there is a tendency for this generality to spread and to perfect itself. In that case, a general idea is a certain modification of consciousness which accompanies any regularity or general relation between chance actions.

270. The consciousness of a general idea has a certain "unity of the ego," in it, which is identical when it passes from one mind to another. It is, therefore, quite analogous to a person; and, indeed, a person is only a particular kind of general idea. Long ago, in the *Journal of Speculative Philosophy* (Vol. II, p. 156),* I pointed out that a person is nothing but a symbol involving a general idea; but my views were, then, too nominalistic to enable me to see that every general idea has the unified living feeling of a person.

271. All that is necessary, upon this theory, to the existence of a person is that the feelings out of which he is constructed should be in close enough connection to influence one another. Here we can draw a consequence which it may be possible to submit to experimental test. Namely, if this be the case, there should be something like personal consciousness in bodies of men who are in intimate and intensely sympathetic communion. It is true that when the generalization of feeling has been carried so far as to include all within a person, a stopping-place, in a certain sense, has been attained; and further generalization will have a less lively character. But we must not think it will cease. *Esprit de corps*, national sentiment, sym-path^y, are no mere metaphors. None of us can fully realize what the minds of corporations are, any more than one of my brain cells can know what the whole brain is thinking. But the law of mind clearly points to the existence of such personalities, and there are many ordinary observations which, if they were critically examined and supplemented by special experiments, might, as first appearances promise, give evidence of the influence of such greater persons upon individuals. It is often remarked that on one day half a dozen people, strangers to one another, will take it into their heads

* See 5.313-14.

to do one and the same strange deed, whether it be a physical experiment, a crime, or an act of virtue. When the thirty thousand young people of the society for Christian Endeavor were in New York, there seemed to me to be some mysterious diffusion of sweetness and light. If such a fact is capable of being made out anywhere, it should be in the church. The Christians have always been ready to risk their lives for the sake of having prayers in common, of getting together and praying simultaneously with great energy, and especially for their common body, for "the whole state of Christ's church militant here in earth," as one of the missals has it. This practice they have been keeping up everywhere, weekly, for many centuries. Surely, a personality ought to have developed in that church, in that "bride of Christ," as they call it, or else there is a strange break in the action of mind, and I shall have to acknowledge my views are much mistaken. Would not the societies for psychical research be more likely to break through the clouds, in seeking evidences of such corporate personality, than in seeking evidences of telepathy, which, upon the same theory, should be a far weaker phenomenon? *

* Cf. 559, 587.

CHAPTER 10

MIND AND MATTER

§1. THE CONNECTION BETWEEN MIND AND MATTER^{P*}

272. Several different theories have been urged during the past months to account for the mutual action between mind and matter in volition and in sensation. Little positive evidence has been gathered as yet for any of them; yet three or four hint at some possible eventual solution of this famous, deeply interesting, and dark problem.

273. It will do no harm to glance, first, at Leibnitz's theory of Preëstablished Harmony, if only to serve as foil to the modern hypotheses. This was possibly evoked by the phenomena of the mutual influence of two pendulums. These phenomena are like the following. A clock with a heavy pendulum had been solidly fastened to a brick wall. About six feet away was a shelf attached to the same wall. A Hardy's noddy, or little inverted pendulum swinging by the bending of a spring, having been adjusted to the period of oscillation of the clock-pendulum, was placed upon that shelf, when it immediately began to swing in unmistakable synchronism with the clock; and this motion it kept up for months. Again, two pendulums exactly alike and weighing some twenty pounds each, were suspended from a two-inch plank which was supported all along its eighteen-inch ends by quarter-inch plates of vertically corrugated iron attached to the floor. The direction of swinging of both pendulums was that of the length of the plank. Both being at rest, one of them was started into oscillation. Almost immediately, the other began to swing, and at the end of about three minutes the one first started had come to rest, while the one that had not been touched was swinging with nearly the same amplitude that the first had in the beginning. But no sooner had the latter come to rest than it began to start up again, while the arcs of the other became less; and

* c. 1893.

in three minutes more, substantially the original condition of things had been restored. Of course, the real explanation of these phenomena is that the support of the heavy pendulum — the brick wall in the one case, the corrugated iron in the other — yielded under the swaying of the pendulums, and so communicated an impulse from each to the other, increasing the motion of the one that was behind and diminishing that of the one that was ahead; and though this effect was in itself imperceptible, yet when it had been multiplied one or two hundred-fold, or as many times as the repetitions of its cause, the total effect became great. Meantime (the pendulum-support in such experiments, not being seen to sway, and being recognized to be almost quite rigid) each pendulum always looks as if it were going through its curious succession of motions of its own accord, although in a sort of inverse sympathy with the other. Nor is this a mere ocular illusion; for when the differential equations which define the forces are integrated, it is found that the motion of each pendulum is simply the sum of two perfectly simple and regular funipendulous motions of slightly different periods, and is, in fact, exactly like that of a cork floating upon still water traversed by two series of waves of slightly different lengths. The remarkable thing is that the motion of each pendulum is expressed as perfectly regular, without reference to the other. And what is so manifest in regard to pendulums is equally true of any other dynamical phenomenon. Namely, the forces are expressed by differential equations; but those equations have their integrals, whether mathematicians have yet discovered them or not; and these integrals express the motion of each particle as perfectly regular and determinate, and express it independently of all other particles. Now, Leibnitz was a professed nominalist. For him, a law was nothing more than a regularity, a regularity nothing less than a law. Since, therefore, each atom was experiencing a series of motions (and, as he presumed, also a series of feelings) which were perfectly regular, independently of every other, it followed, for him, that such was the law of its being; and the action between the different atoms consisted merely in certain relations—a certain harmony — between the laws having been preëstablished by the great Author of those laws; and from this point of view

there was no more difficulty in actions between mind and matter than between matter and matter.

The fault of this explanation is the capital fault which attaches to all nominalistic explanations, namely that they merely restate the fact to be explained under another aspect; or, if they add anything to it, add only something from which no definite consequences can be deduced. A scientific explanation ought to consist in the assertion of some positive matter of fact, other than the fact to be explained, but from which this fact necessarily follows; and if the explanation be hypothetical, the proof of it lies in the experiential verification of predictions deduced from it as necessary consequences. Leibnitz's explanation merely comes to this, that the motions and changes of state of atoms are relative to one another, because God made them so in the beginning. But nothing can be deduced from this theory, since it is impossible for man to predict what God might see fit to do. This stamps the theory as one of those to which Auguste Comte applied the epithet *metaphysical*, that is, unverifiable.* To accept it as sufficient would be to block the road of inquiry.

274. Among the modern theories not open to this objection, the simplest is the materialistic hypothesis. According to this, nothing really exists but matter: feelings are nothing but the way matter appears to itself. The gist of this theory, be it remarked, is that the Whole is governed by mechanical forces that are determined by the state of things at the instant they act, without any reference to a purpose of bringing about any determinate state of things in the future. The distinguishing merits of this theory are its simplicity, together with its loyal adhesion to that wholesome maxim *entia non sunt multiplicanda praeter necessitatem*, which, though urged by an illustrious nominalist, nobody surely can deny. Nor can the theory be absolutely refuted. Still, there are so many facts which have all the appearance of being opposed to it, that, notwithstanding the strong bias in favor of it which Ockham's razor justly produces in the minds of scientific men, few of these who have duly considered the facts have been able to bring themselves to hold it for true. No doubt, all nervous physiology shows the dependence of mind upon body; but that

* See *System of Positive Polity*, vol. 1, pp. 421-422, Paris (1851).

is not in question. The question is whether mental phenomena are exclusively controlled by blind mechanical law, as they certainly must be if mind be but an aspect of matter and matter is governed by such a law. The very circumstance that we can foretell how we shall act seems to militate against the hypothesis; nor is it easy to divine how the hypothesis and this fact are to be reconciled. Then the fact that our knowledge of the future is of so different a kind [from] our knowledge of the past seems to be hopelessly in conflict with materialism; since the laws of mechanics, as they are now understood, make the dynamical relation of the past to the future exactly the same as that of the future to the past. For, given a system of forces, and the positions and velocities of all the particles at any one instant, and all the previous positions and velocities are determined in precisely the same manner as are the subsequent positions and velocities. These are among the more obvious objections to the theory; others even more fatal have been urged.*

275. Another theory, which, though not new, has newly been revived, is that by a mental effort certain material particles can be made temporarily to attract and repel one another. One naturally asks why this would not result in perpetual motion contrary to the principle of the conservation of energy, in case, for example, of the repelling particles being made to do work till they were brought to rest, and then, after attraction between them had been induced, being made to do additional work until restored to their original positions and velocities. The only answer possible would be that fatigue would, in that case, set in; so that a certain amount of work having been done the power of making the particles attract and repel would be exhausted until restored by nutrition. But such exhaustion could not be identified with that fatigue of which we are sensible; for the latter has little relation to the amount of mechanical work performed. It must, then, be an exhaustion which is not otherwise manifested; so that, comparing this theory with that of the materialist, we see that, in regard to muscular exertion, the two almost coincide, the logical advantage, however, being altogether with the materialist. For, brought up against the fact of exhaustion, the

* Cf. 68ff.

materialist fetches out his microscopes and chemical apparatus and endeavors to verify his theory by detecting some histological or chemical facts on which exhaustion may depend; while the other theorist attributes it to a metaphysical agency out of the realm of verification. Note, by the way, this singular feature of the theory under examination, that though, according to it, the mind only sets up now an attraction and now a repulsion between a pair of atoms, yet the exhaustion is not all occasioned by this conversion of attraction into repulsion and of repulsion into attraction, but only arises when these atoms happen to meet with a physical force against which they can do work, or happen to be so moving that their velocities are increased. If to answer the objection that the exhaustion which the theory supposes is a metaphysical butterfly it be maintained that the energy can be traced throughout in its transformations, then not only are mechanical and mental energy correlated, and the latter made measurable in foot-pounds, but it is held that this can be exhibited as so measurable. Now, it is undeniable that mental energy may be expended in producing a purely intellectual result; and mental energy that might be expended in muscular effort may, if we choose, be devoted to thought instead. If, therefore, the mental energy expended in muscular work is really transformed into that work, as this theory has to suppose, in order to preserve any semblance of a conservation of energy, it is necessary to admit that the purely intellectual product upon which that mental energy may be expended has also its equivalent in foot-pounds. Supposing, for example, this energy to be expended in writing a newspaper article, that paper would have to be supposed to contain that energy. So, if the editor does not like it and throws it into the fire, the theorist must either hold that all those foot-pounds have been destroyed, or else that the fire burns hotter on account of the mental energy expended on the composition. In short, this hypothesis falls either into the Scylla of absurdity or into the Charybdis of unverifiable metaphysics. Besides, its application to the action of matter upon mind in sensation is unsatisfactory. For if the energy of the mind is exhausted in volition, sensation ought to share with nutrition the function of restoring it; but this we do not find to be the case.

276. For these and other obvious reasons, all the physicists who have examined into the question of an interchange of energy between mind and matter have come to the conclusion that no such phenomenon takes place. Hence the suggestion is often made that while mind creates a mechanical force between particles this force only acts at right angles to the directions of their motion, so as to leave the mechanical energy unaffected. If the motion of a mass were to be deflected, irrespective of any other, the law of action and reaction would be violated. But this is not what the advocates of this theory mean. Their true meaning will to a mathematician be most clearly expressed by saying that the effect of mind is supposed to be, not to alter the equation of motion, but only to add, at will, an equation of condition. The general reader will have to accept the statement that the theory comes to this, that the mind attaches at will, what it can at will remove, to certain pairs of portions of matter, pairs of absolutely rigid surfaces impenetrable to one another — a surface to each of the two portions of matter — so that these surfaces, being in contact, hamper the motions. But the theory may very advantageously be specialized a little, as follows. Atoms are usually assumed to be absolutely rigid bodies perfectly elastic. Let it be supposed that the mind has the power of altering the shape and size of certain of the atoms, with the proviso that their centers of gravity and inertia-properties be not disturbed in the act. No immediate dynamical result will take place, but only an indirect effect as soon as the atoms next impinge upon one another. This theory seems highly artificial, and is at present sadly in need of evidence to sustain it. Nevertheless, it fulfills the conditions of the problem, and is eminently deserving of being kept in view as one of the possibilities. The manner in which it applies to the action of matter upon mind in sensation is interesting. It is philosophical to presume that this action is analogous to the action of mind upon matter in volition. Upon this theory, then, it must be supposed that in sensation the action of the mental law of association goes on undisturbed, but that an absolute restraint is placed upon the ideas which may present themselves, so that the sensation is really a violent suggestion. But a further development of this idea would probably lead to another theory of the connection

between soul and body, which has recently been advocated and which is the last that we shall mention.

277.* Observations upon living naked protoplasm seem to show that mind, or feeling, has a continuous extension in space. Nobody doubts that it has a continuity in time, nor that the consciousness in one instant directly influences, or spreads over into, the succeeding instant. In like manner, the feeling at any point of space appears to spread and to assimilate to its own quality, though with reduced intensity, the feelings in the closely surrounding places. In this way, feeling seems directly to act upon feeling continuous with it. Now, in obedience to the principle, or maxim, of continuity, that we ought to assume things to be continuous as far as we can, it has been urged that we ought to suppose a continuity between the characters of mind and matter, so that matter would be nothing but mind that had such indurated habits as to cause it to act with a peculiarly high degree of mechanical regularity, or routine. Supposing this to be the case, the reaction between mind and matter would be of no essentially different kind from the action between parts of mind that are in continuous union, and would thus come directly under the great law of mental association, just as the theory last mentioned makes sensation to do. This hypothesis might be called materialistic, since it attributes to mind one of the recognized properties of matter, extension, and attributes to all matter a certain excessively low degree of feeling, together with a certain power of taking habits. But it differs essentially from materialism, in that, instead of supposing mind to be governed by blind mechanical law, it supposes the one original law to be the recognized law of mind, the law of association, of which the laws of matter are regarded as mere special results. This theory has been ridiculed by theologians as the merest whimsey while philosophers have pronounced it to be absurd upon metaphysical grounds; but students of physical and natural science are somewhat more favorable to it. Its advocates maintain that it is a perfectly consistent and legitimate working hypothesis, that it unmistakably commits itself to certain predictions and predesignations, that its truth or falsity ought to be judged exclusively from the comparison of these conse-

* Cf. 133ff.

quences of it with observation, and that, as far as it has been carried, this comparison has been quite favorable to the theory.

§2. THE MATERIALISTIC ASPECT OF REASONING^{P*}

278. The class of chemical substances having the most complicated molecules is, without doubt, that of the protoplasm.¹ This chemical complexity is, in my opinion, sufficient to account for the extraordinary properties of those substances by virtue of which they grow into animals and plants. In particular, the laws of nervous action are, as I think, traceable to the chemical characters of the protoplasm of which the contents of nerve-cells are composed.†

279. When a group of nerves are stimulated, it is certain that the ganglions with which the group is most intimately connected on the whole are thrown into an active state. This in its turn usually occasions movements of the body. Those movements are often intelligent; that is to say, what is to be accomplished determines what is done. Now, as all mechanical action is determined by the conditions at the instant, the question arises how is the tendency of nervous reactions towards ends to be accounted for. Suppose, then, that in the beginning, the reflex movements were not intelligent. In that case, the stimulation continuing, the irritation would spread from ganglion to ganglion, while increasing in intensity. Meantime, the ganglions first excited would begin to be fatigued, and their action would flag; and thus for a double reason the bodily activity would be of a changing kind. This would happen again and again, until at last some motion would remove the stimulus; and as soon as this was withdrawn, the excitement would quickly subside.

280.‡ Now it seems to be a universal property of protoplasm, intimately connected with the property of growth, that it takes habits. That is to say, first, when a lump of protoplasm is disturbed, say by a prick, at a given point, a

* From ch. 3 (Div. II), of the *Grand Logic* (1893). Cf. 3.154ff.

¹ The theory that there is but one protoplasm shall be considered in our chapter on fallacies. [That chapter is not being published.]

† See 246f, 1.386ff.

‡ Cf. 259f, 1.386f.

so-called excited state, in which the matter is more fluid, is brought on; and this condition spreads. But, second, it does not spread uniformly, but very differently in different directions, and precisely what direction the spreading will take seems to be as uncertain as a throw of dice. Nevertheless, third, there is a preponderance of cases in which the path of spreading is the same as it had been the last time a similar stimulation of the same point occurred, or as it had been in the majority of cases.

281. The nerves are particularly ready to take and to change their habits. Consequently, in the case we have been considering, if, after the withdrawal of the stimulus and the consequent cessation of the excitement, the stimulation should be repeated, the last mode of reflex action, which removed the stimulus, is more likely to occur at once than any other; and in case it does not occur at once, the action will as before go on until a reaction takes place which shall remove the stimulus. In this way, a habit is pretty certain to be speedily acquired of so reacting from any stimulation as to remove the stimulus.

282. In fact, the greater part of intelligent actions are directed toward causing the cessation of some irritation. We eat to get rid of hunger, etc. Even when the eye of an infant rolls to the light, the action is perhaps of this kind; for the field of distinct vision on the retina is less sensitive to light than other parts. When we stop and listen to a sound, there may be a different principle; but then, any sensation, when it is interpreted, is diminished in intensity in immediate consciousness.

283. But other principles of intelligent action may probably be deduced from the primitive characters of protoplasm. There are many circumstances which lead us to believe that habit-taking is intimately connected with nutrition. Protoplasm grows: and that not as a crystal in a supersaturated or highly concentrated solution grows, by simply attracting matter like itself. It grows by chemically transforming other substances into its own chemical kind. This I believe to be due to the excessive complexity of its molecule. Chemists have estimated that the number of atoms in ordinary egg-albumen is nearly a thousand; and there are several circumstances which show that it must be nearly that. The most

conclusive of these is the fact that a solution of albumen may be enclosed in the merest film of coagulum, and will float in water without bursting its sac.¹ But albumen is not protoplasm. Albumen is dead; protoplasm is essentially alive. Hence, it is not too much to suppose that protoplasm, even of a low order, has several thousands of atoms in each molecule; and any high order of protoplasm probably has ten thousand. Such a molecule must be excessively unstable; and I believe that in the excited condition a considerable percentage of the molecules of protoplasm are partially decomposed. The peripheral stimulus deranges one or more molecules (which must be imagined as something like little solar systems, only vastly more complex) and an errant fragment from one of these enters another such system and perturbs that. But after the stimulus is removed they gradually settle down again, some molecules being destroyed, but others being recomposed with groups of atoms coming from food, while still others take up fragments which had been thrown off from neighboring molecules. I think it is pretty clear that the new portions thus taken in would be a very long time in acquiring the ideally stable places in the molecule; and until they did so they would be more likely to be thrown out than other portions of the same molecules; and so a new excitation would be likely to repeat approximately the phenomena of the previous one; and the spreading of the disturbance would be likely to take the same course as before.

284. If this theory be true, different modes of spreading might differ greatly in regard to the amount of nutrition that would accompany them; and since the recomposed molecules would be the ones most likely to be deranged, those habits would be most likely to be formed which would result in the greatest nutritive gain. Thus, the animal would appear to

¹ I assume for the percentage composition of albumen the following:

Oxygen	21.5 =	1.34 times at. wt.
Hydrogen	7 =	7. times at. wt.
Nitrogen	16.5 =	1.18 times at. wt.
Carbon	54 =	4.5 times at. wt.
Sulphur	1 =	0.03 times at. wt.
	<hr/>	
	100	14.05

I assume the solution having an osmotic pressure of $\frac{1}{2}$ at. to be of 12.5 p. c. I assume the Sp. Gr. Albumen to be 1.25. Then by the laws of osmotic pressure, there would be 980 atoms to a molecule.

exhibit a preference for modes of action involving the formation of new molecules of protoplasm. Were there a feeling of pain at every breaking of a molecule, and a pleasure at every recomposition of such a system, the animal would have a preference for pleasurable actions, and it would seem to him as if this pleasure, or the anticipation of it, were the cause of his acting in one way rather than in another.

285. This is a mode in which it would seem perhaps possible that a tendency to act intelligently, that is, so as to bring about a certain result, might arise in a mere mechanical system. Although it has not been shown that observed phenomena of intelligence could be thus accounted for, but only that they perhaps might be accounted for, and although the theory presents at one point a monstrous absurdity, that of supposing a piece of dead mechanism to feel pain and pleasure, yet, after all, this does not touch the main point, and I feel quite sure that the hypothesis affords an instructive point of view from which to contemplate the general question.

286. It is plain that intelligence does not consist in feeling in a certain way, but in acting in a certain way. Only, we must acknowledge that there are inward actions — what might be called *potential* actions, that is, actions which do not take place, but which somehow influence the formation of habits.* Certain stimuli, commonly visceral in their origin, throw the brain into an activity which simulates the effect of peripheral excitations of the senses. The reactions from such stimuli have the same internal character; an inward action removes the inward stimulus. A fancied conjuncture leads us to fancy an appropriate line of behaviour. Day-dreams are often spoken of as mere idleness; and so they would be, but for the remarkable fact that they go to form habits, by virtue of which when a similar real conjuncture arises we really behave in the manner we had dreamed of doing.

“Some say the soft Ideal that we wooed
 Confronts us fiercely, foe-beset, pursued,
 And cries reproachful, “Was it, then, my praise
 And not myself was loved? Prove now thy truth;
 I claim of thee the promise of thy youth;
 Give me thy life, or cower in empty phrase,
 The victim of thy genius, not its mate!”

* Cf. 5.479.

People who build castles in the air do not, for the most part, accomplish much, it is true; but every man who does accomplish great things is given to building elaborate castles in the air and then painfully copying them on solid ground. Indeed, the whole business of ratiocination, and all that makes us intellectual beings, is performed in imagination. Vigorous men are wont to hold mere imagination in contempt; and in that they would be quite right if there were such a thing. How we feel is no matter; the question is what we shall do. But that feeling which is subservient to action and to the intelligence of action is correspondingly important; and all inward life is more or less so subservient. Mere imagination would indeed be mere trifling; only no imagination is *mere*. "More than all that is in thy custody, watch over thy phantasy," said Solomon, "For out of it are the issues of life." *Omni custodia serva cor tuum, quia ex ipso vita procedit.**

A decapitated frog almost reasons.† The habit that is in his cerebellum serves as a major premiss. The excitation of a drop of acid is his minor premiss. And his conclusion is the act of wiping it away. All that is of any value in the operation of ratiocination is there, except only one thing. What he lacks is the power of preparatory meditation.

* *Proverbs*, 4.23.

† Cf. 2.711.

CHAPTER 11

EVOLUTIONARY LOVE*

§1. AT FIRST BLUSH. COUNTER-GOSPELS

287. Philosophy, when just escaping from its golden pupa-skin, mythology, proclaimed the great evolutionary agency of the universe to be Love. Or, since this pirate-lingo, English, is poor in such-like words, let us say Eros, the exuberance-love. Afterwards, Empedocles† set up passionate love and hate as the two coördinate powers of the universe. In some passages, kindness is the word. But certainly, in any sense in which it has an opposite, to be senior partner of that opposite, is the highest position that love can attain. Nevertheless, the ontological gossamer, in whose days those views were familiar topics, made the One Supreme Being, by whom all things have been made out of nothing, to be cherishing-love. What, then, can he say to hate? Never mind, at this time, what the scribe of the Apocalypse, if he were John, stung at length by persecution into a rage, unable to distinguish suggestions of evil from visions of heaven, and so become the Slanderer of God to men, may have dreamed. The question is rather what the sane John thought, or ought to have thought, in order to carry out his idea consistently. His statement that God is love seems aimed at that saying of Ecclesiastes that we cannot tell whether God bears us love or hatred. "Nay," says John, "we can tell, and very simply! We know and have trusted the love which God hath in us. God is love." There is no logic in this, unless it means that God loves all men. In the preceding paragraph, he had said, "God is light and in him is no darkness at all." We are to understand, then, that as darkness is merely the defect of light, so hatred and evil are mere imperfect stages of ἀγάπη and ἀγαθόν, love and loveliness. This concords with that utterance reported in

* *The Monist*, vol. 3, pp. 176-200 (1893); the last paper of a series of five. See note to ch. 1.

† See H. Diels, *Fragmente der Vorsokratiker*, vol. 1, 21B.

John's Gospel: "God sent not the Son into the world to judge the world; but that the world should through him be saved. He that believeth on him is not judged: he that believeth not hath been judged already. . . . And this is the judgment, that the light is come into the world, and that men loved darkness rather than the light." That is to say, God visits no punishment on them; they punish themselves, by their natural affinity for the defective. Thus, the love that God is, is not a love of which hatred is the contrary; otherwise Satan would be a coördinate power; but it is a love which embraces hatred as an imperfect stage of it, an Anteros — yea, even needs hatred and hatefulness as its object. For self-love is no love; so if God's self is love, that which he loves must be defect of love; just as a luminary can light up only that which otherwise would be dark. Henry James, the Swedenborgian, says: "It is no doubt very tolerable finite or creaturely love to love one's own in another, to love another for his conformity to one's self: but nothing can be in more flagrant contrast with the creative Love, all whose tenderness *ex vi termini* must be reserved only for what intrinsically is most bitterly hostile and negative to itself." This is from *Substance and Shadow: An Essay on the Physics of Creation*.* It is a pity he had not filled his pages with things like this, as he was able easily to do, instead of scolding at his reader and at people generally, until the physics of creation was well-nigh forgot. I must deduct, however, from what I just wrote: obviously no genius could make his every sentence as sublime as one which discloses for the problem of evil its everlasting solution.

288. The movement of love is circular, at one and the same impulse projecting creations into independency and drawing them into harmony. This seems complicated when stated so; but it is fully summed up in the simple formula we call the Golden Rule. This does not, of course, say, Do everything possible to gratify the egoistic impulses of others, but it says, Sacrifice your own perfection to the perfectionment of your neighbor. Nor must it for a moment be confounded with the Benthamite, or Helvetian, or Beccarian motto, Act for the greatest good of the greatest number. Love is not directed to abstractions but to persons; not to

* p. 442.

persons we do not know, nor to numbers of people, but to our own dear ones, our family and neighbors. "Our neighbor," we remember, is one whom we live near, not locally perhaps but in life and feeling.

289. Everybody can see that the statement of St. John is the formula of an evolutionary philosophy, which teaches that growth comes only from love, from I will not say *self-sacrifice*, but from the ardent impulse to fulfill another's highest impulse. Suppose, for example, that I have an idea that interests me. It is my creation. It is my creature; for as shown in last July's *Monist*,* it is a little person. I love it; and I will sink myself in perfecting it. It is not by dealing out cold justice to the circle of my ideas that I can make them grow, but by cherishing and tending them as I would the flowers in my garden. The philosophy we draw from John's gospel is that this is the way mind develops; and as for the cosmos, only so far as it yet is mind, and so has life, is it capable of further evolution. Love, recognizing germs of loveliness in the hateful, gradually warms it into life, and makes it lovely. That is the sort of evolution which every careful student of my essay "The Law of Mind"† must see that *synechism* calls for.

290. The nineteenth century is now fast sinking into the grave, and we all begin to review its doings and to think what character it is destined to bear as compared with other centuries in the minds of future historians. It will be called, I guess, the Economical Century; for political economy has more direct relations with all the branches of its activity than has any other science. Well, political economy has its formula of redemption, too. It is this: Intelligence in the service of greed ensures the justest prices, the fairest contracts, the most enlightened conduct of all the dealings between men, and leads to the *summum bonum*, food in plenty and perfect comfort. Food for whom? Why, for the greedy master of intelligence. I do not mean to say that this is one of the legitimate conclusions of political economy, the scientific character of which I fully acknowledge. But the study of doctrines, themselves true, will often temporarily encourage

* See 270.

† See ch. 5.

generalizations extremely false, as the study of physics has encouraged necessitarianism. What I say, then, is that the great attention paid to economical questions during our century has induced an exaggeration of the beneficial effects of greed and of the unfortunate results of sentiment, until there has resulted a philosophy which comes unwittingly to this, that greed is the great agent in the elevation of the human race and in the evolution of the universe.

291. I open a handbook of political economy* — the most typical and middling one I have at hand — and there find some remarks of which I will here make a brief analysis. I omit qualifications, sops thrown to Cerberus, phrases to placate Christian prejudice, trappings which serve to hide from author and reader alike the ugly nakedness of the greed-god. But I have surveyed my position. The author enumerates “three motives to human action:†

The love of self;

The love of a limited class having common interests and feelings with one’s self;

The love of mankind at large.”

Remark, at the outset, what obsequious title is bestowed on greed — “the love of self.” Love! The second motive *is* love. In place of “a limited class” put “certain persons,” and you have a fair description. Taking “class” in the old-fashioned sense, a weak kind of love is described. In the sequel, there seems to be some haziness as to the delimitation of this motive. By the love of mankind at large, the author does not mean that deep, subconscious passion that is properly so called; but merely public-spirit, perhaps little more than a fidget about pushing ideas. The author proceeds to a comparative estimate of the worth of these motives. Greed, says he, but using, of course, another word, “is not so great an evil as is commonly supposed. . . . Every man can promote his own interests a great deal more effectively than he can promote any one else’s, or than any one else can promote his.” Besides, as he remarks on another page, the more miserly a man is, the more good he does. The second motive “is the most dangerous one to which society is exposed.” Love is all

* Simon Newcomb, *Principles of Political Economy*, New York (1886).

† *Ibid.*, p. 534.

very pretty: "no higher or purer source of human happiness exists." (Ahem!) But it is a "source of enduring injury," and, in short, should be overruled by something wiser. What is this wiser motive? We shall see.

As for public spirit, it is rendered nugatory by the "difficulties in the way of its effective operation." For example, it might suggest putting checks upon the fecundity of the poor and the vicious; and "no measure of repression would be too severe," in the case of criminals. The hint is broad. But unfortunately, you cannot induce legislatures to take such measures, owing to the pestiferous "tender sentiments of man towards man." It thus appears that public-spirit, or Benthamism, is not strong enough to be the effective tutor of love (I am skipping to another page) which must, therefore, be handed over to "the motives which animate men in the pursuit of wealth," in which alone we can confide, and which "are in the highest degree beneficent."¹ Yes, in the "highest degree" without exception are they beneficent to the being upon whom all their blessings are poured out, namely, the Self, whose "sole object," says the writer, in accumulating wealth is his individual "sustenance and enjoyment." Plainly, the author holds the notion that some other motive might be in a higher degree beneficent, even for the man's self, to be a paradox wanting in good sense. He seeks to glaze and modify his doctrine; but he lets the perspicacious reader see what his animating principle is; and when, holding the opinions I have repeated, he at the same time acknowledges that society could not exist upon a basis of intelligent greed alone, he simply pigeon-holes himself as one of the eclectics of inharmonious opinions. He wants his mammon flavored with a *souçon* of god.

292. The economists accuse those, to whom the enunciation of their atrocious villainies communicates a thrill of horror, of being *sentimentalists*. It may be so: I willingly confess to having some tincture of sentimentalism in me, God be thanked! Ever since the French Revolution brought

¹ How can a writer have any respect for science, as such, who is capable of confounding with the scientific propositions of political economy, which have nothing to say concerning what is "beneficent," such brummagem generalizations as this?

this leaning of thought into ill repute — and not altogether undeservedly, I must admit, true, beautiful, and good as that great movement was — it has been the tradition to picture sentimentalists as persons incapable of logical thought and unwilling to look facts in the eyes. This tradition may be classed with the French tradition that an Englishman says *godam* at every second sentence, the English tradition that an American talks about “Britishers,” and the American tradition that a Frenchman carries forms of etiquette to an inconvenient extreme; in short, with all those traditions which survive simply because the men who use their eyes and ears are few and far between. Doubtless some excuse there was for all those opinions in days gone by; and sentimentalism, when it was the fashionable amusement to spend one’s evenings in a flood of tears over a woeful performance on a candle-litten stage, sometimes made itself a little ridiculous. But what after all is sentimentalism? It is an *ism*, a doctrine, namely, the doctrine that great respect should be paid to the natural judgments of the sensible heart. This is what sentimentalism precisely is; and I entreat the reader to consider whether to condemn it is not of all blasphemies the most degrading. Yet the nineteenth century has steadily condemned it, because it brought about the Reign of Terror. That it did so is true. Still, the whole question is one of *how much*. The Reign of Terror was very bad; but now the Gradgrind banner has been this century long flaunting in the face of heaven, with an insolence to provoke the very skies to scowl and rumble. Soon a flash and quick peal will shake economists quite out of their complacency, too late. The twentieth century, in its latter half, shall surely see the deluge-tempest burst upon the social order — to clear upon a world as deep in ruin as that greed-philosophy has long plunged it into guilt. No post-thermidorian high jinks then!

So a miser is a beneficent power in a community, is he? With the same reason precisely, only in a much higher degree, you might pronounce the Wall Street sharp to be a good angel, who takes money from heedless persons not likely to guard it properly, who wrecks feeble enterprises better stopped, and who administers wholesome lessons to unwary scientific men, by passing worthless checks upon them — as you did, the

other day, to me, my millionaire Master in glomery, when you thought you saw your way to using my process without paying for it, and of so bequeathing to your children something to boast about of their father — and who by a thousand wiles puts money at the service of intelligent greed, in his own person. Bernard Mandeville, in his *Fable of the Bees*,* maintains that private vices of all descriptions are public benefits, and proves it, too, quite as cogently as the economist proves his point concerning the miser. He even argues, with no slight force, that but for vice civilization would never have existed. In the same spirit, it has been strongly maintained and is today widely believed that all acts of charity and benevolence, private and public, go seriously to degrade the human race.

293. The *Origin of Species* of Darwin merely extends politico-economical views of progress to the entire realm of animal and vegetable life. The vast majority of our contemporary naturalists hold the opinion that the true cause of those exquisite and marvelous adaptations of nature for which, when I was a boy, men used to extol the divine wisdom, is that creatures are so crowded together that those of them that happen to have the slightest advantage force those less pushing into situations unfavorable to multiplication or even kill them before they reach the age of reproduction. Among animals, the mere mechanical individualism is vastly reënforced as a power making for good by the animal's ruthless greed. As Darwin puts it on his title-page, it is the struggle for existence; and he should have added for his motto: Every individual for himself, and the Devil take the hindmost! Jesus, in his sermon on the Mount, expressed a different opinion.

294. Here, then, is the issue. The gospel of Christ says that progress comes from every individual merging his individuality in sympathy with his neighbors. On the other side, the conviction of the nineteenth century is that progress takes place by virtue of every individual's striving for himself with all his might and trampling his neighbor under foot whenever he gets a chance to do so. This may accurately be called the Gospel of Greed.

* See especially Remark G.

295. Much is to be said on both sides. I have not concealed, I could not conceal, my own passionate predilection. Such a confession will probably shock my scientific brethren. Yet the strong feeling is in itself, I think, an argument of some weight in favor of the agapastic theory of evolution — so far as it may be presumed to bespeak the normal judgment of the Sensible Heart. Certainly, if it were possible to believe in agapasm without believing it warmly, that fact would be an argument against the truth of the doctrine. At any rate, since the warmth of feeling exists, it should on every account be candidly confessed; especially since it creates a liability to one-sidedness on my part against which it behooves my readers and me to be severally on our guard.

§2. SECOND THOUGHTS. IRENICA

296. Let us try to define the logical affinities of the different theories of evolution.* Natural selection, as conceived by Darwin, is a mode of evolution in which the only positive agent of change in the whole passage from moner to man is fortuitous variation. To secure advance in a definite direction chance has to be seconded by some action that shall hinder the propagation of some varieties or stimulate that of others. In natural selection, strictly so called, it is the crowding out of the weak. In sexual selection, it is the attraction of beauty, mainly.

297. The *Origin of Species* was published toward the end of the year 1859. The preceding years since 1846 had been one of the most productive seasons — or if extended so as to cover the great book we are considering, *the* most productive period of equal length in the entire history of science from its beginnings until now. The idea that chance begets order, which is one of the corner-stones of modern physics (although Dr. Carus† considers it “the weakest point in Mr. Peirce’s system”) was at that time put into its clearest light. Quetelet had opened the discussion by his *Letters on the Application of Probabilities to the Moral and Political Sciences*,‡ a work which

* Cf. 13ff.

† See “Mr. Charles S. Peirce’s Onslaught on the Doctrine of Necessity,” *The Monist*, vol. 2, p. 576.

‡ Bruxelles, 1846. Translation by O. G. Downes. London, 1849.

deeply impressed the best minds of that day, and to which Sir John Herschel* had drawn general attention in Great Britain. In 1857, the first volume of Buckle's *History of Civilisation* had created a tremendous sensation, owing to the use he made of this same idea. Meantime, the "statistical method" had, under that very name, been applied with brilliant success to molecular physics. Dr. John Herapath, an English chemist, had in 1847 outlined the kinetical theory of gases in his *Mathematical Physics*; and the interest the theory excited had been refreshed in 1856 by notable memoirs by Clausius† and Krönig.‡ In the very summer preceding Darwin's publication, Maxwell had read before the British Association the first and most important of his researches on this subject.§ The consequence was that the idea that fortuitous events may result in a physical law, and further that this is the way in which those laws which appear to conflict with the principle of the conservation of energy are to be explained, had taken a strong hold upon the minds of all who were abreast of the leaders of thought. By such minds, it was inevitable that the *Origin of Species*, whose teaching was simply the application of the same principle to the explanation of another "non-conservative"¶ action, that of organic development, should be hailed and welcomed. The sublime discovery of the conservation of energy by Helmholtz in 1847,|| and that of the mechanical theory of heat by Clausius° and by Rankine,** independently, in 1850, had decidedly overawed all those who might have been inclined to sneer at physical science. Thereafter a belated poet still harping upon "science peddling with the names of

* "Quetelet on Probabilities," *Edinburgh Review*, vol. 42, pp. 1-57 (1850).

† "Ueber die Art der Bewegung welche wir Wärme nennen," *Poggendorff's Annalen*, Bd. 100, S. 365 (1857).

‡ "Grundzüge einer Theorie der Gase," *Poggendorff's Annalen*, Bd. 99, S. 315 (1856).

§ "Illustrations of the Dynamical Theory of Gases," *Philos. Magazine* IV, p. 22 (1860). Reprinted in *Collected Papers*, vol. 1, p. 377.

¶ See 71.

|| *Ueber die Erhaltung der Kraft*. Introduction to a series of lectures delivered at Karlsruhe 1862-63. Translated in *Popular Scientific Lectures*, vol. 1, pp. 316-362, New York, (1885).

° "Ueber die bewegende Kraft der Wärme," *Poggendorff's Annalen*, Bd. 79, S. 368.

** *Transactions of the Royal Society of Edinburgh*, vol. 20, p. 192.

things" would fail of his effect. Mechanism was now known to be all, or very nearly so. All this time, utilitarianism — that improved substitute for the Gospel — was in its fullest feather; and was a natural ally of an individualistic theory. Dean Mansell's injudicious advocacy had led to mutiny among the bondsmen of Sir William Hamilton, and the nominalism of Mill had profited accordingly; and although the real science that Darwin was leading men to was sure some day to give a death-blow to the sham-science of Mill, yet there were several elements of the Darwinian theory which were sure to charm the followers of Mill.* Another thing: anæsthetics had been in use for thirteen years. Already, people's acquaintance with suffering had dropped off very much; and as a consequence, that unlovely hardness, by which our times are so contrasted with those that immediately preceded them, had already set in, and inclined people to relish a ruthless theory. The reader would quite mistake the drift of what I am saying if he were to understand me as wishing to suggest that any of those things (except perhaps Malthus) influenced Darwin himself. What I mean is that his hypothesis, while without dispute one of the most ingenious and pretty ever devised, and while argued with a wealth of knowledge, a strength of logic, a charm of rhetoric, and above all with a certain magnetic genuineness that was almost irresistible, did not appear, at first, at all near to being proved; and to a sober mind its case looks less hopeful now than it did twenty years ago; but the extraordinarily favorable reception it met with was plainly owing, in large measure, to its ideas being those toward which the age was favorably disposed, especially, because of the encouragement it gave to the greed-philosophy.

298. Diametrically opposed to evolution by chance are those theories which attribute all progress to an inward necessary principle, or other form of necessity. Many naturalists have thought that if an egg is destined to go through a certain series of embryological transformations, from which it is perfectly certain not to deviate, and if in geological time almost exactly the same forms appear successively, one replacing another in the same order, the strong presumption is that this latter succession was as predeterminate and certain to take

* Cf. 5.64.

place as the former. So, Nägeli,* for instance, conceives that it somehow follows from the first law of motion and the peculiar, but unknown, molecular constitution of protoplasm, that forms must complicate themselves more and more. Kölliker† makes one form generate another after a certain maturation has been accomplished. Weismann,‡ too, though he calls himself a Darwinian, holds that nothing is due to chance, but that all forms are simple mechanical resultants of the heredity from two parents.¹ It is very noticeable that all these different sectaries seek to import into their science a mechanical necessity to which the facts that come under their observation do not point. Those geologists who think that the variation of species is due to cataclysmic alterations of climate or of the chemical constitution of the air and water are also making mechanical necessity chief factor of evolution.

299. Evolution by sporting and evolution by mechanical necessity are conceptions warring against one another. A third method, which supersedes their strife, lies enwrapped in the theory of Lamarck.§ According to his view, all that distinguishes the highest organic forms from the most rudimentary has been brought about by little hypertrophies or atrophies which have affected individuals early in their lives, and have been transmitted to their offspring. Such a transmission of acquired characters is of the general nature of habit-taking, and this is the representative and derivative within the physiological domain of the law of mind. Its action is essentially dissimilar to that of a physical force; and that is the secret of the repugnance of such necessitarians as Weismann to admitting its existence. The Lamarckians further suppose that, although some of the modifications of form so transmitted were originally due to mechanical causes, yet

* In his *Mechanisch-physiologische Theorie der Abstammungslehre*. Einleitung, S. 14ff. München and Leipzig (1884).

† *Entwicklungsgeschichte des Menschen und der Höheren Thiere*, Einleitung §1, Leipzig (1879).

‡ See *Essays on Heredity*, vol. 1, essay 2.

¹ I am happy to find that Dr. Carus ["The Soul of Man," *Open Court*, 1891, p. 215], too, ranks Weismann among the opponents of Darwin, notwithstanding his flying that flag.

§ *Philosophie Zoologique*, Pt. I, ch. 7, Paris (1873).

the chief factors of their first production were the straining of endeavor and the overgrowth superinduced by exercise, together with the opposite actions. Now, endeavor, since it is directed toward an end, is essentially psychical, even though it be sometimes unconscious; and the growth due to exercise, as I argued in my last paper,* follows a law of a character quite contrary to that of mechanics.

300. Lamarckian evolution is thus evolution by the force of habit. — That sentence slipped off my pen while one of those neighbors whose function in the social cosmos seems to be that of an Interrupter was asking me a question. Of course, it is nonsense. Habit is mere inertia, a resting on one's oars, not a propulsion. Now it is energetic projaculation (lucky there is such a word, or this untried hand might have been put to inventing one) by which in the typical instances of Lamarckian evolution the new elements of form are first created. Habit, however, forces them to take practical shapes, compatible with the structures they affect, and, in the form of heredity and otherwise, gradually replaces the spontaneous energy that sustains them. Thus, habit plays a double part; it serves to establish the new features, and also to bring them into harmony with the general morphology and function of the animals and plants to which they belong. But if the reader will now kindly give himself the trouble of turning back a page or two, he will see that this account of Lamarckian evolution coincides with the general description of the action of love, to which, I suppose, he yielded his assent.

301. Remembering that all matter is really mind, remembering, too, the continuity of mind, let us ask what aspect Lamarckian evolution takes on within the domain of consciousness. Direct endeavor can achieve almost nothing. It is as easy by taking thought to add a cubit to one's stature as it is to produce an idea acceptable to any of the Muses by merely straining for it before it is ready to come. We haunt in vain the sacred well and throne of Mnemosyne; the deeper workings of the spirit take place in their own slow way, without our connivance. Let but their bugle sound, and we may then make our effort, sure of an oblation for the altar of whatsoever divinity its savour gratifies. Besides this inward process,

* See 261ff.

there is the operation of the environment, which goes to break up habits destined to be broken up and so to render the mind lively. Everybody knows that the long continuance of a routine of habit makes us lethargic, while a succession of surprises wonderfully brightens the ideas. Where there is a motion, where history is a-making, there is the focus of mental activity, and it has been said that the arts and sciences reside within the temple of Janus, waking when that is open, but slumbering when it is closed. Few psychologists have perceived how fundamental a fact this is. A portion of mind, abundantly commissured to other portions, works almost mechanically. It sinks to a condition of a railway junction. But a portion of mind almost isolated, a spiritual peninsula, or *cul-de-sac*, is like a railway terminus. Now mental commissures are habits. Where they abound, originality is not needed and is not found; but where they are in defect spontaneity is set free. Thus, the first step in the Lamarckian evolution of mind is the putting of sundry thoughts into situations in which they are free to play. As to growth by exercise, I have already shown, in discussing "Man's Glassy Essence,"* in last October's *Monist*, what its *modus operandi* must be conceived to be, at least, until a second equally definite hypothesis shall have been offered. Namely, it consists of the flying asunder of molecules, and the reparation of the parts by new matter. It is, thus, a sort of reproduction. It takes place only during exercise, because the activity of protoplasm consists in the molecular disturbance which is its necessary condition. Growth by exercise takes place also in the mind. Indeed, that is what it is to *learn*. But the most perfect illustration is the development of a philosophical idea by being put into practice. The conception which appeared, at first, as unitary splits up into special cases; and into each of these new thought must enter to make a practicable idea. This new thought, however, follows pretty closely the model of the parent conception; and thus a homogeneous development takes place. The parallel between this and the course of molecular occurrences is apparent. Patient attention will be able to trace all these elements in the transaction called learning.

* See 250ff.

302. Three modes of evolution have thus been brought before us: evolution by fortuitous variation, evolution by mechanical necessity, and evolution by creative love. We may term them *tychastic* evolution, or *tychasm*, *anancastic* evolution, or *anancasm*, and *agapastic* evolution, or *agapasm*. The doctrines which represent these as severally of principal importance we may term *tychasticism*, *anancasticism*, and *agapasticism*. On the other hand the mere propositions that absolute chance, mechanical necessity, and the law of love are severally operative in the cosmos may receive the names of *tychism*, *anancism*, and *agapism*.

303. All three modes of evolution are composed of the same general elements. Agapasm exhibits them the most clearly. The good result is here brought to pass, first, by the bestowal of spontaneous energy by the parent upon the offspring, and, second, by the disposition of the latter to catch the general idea of those about it and thus to subserve the general purpose. In order to express the relation that tychasm and anancasm bear to agapasm let me borrow a word from geometry. An ellipse crossed by a straight line is a sort of cubic curve; for a cubic is a curve which is cut thrice by a straight line; now a straight line might cut the ellipse twice and its associated straight line a third time. Still the ellipse with the straight line across it would not have the characteristics of a cubic. It would have, for instance, no contrary flexure, which no true cubic wants; and it would have two nodes, which no true cubic has. The geometers say that it is a *degenerate* cubic. Just so, tychasm and anancasm are degenerate forms of agapasm.

304. Men who seek to reconcile the Darwinian idea with Christianity will remark that tychastic evolution, like the agapastic, depends upon a reproductive creation, the forms preserved being those that use the spontaneity conferred upon them in such wise as to be drawn into harmony with their original, quite after the Christian scheme. Very good! This only shows that just as love cannot have a contrary, but must embrace what is most opposed to it, as a degenerate case of it, so tychasm is a kind of agapasm. Only, in the tychastic evolution, progress is solely owing to the distribution of the napkin-hidden talent of the rejected servant among those not rejected,

just as ruined gamblers leave their money on the table to make those not yet ruined so much the richer. It makes the felicity of the lambs just the damnation of the goats, transposed to the other side of the equation. In genuine agapasm, on the other hand, advance takes place by virtue of a positive sympathy among the created springing from continuity of mind. This is the idea which tychasticism knows not how to manage.

305. The anancasticist might here interpose, claiming that the mode of evolution for which he contends agrees with agapasm at the point at which tychasm departs from it. For it makes development go through certain phases, having its inevitable ebbs and flows, yet tending on the whole to a fore-ordained perfection. Bare existence by this its destiny betrays an intrinsic affinity for the good. Herein, it must be admitted, anancasm shows itself to be in a broad acceptance a species of agapasm. Some forms of it might easily be mistaken for the genuine agapasm. The Hegelian philosophy is such an anancasticism. With its revelatory religion, with its synechism (however imperfectly set forth), with its "reflection," the whole idea of the theory is superb, almost sublime. Yet, after all, living freedom is practically omitted from its method. The whole movement is that of a vast engine, impelled by a *vis a tergo*, with a blind and mysterious fate of arriving at a lofty goal. I mean that such an engine it *would* be, if it really worked; but in point of fact, it is a Keely motor.* Grant that it really acts as it professes to act, and there is nothing to do but accept the philosophy. But never was there seen such an example of a long chain of reasoning — shall I say with a flaw in every link? — no, with every link a handful of sand, squeezed into shape in a dream. Or say, it is a pasteboard model of a philosophy that in reality does not exist. If we use the one precious thing it contains, the idea of it, introducing the tychism which the arbitrariness of its every step suggests, and make that the support of a vital freedom which is the breath of the spirit of love, we may be able to produce that genuine agapasticism at which Hegel was aiming.

* An engine "invented" in 1874 by J. E. W. Keely, supposed to produce power by responding to the intermolecular vibrations of the ether.

§3. A THIRD ASPECT. DISCRIMINATION

306. In the very nature of things, the line of demarcation between the three modes of evolution is not perfectly sharp. That does not prevent its being quite real; perhaps it is rather a mark of its reality. There is in the nature of things no sharp line of demarcation between the three fundamental colors, red, green, and violet. But for all that they are really different. The main question is whether three radically different evolutionary elements have been operative; and the second question is what are the most striking characteristics of whatever elements have been operative.

307. I propose to devote a few pages to a very slight examination of these questions in their relation to the historical development of human thought. I first formulate for the reader's convenience the briefest possible definitions of the three conceivable modes of development of thought, distinguishing also two varieties of anancasm and three of agapasm. The tyochastic development of thought, then, will consist in slight departures from habitual ideas in different directions indifferently, quite purposeless and quite unconstrained whether by outward circumstances or by force of logic, these new departures being followed by unforeseen results which tend to fix some of them as habits more than others. The anancastic development of thought will consist of new ideas adopted without foreseeing whither they tend, but having a character determined by causes either external to the mind, such as changed circumstances of life, or internal to the mind as logical developments of ideas already accepted, such as generalizations. The agapastic development of thought is the adoption of certain mental tendencies, not altogether heedlessly, as in tychasm, nor quite blindly by the mere force of circumstances or of logic, as in anancasm, but by an immediate attraction for the idea itself, whose nature is divined before the mind possesses it, by the power of sympathy, that is, by virtue of the continuity of mind; and this mental tendency may be of three varieties, as follows. First, it may affect a whole people or community in its collective personality, and be thence communicated to such individuals as are in powerfully sympathetic connection with the collective people, although they may be intellectually incapable of attaining the

idea by their private understandings or even perhaps of consciously apprehending it. Second, it may affect a private person directly, yet so that he is only enabled to apprehend the idea, or to appreciate its attractiveness, by virtue of his sympathy with his neighbors, under the influence of a striking experience or development of thought. The conversion of St. Paul may be taken as an example of what is meant. Third, it may affect an individual, independently of his human affections, by virtue of an attraction it exercises upon his mind, even before he has comprehended it. This is the phenomenon which has been well called the *divination* of genius; for it is due to the continuity between the man's mind and the Most High.

308. Let us next consider by means of what tests we can discriminate between these different categories of evolution. No absolute criterion is possible in the nature of things, since in the nature of things there is no sharp line of demarcation between the different classes. Nevertheless, quantitative symptoms may be found by which a sagacious and sympathetic judge of human nature may be able to estimate the approximate proportions in which the different kinds of influence are commingled.

309. So far as the historical evolution of human thought has been tychastic, it should have proceeded by insensible or minute steps; for such is the nature of chances when so multiplied as to show phenomena of regularity. For example, assume that of the native-born white adult males of the United States in 1880, one-fourth part were below 5 feet 4 inches in stature and one-fourth part above 5 feet 8 inches. Then by the principles of probability, among the whole population, we should expect

	216 under 4 feet 6 inches		216 above 6 feet 6 inches
	48 under 4 feet 5 inches		48 above 6 feet 7 inches
	9 under 4 feet 4 inches		9 above 6 feet 8 inches
less than	2 under 4 feet 3 inches	less than	2 above 6 feet 9 inches

I set down these figures to show how insignificantly few are the cases in which anything very far out of the common run presents itself by chance. Though the stature of only every second man is included within the four inches between 5 feet 4 inches and 5 feet 8 inches, yet if this interval be extended by thrice four inches above and below, it will embrace all our

8 millions odd of native-born adult white males (of 1880), except only 9 taller and 9 shorter.

310. The test of minute variation, if *not* satisfied, absolutely negatives tychasm. If it *is* satisfied, we shall find that it negatives anancasm but not agapasm. We want a positive test, satisfied by tychasm, only. Now wherever we find men's thought taking by imperceptible degrees a turn contrary to the purposes which animate them, in spite of their highest impulses, there, we may safely conclude, there has been a tychastic action.

311. Students of the history of mind there be of an erudition to fill an imperfect scholar like me with envy adulcorated by joyous admiration, who maintain that ideas when just started are and can be little more than freaks, since they cannot yet have been critically examined, and further that everywhere and at all times progress has been so gradual that it is difficult to make out distinctly what original step any given man has taken. It would follow that tychasm has been the sole method of intellectual development. I have to confess I cannot read history so; I cannot help thinking that while tychasm has sometimes been operative, at others great steps covering nearly the same ground and made by different men independently have been mistaken for a succession of small steps, and further that students have been reluctant to admit a real entitative "spirit" of an age or of a people, under the mistaken and unscrutinized impression that they should thus be opening the door to wild and unnatural hypotheses. I find, on the contrary, that, however it may be with the education of individual minds, the historical development of thought has seldom been of a tychastic nature, and exclusively in backward and barbarizing movements. I desire to speak with the extreme modesty which befits a student of logic who is required to survey so very wide a field of human thought that he can cover it only by a reconnaissance, to which only the greatest skill and most adroit methods can impart any value at all; but, after all, I can only express my own opinions and not those of anybody else; and in my humble judgment, the largest example of tychasm is afforded by the history of Christianity, from about its establishment by Constantine to, say, the time of the Irish monasteries, an era or eon of about 500 years. Undoubt-

edly the external circumstance, which more than all others at first inclined men to accept Christianity in its loveliness and tenderness, was the fearful extent to which society was broken up into units by the unmitigated greed and hard-heartedness into which the Romans had seduced the world. And yet it was that very same fact, more than any other external circumstance, that fostered that bitterness against the wicked world of which the primitive gospel of Mark contains not a single trace. At least, I do not detect it in the remark about the blasphemy against the Holy Ghost,* where nothing is said about vengeance, nor even in that speech† where the closing lines of Isaiah‡ are quoted, about the worm and the fire that feed upon the “carcasses of the men that have transgressed against me.” But little by little the bitterness increases until, in the last book of the New Testament, its poor distracted author represents that all the time Christ was talking about having come to save the world, the secret design was to catch the entire human race, with the exception of a paltry 144,000, and souse them all in a brimstone lake, and as the smoke of their torment went up forever and ever, to turn and remark, “There is no curse any more.” Would it be an insensible smirk or a fiendish grin that should accompany such an utterance? I wish I could believe St. John did not write it; but it is his gospel which tells about the “resurrection unto condemnation”—that is of men’s being resuscitated just for the sake of torturing them—and at any rate, the Revelation is a very ancient composition. One can understand that the early Christians were like men trying with all their might to climb a steep declivity of smooth wet clay; the deepest and truest element of their life, animating both heart and head, was universal love; but they were continually, and against their wills, slipping into a party spirit, every slip serving as a precedent, in a fashion but too familiar to every man. This party feeling insensibly grew until by about A.D. 330 the luster of the pristine integrity that in St. Mark reflects the white spirit of light was so far tarnished that Eusebius (the Jared Sparks of that day), in the preface to his History, could announce his intention of exaggerating every-

* See Mark 3, 29.

† See Mark 9, 48.

‡ See Isaiah 66, 24.

thing that tended to the glory of the church and of suppressing whatever might disgrace it.* His Latin contemporary Lactantius† is worse still; and so the darkling went on increasing until before the end of the century the great library of Alexandria was destroyed by Theophilus,¹ until Gregory the Great, two centuries later, burnt the great library of Rome, ‡ proclaiming that "Ignorance is the mother of devotion" (which is true, just as oppression and injustice is the mother of spirituality), until a sober description of the state of the church would be a thing our not too nice newspapers would treat as "unfit for publication." All this movement is shown by the application of the test given above to have been tychastic. Another very much like it on a small scale, only a hundred times swifter, for the study of which there are documents by the library-full, is to be found in the history of the French Revolution.

312. Anancastic evolution advances by successive strides with pauses between. The reason is that, in this process, a habit of thought, having been overthrown, is supplanted by the next strongest. Now this next strongest is sure to be widely disparate from the first, and as often as not is its direct contrary. It reminds one of our old rule of making the second candidate vice-president. This character, therefore, clearly distinguishes anancasm from tychasm. The character which distinguishes it from agapasm is its purposelessness. But external and internal anancasm have to be examined separately. Development under the pressure of external circumstances, or cataclasmic evolution, is in most cases unmistakable enough. It has numberless degrees of intensity, from the brute force, the plain war, which has more than once turned the current of the world's thought, down to the hard fact of evidence, or what has been taken for it, which has been known to convince men by hordes. The only hesitation that can subsist in the presence of such a history is a quantitative one. Never are external influences the only ones which affect the mind, and therefore it must be a matter of judgment for which it would scarcely be worth while to attempt to set rules,

* *Ecclesiastical History*, vol. 8, p.2.

† See "Of the False Wisdom of Philosophers." *The Divine Institutes*, Bk. III.

¹ See Draper's *History of Intellectual Development*, ch. 10.

‡ See John of Salisbury, *Policraticus*, ii, 26; viii, 19.

whether a given movement is to be regarded as principally governed from without or not. In the rise of medieval thought, I mean scholasticism and the synchronistic art developments, undoubtedly the crusades and the discovery of the writings of Aristotle were powerful influences. The development of scholasticism from Roscellin to Albertus Magnus closely follows the successive steps in the knowledge of Aristotle. Prantl thinks that that is the whole story,* and few men have thumbed more books than Carl Prantl. He has done good solid work, notwithstanding his slap-dash judgments. But we shall never make so much as a good beginning of comprehending scholasticism until the whole has been systematically explored and digested by a company of students regularly organized and held under rule for that purpose. But as for the period we are now specially considering, that which synchronized the Romanesque architecture, the literature is easily mastered. It does not quite justify Prantl's dicta as to the slavish dependence of these authors upon their authorities. Moreover, they kept a definite purpose steadily before their minds, throughout all their studies. I am, therefore, unable to offer this period of scholasticism as an example of pure external anancasm, which seems to be the fluorine of the intellectual elements. Perhaps the recent Japanese reception of western ideas is the purest instance of it in history. Yet in combination with other elements, nothing is commoner. If the development of ideas under the influence of the study of external facts be considered as external anancasm — it is on the border between the external and the internal forms — it is, of course, the principal thing in modern learning. But Whewell, whose masterly comprehension of the history of science critics have been too ignorant properly to appreciate, clearly shows that it is far from being the overwhelmingly preponderant influence, even there.

313. Internal anancasm, or logical groping, which advances upon a predestined line without being able to foresee whither it is to be carried nor to steer its course, this is the rule of development of philosophy. Hegel first made the world understand this; and he seeks to make logic not merely the subjective

* *Geschichte der Logik in Abendlande*, Leipzig (1867), Dritter Band, 17 Abschn., S. 2.

guide and monitor of thought, which was all it had been ambitioning before, but to be the very mainspring of thinking, and not merely of individual thinking but of discussion, of the history of the development of thought, of all history, of all development. This involves a positive, clearly demonstrable error. Let the logic in question be of whatever kind it may, a logic of necessary inference or a logic of probable inference (the theory might perhaps be shaped to fit either), in any case it supposes that logic is sufficient of itself to determine what conclusion follows from given premisses; for unless it will do so much, it will not suffice to explain why an individual train of reasoning should take just the course it does take, to say nothing of other kinds of development. It thus supposes that from given premisses, only one conclusion can logically be drawn, and that there is no scope at all for free choice. That from given premisses only one conclusion can logically be drawn is one of the false notions which have come from logicians' confining their attention to that Nantucket of thought, the logic of non-relative terms. In the logic of relatives, it does not hold good.*

314. One remark occurs to me. If the evolution of history is in considerable part of the nature of internal anancasm, it resembles the development of individual men; and just as thirty-three years is a rough but natural unit of time for individuals, being the average age at which man has issue, so there should be an approximate period at the end of which one great historical movement ought to be likely to be supplanted by another. Let us see if we can make out anything of the kind. Take the governmental development of Rome as being sufficiently long and set down the principal dates.

- B.C. 753, Foundation of Rome.
- B.C. 510, Expulsion of the Tarquins.
- B.C. 27, Octavius assumes title Augustus.
- A.D. 476, End of Western Empire.
- A.D. 962, Holy Roman Empire.
- A.D. 1453, Fall of Constantinople.

The last event was one of the most significant in history, especially for Italy. The intervals are 243, 483, 502, 486 491, years. All are rather curiously near equal, except the first

* See 3.396ff, 3.506ff, 3.641.

which is half the others. Successive reigns of kings would not commonly be so near equal. Let us set down a few dates in the history of thought.

- B.C. 585, Eclipse of Thales. Beginning of Greek philosophy.
- A.D. 30, The crucifixion.
- A.D. 529, Closing of Athenian schools. End of Greek philosophy.
- A.D. 1125, (Approximate) Rise of the Universities of Bologna and Paris.
- A.D. 1543, Publication of the *De Revolutionibus* of Copernicus. Beginning of Modern Science.

The intervals are 615, 499, 596, 418 years. In the history of metaphysics, we may take the following:

- B.C. 322, Death of Aristotle.
- A.D. 1274, Death of Aquinas.
- A.D. 1804, Death of Kant.

The intervals are 1595 and 530 years. The former is about thrice the latter.

From these figures, no conclusion can fairly be drawn. At the same time, they suggest that perhaps there may be a rough natural era of about 500 years. Should there be any independent evidence of this, the intervals noticed may gain some significance.

315. The agapastic development of thought should, if it exists, be distinguished by its purposive character, this purpose being the development of an idea. We should have a direct agapic or sympathetic comprehension and recognition of it by virtue of the continuity of thought. I here take it for granted that such continuity of thought has been sufficiently proved by the arguments used in my paper on the "Law of Mind" in *The Monist* of last July [Chapter 5]. Even if those arguments are not quite convincing in themselves, yet if they are reënforced by an apparent agapasm in the history of thought, the two propositions will lend one another mutual aid. The reader will, I trust, be too well grounded in logic to mistake such mutual support for a vicious circle in reasoning. If it could be shown directly that there is such an entity as the "spirit of an age" or of a people, and that mere individual

intelligence will not account for all the phenomena, this would be proof enough at once of agapasticism and of synechism. I must acknowledge that I am unable to produce a cogent demonstration of this; but I am, I believe, able to adduce such arguments as will serve to confirm those which have been drawn from other facts. I believe that all the greatest achievements of mind have been beyond the powers of unaided individuals; and I find, apart from the support this opinion receives from synechistic considerations, and from the purposive character of many great movements, direct reason for so thinking in the sublimity of the ideas and in their occurring simultaneously and independently to a number of individuals of no extraordinary general powers. The pointed Gothic architecture in several of its developments appears to me to be of such a character. All attempts to imitate it by modern architects of the greatest learning and genius appear flat and tame, and are felt by their authors to be so. Yet at the time the style was living, there was quite an abundance of men capable of producing works of this kind of gigantic sublimity and power. In more than one case, extant documents show that the cathedral chapters, in the selection of architects, treated high artistic genius as a secondary consideration, as if there were no lack of persons able to supply that; and the results justify their confidence. Were individuals in general, then, in those ages possessed of such lofty natures and high intellect? Such an opinion would break down under the first examination.

316. How many times have men now in middle life seen great discoveries made independently and almost simultaneously! The first instance I remember was the prediction of a planet exterior to Uranus by Leverrier* and Adams.† One hardly knows to whom the principle of the conservation of energy ought to be attributed, although it may reasonably be considered as the greatest discovery science has ever made. The mechanical theory of heat was set forth by Rankine‡ and by Clausius§ during the same month of February, 1850; and

* "Recherches sur les mouvements de la planète Herschel, dite Uranus." *Connaissances des temps*, 1849.

† See *Nautical Almanac*, 1851, p. 3.

‡ *Transactions of the Royal Society of Edinburgh*, vol. 20, p. 192.

§ "Ueber die bewegende Kraft der Wärme," *Poggendorff's Annalen*, Bd. 79, S. 368.

there are eminent men who attribute this great step to Thomson.¹ The kinetical theory of gases, after being started by John Bernoulli* and long buried in oblivion, was reinvented and applied to the explanation not merely of the laws of Boyle, Charles, and Avogadro, but also of diffusion and viscosity, by at least three modern physicists separately. It is well known that the doctrine of natural selection was presented by Wallace and by Darwin at the same meeting of the British Association; and Darwin in his "Historical Sketch" prefixed to the later editions of his book shows that both were anticipated by obscure forerunners. The method of spectrum analysis was claimed for Swan as well as for Kirchhoff, and there were others who perhaps had still better claims. The authorship of the Periodical Law of the Chemical Elements is disputed between a Russian, a German, and an Englishman;† although there is no room for doubt that the principal merit belongs to the first. These are nearly all the greatest discoveries of our times. It is the same with the inventions. It may not be surprising that the telegraph should have been independently made by several inventors, because it was an easy corollary from scientific facts well made out before. But it was not so with the telephone and other inventions. Ether, the first anæsthetic, was introduced independently by three different New England physicians‡. Now ether had been a common article for a century. It had been in one of the pharmacopœias three centuries before. It is quite incredible that its anæsthetic property should not have been known; it was known. It had probably passed from mouth to ear as a secret from the days of Basil Valentine; but for long it had been a secret of the PUNCHINELLO kind. In New England, for many years, boys had used it for amusement. Why then had it not been put to its serious use? No reason can be given, except that the motive to do so was not strong enough. The motives to doing so could only have been desire for gain and philanthropy. About 1846, the date of the introduction, philanthropy was undoubtedly in an

¹ Thomson, himself, in his article *Heat* in the *Encyclopedia Britannica* [edition of 1875-89] never once mentions the name of Clausius.

* Daniel Bernoulli, *Hydrodynamica*, Section X (1738).

† Mendeléeff, Lothar Meyer, and J. A. R. Newlands.

‡ W. T. G. Morton, C. T. Jackson, J. C. Warren.

unusually active condition. That sensibility, or sentimentalism, which had been introduced in the previous century, had undergone a ripening process, in consequence of which, though now less intense than it had previously been, it was more likely to influence unreflecting people than it had ever been. All three of the ether-claimants had probably been influenced by the desire for gain; but nevertheless they were certainly not insensible to the agapic influences.

317. I doubt if any of the great discoveries ought, properly, to be considered as altogether individual achievements; and I think many will share this doubt. Yet, if not, what an argument for the continuity of mind, and for agapasticism is here! I do not wish to be very strenuous. If thinkers will only be persuaded to lay aside their prejudices and apply themselves to studying the evidences of this doctrine, I shall be fully content to await the final decision.

CHAPTER 12

NOTES ON METAPHYSICS

§1. RELATIONS AND RELATIONSHIPS*

318. I have, since 1870, written much about the logic of relations. In those writings, I have *usually* restricted the terms “relations” and “relationships” to *existential* relations and relationships. By a relationship I understand the conception of a fact about a set of things abstracted from the representation of the things themselves or, in other words, a predicate which requires more than one subject to complete a proposition, or conception of a fact. A “relation” only differs from a “relationship” in that one of the subjects is regarded as being taken account of first, and is usually called the *subject nominative*, while the others are called the *direct* and *indirect objects*.† In other words a relation is a predicate requiring one subject nominative and one or more objects in a definite sequence. In my earlier papers [in Volume 3] I use the conception of relation chiefly; in my later ones that of relationship. The difference is little more than trifling. An *existential* relation or relationship is distinguished from others by two marks.‡ In the first place, its different subjects all belong to one universe; which distinguishes it very strikingly from such relations as that which subsists between a thing and its qualities, and that which subsists between portions of matter and the form into which they are built; as for example between the cells of a living body and the whole body, and often times between the different singulars of a plural and the plural itself. In the second place, an existential relation or relationship differs from some other relations and relationships in a respect which may be described in two ways, according as we employ collective or distributive forms of expression and thought.

* §§1–6 are from “Some Amazing Mazes, Fourth Curiosity” (c.1909). See 4.647.

† See 3.466f, 3.571.

‡ See 3.573f.

Speaking collectively, the one logical universe, to which all the correlates of an existential relationship belong, is ultimately composed of *units*, or subjects, none of which is in any sense separable into parts that are members of the same universe. For example, no relation between different lapses of time — say, between the age of Agamemnon and that of Homer — can be an existential relation, if we conceive every lapse of time to be made up of lapses of time, so that there are no indivisible units of time. To state the same thing distributively, every correlate of an existential relation is a single object which may be indefinite, or may be distributed;* that is, may be chosen from a class by the interpreter of the assertion of which the relation or relationship is the predicate, or may be designated by a proper name, but in itself, though in some guise or under some mask, it can always be perceived, yet never can it be unmistakably identified by any sign whatever, without collateral observation. Far less can it be defined. It is *existent*, in that its being does not consist in any *qualities*, but in its effects — in its actually acting and being acted on, so long as this action and suffering endures. Those who experience its effects perceive and know it in that action; and just that constitutes its very being. It is not in perceiving its qualities that they know it, but in hefting its insistency then and there, which Duns called its *haecceitas* — or, if he didn't, it was this that he was groping after. However, let me not lapse further into metaphysics just now.

319. My reasons for mostly limiting the scope of my logical studies of relations to the existential class were, firstly, that these are very tangible and are logically tractable; secondly that the great body of other sorts of relations differ from these merely in being indeterminate in some respects in which existential relations or some species of these are determinate, so that the logical theory of these virtually puts the student into possession of the logical theory of all but a very few recondite relations; thirdly, that when one takes up a virgin subject with a view to clearing the ground and erecting upon it a scientific structure, it is necessary to begin with some part of the work; and fourthly and finally, that to my perhaps dull apprehension it seemed that no sane mind could, after mature

* See 2.357.

deliberation, make choice of another part of the whole task to begin with than that which I chose. I may add that it does not convince me that that seeming was illusory, that those who think it was so, instead of pointing out some better way of treating the problem, have been led to despair of the possibility of erecting any logic of relations at all. But while they have been occupying themselves with these doleful prognostications, I have taken hold of the work of erection itself and have brought it to a promising stage of advance. But just as there are many fogies nowadays — old and young — who with idle conservatism dispute the value of my work, so, unless the whole congregation of logicians experiences a regeneration, I expect the day will come when another generation of old and young fogies will be equally indisposed to admit that there is any corner of the whole field that I have not turned up, and put into the right condition. Yet I have faithfully tried to do my share in putting an end to all such unscientific attitudes among logicians, and am confident that the new blood that has been brought into our house is going to insure its modicum of scientific health to the logical stock of the next generation.

320. The intellectual life of thought resides in its forms — its patterns. Now there is one pattern which must always be supreme in thought, because it is essentially the pattern of reasoning itself. It ought to be called the Aristotelian pattern, because it was first formally emphasized in Aristotle's definition of universal predication — the *dictum de omni*, or “universal predication.”* That definition runs thus: “We say that a term, *P*, is predicated universally, when there is nothing of which its subject is predicated of which the term *P* is not likewise predicated.”† . . . The negative of an Aristotelian relationship is of a different pattern; and since Reasoning is essentially critical, it is almost as important to consider what does not follow as what does follow, consequently, the pattern of the negative of an Aristotelian — or of a *neg-Aristotelian*, as we may call it — has an importance second only to that of the Aristotelian pattern. This *neg-Aristotelian* pattern will be sufficiently illustrated in a single example: “*A*, even though he

* Cf. 2.590f, 4.355.

† *Anal. priora* I, 24b, 28.

does not love B , may love something unloved by B .”* Of special importance is such a combination of the Aristotelian and neg-Aristotelian patterns as not to produce a self-contradiction. Such is: “ A loves whatever B may love and something besides.”† This is the pattern of any *transitive difference*; that is, of any transitive relation in which nothing can stand to itself. It may be called the *alio-transitive* pattern. . . . The *alio-transitive* pattern may also be called the *linear-pattern*; since among points lying upon a line, if one, A , is further advanced — say, for example, further along the line from one end of it — than another, B , it will be further advanced than any point than which B may be further advanced, and is also further advanced than some (perhaps unactualized, i.e. unmarked) point than which B is not further advanced. This pattern is the logically simplest of any that is at once needful and sufficient as a basis for exact reasoning, and consequently is involved in all exact reasoning. This statement, faulty as it is in being vague, and inevident, is nevertheless a correct statement of the reason of the supreme importance of number.

321. That reasoning is of a triadic constitution has generally been perceived since Aristotle, though not generally quite definitely and accurately. In some external particulars this character has even been exaggerated by Kant and his school, who not only defines reasoning as “judgment by means of a mediate attribute,” thus introducing the triadic character correctly enough, but also goes so far as to insist that a [Vernunft] *Schluss* must have two premisses;‡ giving a different title to what usually goes by the name of “immediate inference”; which is a purely verbal distinction. But even an immediate inference — if it really be an inference, and not a mere rewording, like, “No man is mortal,” therefore “No mortal is man”§ — involves a triadic relation. Take, for example, the inference from, “A certain woman is adored by all catholic men,” and therefore, “Every catholic man adores some woman or other.”¶ In order to show the structure of this reasoning, it

* Cf. 3.575 (6), 3.595.

† Cf. 3.575 (8), 3.597.

‡ *Kritik der Reinen Vernunft*, A 303, B 360.

§ Cf. 2.496.

¶ I.e., $\sum_w \Pi_c cAw - < \Pi_c \sum_w cAw$.

should be stated in some such fashion as this: "I could name such a woman that you could not find a catholic man that did not adore her," and therefore, "Specify what catholic man you will and I can mention some woman whom he adores." This turns on a relation between, first, what you can designate, secondly, what I can designate, and thirdly, the result. If you choose to say that there are *more* than three correlates, that is a matter of indifference; for every relationship of more than three correlates is equivalent to a logical composite of two or more triadic relationships; but a triadic relationship cannot be built up from dyadic relationships.* Whoever thinks it can be so composed has overlooked the fact that *composition* is itself a triadic relationship, between the two (or more) components and the composite whole.

322. For forty years, that is, since the beginning of the year 1867, I have been constantly on the alert to find a *genuine* triadic relation — that is, one that does not consist in a mere collocation of dyadic relations, or the negative of such, etc. (I prefer not to attempt a perfectly definite definition)— which is not either an intellectual relation or a relation concerned with the less comprehensible phenomena of life. I have not met with one which could not reasonably be supposed to belong to one or other of these two classes. As a case as nearly brute and inorganic as any, I may mention the form of relationship involved in any screw-form which is definitely of the right-hand, or occidental, mode, or is definitely of the Japanese, or left-handed, mode. Such a relation exists in every carbon-atom whose four valencies are saturated by combination with four atoms of as many different kinds. But where the action of chance determines whether the screw be a right-handed or a left-handed one, the two forms will, in the long run, be produced in equal proportions, and the general result will not be definitely, or decisively, of either kind. We know no case of a definitely right-handed or left-handed screw-phenomenon, where the decision is not certainly due to the intervention of a definitely one-sided screw in the conditions of that decision, except in cases where the choice of a living being determines it; as when Pasteur picked out under the microscope the two kinds of crystals of a tartrate, and shoved those

* See 3.63, 3.144, 3.421, 3.483f.

of one kind to the right and those of the other kind to the left.* We do not know the mechanism of such choice, and cannot say whether it be determined by an antecedent separation of left-handed screws from right-handed screws or not. No doubt, all that chance is competent to destroy, it may, once in a long, long time, produce; but it is a question whether absolute chance — pure tychism — ought not to be regarded as a product of freedom, and therefore of life, not necessarily physiological. It could not be caused, apparently, by the inorganic action of dynamical law. For the only way in which the laws of dynamics involve triadic relations is by their reference to second differentials of positions.† But though a second differential generally involves a triadic relation, yet owing to the law of the conservation of energy, which has been sufficiently proved for purely inorganic phenomena, the dynamic laws for such phenomena are expressible in terms of first differentials. It is, therefore, a non-genuine, or, as I phrase it, a “degenerate” form of triadic relationship‡ which is involved in such case. In short, the problem of how genuine triadic relationships first arose in the world is a better, because more definite, formulation of the problem of how life first came about; and no explanation has ever been offered except that of pure chance, which we must suspect to be no explanation, owing to the suspicion that pure chance may itself be a vital phenomenon. In that case, life in the physiological sense would be due to life in the metaphysical sense. Of course, the fact that a given individual has been persuaded of the truth of a proposition is the very slenderest possible argument for its truth; nevertheless, the fact that I, a person of the strongest possible physicistic prejudices, should, as the result of forty years of questionings, have been brought to the deep conviction that there is some essentially and irreducibly other element in the universe than pure dynamism may have sufficient interest to excuse my devoting a single sentence to its expression. For you may be sure that I had reasons that withstood severe, not to say hostile criticism; and if I live to do it, I shall embody them in a volume.§

* See *Œuvres de Pasteur*, vol. 1, pp. 83ff, Paris (1922).

† See 68.

‡ Cf. 1.473, 2.274.

§ Peirce died in 1914, about five years after he wrote this paper, the last detailed study he seems to have made.

323. A tetradic, pentadic, etc. relationship is of no higher nature than a triadic relationship; in the sense that it consists of triadic relationships and is constituted of them. But a triadic relationship is of an essentially higher nature than a dyadic relationship, in the sense that while it involves three dyadic relationships, it is not constituted by them. If *A* gives *B* to *C*, he, *A*, acts upon *B*, and acts upon *C*; and *B* acts upon *C*. Perhaps, for example, he lays down *B*, whereupon *C* takes *B* up, and is benefited by *A*. But these three acts might take place without that essentially intellectual operation of transferring the legal right of possession, which axiomatically cannot be brought about by any pure dyadic relationships whatsoever. Just as much, but no more, is a dyadic relation — or the sort of fact expressed by a two-subject predicate — of a higher nature than any fact expressed by a one-subject predicate, such as “is blue.” For the two-subject fact involves two one-subject facts, but is not constituted by them. If *A* acts upon *B* in any way, something analogous to a strain, or stress, takes place within *A*, and something of the same sort in *B*; but these two happenings might take place irrespectively of one another, without any action of *A* on *B*. In that sense the action is a higher sort of fact than the one-subject stress. A man cannot conceive of a one-subject fact otherwise than as more or less vaguely analogous to a feeling of his own. He cannot conceive of a two-subject fact otherwise than as analogous to an action of his own. A three-subject fact is comprehensible and is analogous to an utterance, a speech, a thought.

324. It is astonishing how human minds seem naturally to pervert the interrelations of these three categories of facts. The triadic fact takes place in thought. I do not say in anybody's thinking, but in pure abstract thought; while the dyadic fact is existential. With that comparison plainly before them, our minds perversely regard the dyadic fact as superior in reality to the “mere” relation of thought which is the triadic fact. We forget that thinking implies existential action, though it does not consist in that; or if we remember that thought implies the action of forces upon a brain or something like it, we still more perversely regard that as lowering the dignity of thought, and as making it a “mere” existential event; whereas the truth is just the opposite. In that thought

requires existential acting, and further requires something else beside that, it ought to be plain enough that it exceeds the existential acting. The ruler of a nation depends upon his cook and his secretaries. That does not place him lower than they, but higher. Thought is higher than brute fact in much the same way that a statesman is higher than his secretaries: namely, it needs the existential facts, but regulates them. It is only imitation-thought to which the adjective "mere" is appropriate. . . .

§2. MATHEMATICAL AND REAL TIME

325. If the pure mathematician speaks of "time," he by no means refers to the time of which we have experience, but to an arbitrarily imagined object whose characters are analogous to those of experiential time, so far as the characters of the latter are known. The mathematician's time is an arbitrarily supposed object in some respects analogous (this I insert to give a temporary support, or scaffolding, to the reader's conception) to the instantaneous condition of the water of some river whose water should be perfectly homogeneous and not composed of molecules, supposing however that we quite disregard the dimensions of depth and breadth of the river. But understand me: I mean this comparison with the river merely to afford a temporary support to your mind, Reader; a scaffolding that shall be convenient until the mathematical concept of Time has been erected in your field of thought; but being no part of that concept, it is afterward to be broken up and thrown away, unless its fragments should be serviceable in erecting some other concept. Analogies are never perfect, for an analogy that should be made perfect would be more than an analogy. The most important of the respects in which the ideal river differs from Time is that the former is the idea of a form that is imagined to exist, while the hypothesis of Time (for however closely it may agree with something in experience, which experience has indeed occasioned the hypothesis, nevertheless the mathematician's "time" is a purely arbitrary hypothesis, and makes no appeal to any evidences), the supposed "Time," far from being imagined to be anything existent, that is, anything that can react with the other existents,

is imagined to be a mere *possibleness* — in forming which word I assume that “possible” is taken, not as relative to this or that condition, but as absolutely supposable in consistent thought. This point of contrast between the river and Time entrains consequences that it would be obviously fatal to sound thought to overlook. The chiefest of these, to my thinking, are the two I am going to mention. I will remark that although it is a Heraclitan river — is that river I am supposing to be supposed (i.e., one of those rivers that one can only cross once, because it is the water in its instantaneous place)—yet this does not prevent the recognition of its relation to other Heraclitan states of the same water; so that, notwithstanding that a quite instantaneous state composes this river, every drop has its temporal relation to the state of the water at another indefinitely near instant; so that while instantaneous, every part of it has a definite velocity. Now then, I might imagine that this flowing water comes into existence at a certain section of the stream, and is annihilated at another section, or I might, if I chose, imagine it to be sourceless and mouthless, an unlimited Heraclitan river. I might imagine that these creations and annihilations were many along the river. I might even imagine that the water never comes into complete existence, but [is] instantly annihilated at the very instant of its instantaneous creation, [so] that it consists of a series of lengthless cross sections; and so [that] the whole would have but an inchoate existence. All that is easily supposable in the case of the river, because the river is imagined to be existent, that is, to have a mode of being quite independent of any rationality, but consisting only in certain brute action. This gives room for supposing that a predicate is neither wholly true of it nor wholly false, nor has the limit between the true and the false parts at any definitely described cross sections. We can suppose those limits to be at *some* cross sections without saying what ones, nor even saying that it would be possible exactly to define them. But with mathematical Time all this is quite different, owing to its being a possibleness consisting in freedom from self-contradiction, without any supposed experience forcing ideas upon the mind from the external world.

326. If on a Monday an idea be possible, in the sense of

involving no contradiction within itself regardless of all mere *circumstances*, then it will be possible on Tuesdays, on Wednesdays, and on Fridays; in short it will be possible forever and ever, unless the idea of the circumstance should come into *definite* rational contradiction to the idea in question.* Consequently, mathematical Time cannot have an arbitrary beginning nor end. For it is but a possibility; and what is possible at all is possible without limit, unless there be some kind of a limit which comes into *definite* rational contradiction with the idea of Time. For the *indefinite* inhabits only the realm of experience, being, or having been, forced upon us brutally and without reason. That a certain idea may be existentially impossible may be a brute fact; but that it should be rationally impossible requires a definite reason. In like manner, if there be a "lapse," or determination of time, that is at once "after" one lapse *B*, and "before" another *Y*, then (but for a restriction which I shall insert before I reach the end of this statement) there must be any multitude you please of lapses that are at once "after" *B* and "before" *Y*; and since I long ago proved (*Monist*, Vol. 7, [3.548f]) that there is no maximum multitude of objects *distinct from one another* it will follow that in Time *itself* there is no such thing as an absolute *instant*, or absolutely definite before-and-afterness relatively to all other instants, and that an instant can only come about as the consequence of some brute existential fact related to time; but all this is subject to the following restriction: if it be true that some multitude — say, for example, the second abnumerable multitude, which is the multitude of all possible different collections of irrational quantities — is of such a nature that the idea of arranging the singulars of any plural of that multitude in a linear series would involve a self-contradiction, then the consequence falls to the ground, and it only remains that between *B* and *Y* there must be a plural of lapses whose multitude is the largest that is capable of linear arrangement.¹ . . .

* Cf. 364f, 3.527.

¹ I know no question of metaphysics so pressing as this of whether or not there be a maximum multitude capable of linear arrangement. There appears to be a proof that there is none; but owing to the extreme liability to fallacy of reasoning concerning this question, I have some doubt of its validity. I found what appeared to be a proof to the same effect. After careful and repeated scrutiny, I discovered no fallacy in it; and there was no great intricacy in the

§3. EXTERNALITY AND REALITY*

327. What is meant by calling anything *real*? I can tell you in what sense I always use the word. According to my use of it, there is a certain resemblance between the *Real* and the *External* which renders the discrimination of each from the other important for right reason. Any object whose attributes, i.e. all that may truly be predicated, or asserted, of it, will, and always would, remain exactly what they are, unchanged, though you or I or any man or men should think or should have thought as variously as you please, I term *external*, in contradistinction to *mental*. For example, a dream is mental, because it depends upon what passed in the thoughts of the dreamer whether it be true that the dream was of a dog or was of the Round Table of King Arthur or of anything else. On the other hand, the colors of objects of human experience and in particular the contrast between the color of the petals of a Jaqueminot rose and that of the leaves of the bush, although it is relative to the sense of sight, is not *mental*, in my sense of that word. It is true that all colors are relative to the sense of sight. Yet there is a difference between a color and a sensation of color. For a color is a quality of a thing which remains the same whether it be exposed to one kind of illumination or to another, and whether it be seen by a normal or by a color-blind eye. Such is the established signification of the word "color." For we do not say that the petals and leaves of a rose-bush have the same color when they are viewed by color-blind people: on the contrary, we say that such people cannot distinguish those colors. Color is also something essentially vague; for the color of an object is the admixture of lights necessary to producing the same chromatic effect (1) upon a normal eye, in the absence of any perturbing cause, and (2) under a moderate white illumination. Now even normal eyes receive quite different chromatic sensations from the same objects; and two white illuminations may be quite indistin-

proof. I submitted it to two persons, each of whom had devoted so much study to the general subject that I had a right to presume that not a dozen persons living were as competent in the premisses as he. Neither could discover any fallacy. Yet, I subsequently found, myself, that my proof was fallacious. Such an experience naturally renders me very cautious. [Cf. 3.549n. 4.218, 4.652.]

* Cf. 5.405f, 5.430f.

guishable and yet may be produced by two lights of such different compositions that it is possible to find two colored objects such that the one will to all normal eyes plainly appear to be of the warmer color under one of the two white illuminations, while the other object will as obviously appear to be of the warmer color under the other illumination; though the two illuminations are absolutely indistinguishable when viewed directly without being reflected. I once got up an apparatus to exhibit this, and showed the striking phenomenon to all visitors for months. Few persons are aware how very striking such phenomena can be made. Color, therefore, is a quite remarkably vague quality, as well as being relative to the normal sense of sight. If by "normal" were meant merely the average (or any other kind of mean) of actually occurring instances, say the average sensation of all the inhabitants of the globe on a certain date, then this might have been modified by some disease affecting a large part of the people who happened to be living at the time; and since "color" refers to *normal* chromatic sense, it would depend upon what passed in the minds of a certain body of men. But, in fact, the "normal" is not the average (or any other kind of mean) of what actually occurs, but of what *would*, in the long run, occur under certain circumstances. Now what *would* be, can, it is true, only be learned through observation of what happens to be; but nevertheless no collection of happenings can constitute one trillionth of one *per cent* of what might be, and would be under supposable conditions; and therefore, though it might conceivably prevent many generations from rightly determining what is normal, it could not affect the true — and ultimately ascertainable (provided there were anybody to ascertain it) — mean and normal; and thus, the result is that no such accident could affect the normal or the true color. So, in general, what I mean by the *external* might vary with how persons of a given general description *would* think under supposable circumstances; but it will not vary with how any finite body of individuals have thought, do now think, or will actually think.

328. So much for what I mean by the *external*. The main difference between the *external*, as I use the term, and the *real*, as I employ *that* term, seems to be that the question

whether anything is *external* or not is the question of what a word or other symbol or concept (for thinking proper is always conducted in general signs of some sort) is, I say, a question of what a symbol *signifies*; while the question of whether anything is *real* or is a *figment* is the question what a word or other symbol or concept *denotes*. If the attributes of or possible true assertions about an object could vary according to the way in which you or I or any man or actual body of single men, living at any time or times, might think *about that object*, then that object is what I call a *figment*. But if even although its attributes, or what is true of it, should possibly vary according to what some man or men might think, yet if no attribute could vary between being true and being false, according to what any plural of single men could think *about that thing*, then, and though it were accordingly not *external* but *mental*, it would nevertheless be *real*, since precisely that is what I mean by calling an object real. . . . If two contradictory assertions about the same definite subject be true that subject cannot be real, is the principle of the *reductio ad absurdum*. If a subject of two assertions conflicting in form be indefinite (as, for example, "One might have one's pocket picked of real property" and "One cannot have one's pocket picked of real property") those assertions are not, properly speaking, *contradictory*, nor are they usually called so. They are, in logical parlance, *subcontrary*. (In the example, one assertion means "One can have one's pocket picked of real property in *some sense*," and "One cannot have one's pocket picked of real property in *some sense*.") That is, they are related like "Some *S* is *P*" and "Some *S* is not *P*." Such, then, is the sense to which I restrict the word "real"; and I believe that my definition comes as near to expressing the principal sense of our vernacular word in the mouths of the clearest-headed talkers as any definition could. Except in the legal sense, the vernacular word was derived from *realis*, which (except in the legal sense) was a vocable invented by medieval metaphysicians for their own purposes. Especially, it is a prominent word in the works of Duns Scotus, of which I have been an attentive and meditative student. Now Duns, generally believed to be the birthplace of this great thinker (and I have scarce a doubt of it), is less than ten statute miles

north of the Tweed in Berwick, so that in the last quarter of the thirteenth century the logician was doubtless as almost genuinely an English boy as he would be if born there today. A northern dialect of Middle English was his mother tongue. No medieval logician influenced the present English of the market-place so much as he did; and my definition is thoroughly imbued with the spirit of Scotism. These considerations confirm my confidence that my definition not only, as that of a term of philosophy, best conforms to sound canons of terminology,* but that it expresses, as nearly as any definition could, the principal sense of the vernacular word, which, if this be true, is a supererogatory virtue. . . .

§4. DYADIC AND TRIADIC ACTION

329. There has been during the nineteenth century a decided leaning of scientific opinion to discredit any other sort of action in the external world than that of dynamical force; to understand a dynamical force to be a purely brute force with no element of inherent reasonableness in it, but merely to be the only force that scientific research could discover. Especially, at a date about a generation after the enunciation of the doctrine of the conservation of energy (or "of forces," as the phrase was, until the conception of energy became widespread), and half a generation after the setting forth of the theory of natural selection, this current of opinion was mighty strong, wide, and deep in the scientific world. It has since sensibly abated. It certainly cannot be said that this conviction is, or was, quite without any sound reason to back it; for there were two such. The principal argument runs as follows: Scientific research has hitherto made plainly apparent no other cause of changes in the physical universe than brute force; and therefore it is presumable that there is no other. This is a sort of induction resting upon the principle that whatever error it may lead us into the very same argument will in time correct, if it be persisted in long enough. We still occasionally are obliged to take refuge in this argument; and doubtless always shall be so obliged; but it is the very weakest of all those forms

* See vol. 2, bk. II, ch. 1.

of argumentation that have any validity at all.* It is good for nothing against the least sound objection; and in this case there is the conclusive objection that exact logical analysis shows dynamic causation (if every element of it be considered) is more than the mere brute force, the dyadic action, that it appears to superficial thinkers to be. For it is governed by law; and to him who bends his ear to that law it articulately testifies, though in a whisper, to the existential might of reasonableness. The secondary argument is therefore in truth somewhat the stronger of the two. It is that in all recent debate the contentions of the champions of spiritual force in Nature are pretty constantly marked with sophistries, exaggerations, unfairness, fageyism, velleities of persecution; phenomena each of which is an infallible mark of a faith which is rotting in the breasts of its most insistent defenders. Except that "pretty constantly" is perhaps an exaggeration, this is entirely true. But it is no argument whatever against the reality of reasonableness: it only illustrates how the materialistic view recommends itself the more to those minds who are the further from sharing the spirit of science.

330. Any dynamic action — say, the attraction by one particle of another — is in itself *dyadic*. It is governed by a law; but that law no more furnishes a correlate to the relation than the vote of a legislator which insures a bill's becoming a statute makes him a participator in the blow of the swordsman who, in obedience to the warrant issued after conviction according to that statute, strikes off the head of a condemned man. In the law, *per se*, there is no physical force nor other compulsion. It is nothing but a formula, a maxim. The particles follow the law simply because, being sprung from the stock of reason, they naturally incline to obey reason. It is true that the attraction of one particle for another acts through continuous Time and Space, both of which are of triadic constitution. Yes; but this continuous Time and Space merely serve to weld together (while imparting form to the welded whole) instantaneous impulses in which there is neither continuous Time, Space, nor any third correlate; and it is such instantaneous impulse that I say is dyadic. However, the

* Cf. 2.269, 2.756f.

dyadic action is not the whole action; and the whole action is, in a way, triadic.

331.* Every triadic relationship involves three dyadic relationships and three monadic characters; just as every dyadic action involves two monadic characters. A monadic character involves nothing dyadic or triadic; nor does a dyadic action involve anything triadic. But a triad always involves three dyads and three monads; and a dyad involves two monads.

332. That whatever action is brute, unintelligent, and unconcerned with the result of it is purely dyadic is either demonstrable or is too evident to be demonstrable. But in case that dyadic action is merely a member of a triadic action, then so far from its furnishing the least shade of presumption that all the action in the physical universe is dyadic, on the contrary, the entire and triadic action justifies a guess that there may be other and more marked examples in the universe of the triadic pattern. No sooner is the guess made than instances swarm upon us amply verifying it, and refuting the agnostic position; while others present new problems for our study. With the refutation of agnosticism, the agnostic is shown to be a superficial neophyte in philosophy, entitled at most to an occasional audience on special points, yet infinitely more respectable than those who seek to bolster up what is really true by sophisticated arguments — the traitors to truth that they are. . . .

§5. ESSENCE AND EXISTENCE

333. There are two grades or constituents of Being: the *Essence*, and the *Existence*. Each of these terms has an epistemological and metaphysical force. I consider Existence first, and to begin with, in its epistemological aspect. When a new image, optical, acoustical, or other, appears in the mind, one subjects it to various tests in order to ascertain whether it be of internal or of external provenance. These tests may be distributed into three classes, according to their strength when they testify to externality of origin (which I call being “affirmative”) and according to their strength when they testify to internality of origin (which I call being “negative”).

* Cf. 1.471ff, 1.536ff.

334. The following scheme shows the classes:

TESTS OF EXTERNALITY

Class I. *Affirmatively, the strongest; negatively, the weakest.*

Tests by physical concomitants; as by photography, phonography, seismography, chemical test-papers; and a great variety of other physical apparatus and observations.

Class II. *Affirmatively and negatively of middling value.*

Tests by the testified experience of other observers, or even of oneself at another time, placed in nearly the same circumstances.

Class III. *Affirmatively, the weakest; negatively, the strongest.*

Criticism of all the circumstances of the apparition, ending with the readiest and, in case its evidence should be negative, the most conclusive of all single tests, namely, that of making a direct inward effort to suppress the apparition.

335. The word "insistency," which I have used, wrongly conveys the suggestion of a more or less. But the above tests, critically applied, avail to separate apparitions into two discrete classes, with none of an intermediate character: those which are due to the normal action of the senses, and those which are due to some derangements of the health of the person to whom the appearance comes. The former are really *experienced*, the latter are deceptive hallucinations or illusions. All to which the senses normally testify without room for critical reasoning is usually and properly said to be "experienced"; and all that is truly experienced is, in the epistemological sense, *existent*. But experience only informs us that single objects exist, and that each of these at each single date exists only in a single place. These, no doubt, are what Aristotle meant by τὸ καθ' ἑκάστων* and by αἱ πρῶται οὐσίαι† in his earlier works, particularly the *Predicaments*. For οὐσία there plainly means existent, and τὸ τι εἶναι is existence. (I cannot satisfy myself that this was his meaning in his later writings; nor do I think it possible that Aristotle was such a dolt as never to modify his metaphysical opinions.) But

* *Analytica Posteriora*, II, 100a, 18.

† *Categoria*, 2b, 5.

τὸ ἄτομον* was, I think, the strict logical individual, determinate in every respect.¹

336. In the metaphysical sense, *existence* is that mode of being which consists in the resultant genuine dyadic relation of a strict individual with all the other such individuals of the same universe. . . .

337. Coming to Essence, this in its epistemological force is that intelligible character which truly defines what a general or indefinite, that is, what an indeterminate monadic predicate primarily asserts, so that all else that it asserts is the necessary consequence of this epistemological essence. It is easy to state what the essences of artificial objects are: The essence of a stove is that it is intended to diffuse warmth. But as to the essence of natural objects, if they have any, we are unable as yet to give them. We are only able to state the essence of our common names for such things. The metaphysical essence is the intelligible element of the possibility of its Being, or so much of that as is not a mere consequence of the rest. . . .

§6. MODES OF BEING

338. All thinking is dialogic in form. Your self of one instant appeals to your deeper self for his assent. Consequently, all thinking is conducted in signs that are mainly of the same general structure as words; those which are not so, being of the nature of those signs of which we have need now and then in our converse with one another to eke out the defects of words, or *symbols*.† These non-symbolic thought-signs are of two classes: first, pictures or diagrams or other images (I call them *Icons*†) such as have to be used to explain the significations of words; and secondly, signs more or less analogous to symptoms (I call them *Indices*†) of which the collateral observations, by which we know what a man is talking about, are examples. The Icons chiefly illustrate the significations of predicate-thoughts, the Indices the denotations of

* *Analytica Posteriora*, II, 91b, 34; *Categoriae*, 1b, 6.

¹ But I am here expressing myself upon points which I have not reexamined for a great many years. I might hold different opinions, if I were to revise my judgments.

† See 2.247, 2.274ff.

subject-thoughts. The substance of thoughts consists of these three species of ingredients.

339. The next step consists in considering why it is that thoughts should take those three different forms. You will observe that each kind of sign serves to bring before the mind objects of a different kind from those revealed by the other species of signs. The key to the solution of this question is that what we think of cannot possibly be of a different nature from thought itself. For the thought thinking and the immediate thought-object are the very same thing regarded from different points of view. Therefore, Berkeley* was, so far, entirely in the right; although he blundered when from that manifest truth he inferred his idealism — and it was a blunder for just the reason pointed out by Kant in the second edition of the *Kritik der Reinen Vernunft*.† We must conclude, then, that the reason why different things have to be differently thought of is that their modes of metaphysical being are different.

340. Aristotle, however, failed to strike the nail squarely on the head when he said that generals are known by reason and singulars by sense.‡ Generals are predicates. Now while the *structure*, not only of predicates, but of all kinds of thought, is known by reason, that is, by symbols, like words, the *matter* of predicates, *simple* predicates, is *not* known by reason, but by the senses and by other feelings. A subject of every judgment — and it is *the* subject *par excellence* — is a singular;§ and every singular, as Aristotle¶ himself says, is a subject. But to say that a singular is known by sense is a confusion of thought. It is not known by the feeling-element of sense, but by the compulsion, the insistency, that characterizes experience. For the singular subject is real; and reality is insistency. That is what we mean by “reality.” It is the brute irrational insistency that forces us to acknowledge the reality of what we experience, that gives us our conviction of any singular.

* *Principles of Human Knowledge*, §3.

† B 274–279.

‡ *Anal. Post.*, I, 31, 87b, 27–32; II, 19, 100a, 14–64.

§ Cf. 4.539.

¶ *Categoricæ*, 1b, 3.

341. The mode of being of the composition of thought, which is always of the nature of the attribution of a predicate to a subject, is the living intelligence which is the creator of all intelligible reality, as well as of the knowledge of such reality. It is the *entelechy*, or perfection of being.

342. So, then, there are these three modes of being: first, the being of a feeling, in itself, unattached to any subject, which is merely an atmospheric possibility, a possibility floating *in vacuo*, not rational yet capable of rationalization; secondly, there is the being that consists in arbitrary brute action upon other things, not only irrational but anti-rational, since to rationalize it would be to destroy its being; and thirdly, there is living intelligence from which all reality and all power are derived; which is rational necessity and necessitation.

343. A feeling is what it is, positively, regardless of anything else. Its being is in it alone, and it is a mere potentiality. A brute force, as, for example, an existent particle, on the other hand, is nothing for itself; whatever it is, it is for what it is attracting and what it is repelling: its being is actual, consists in action, is dyadic. That is what I call *existence*. A reason has its being in bringing other things into connexion with each other; its essence is to compose: it is triadic, and it alone has a real power.

344. Signs, the only things with which a human being can, without derogation, consent to have any transaction, being a sign himself,* are triadic; since a sign denotes a subject, and signifies a form of fact, which latter it brings into connexion with the former.† “But what,” some listener, not you, dear Reader, may say, “are we not to occupy ourselves at all with earthquakes, droughts, and pestilence?” To which I reply, if those earthquakes, droughts, and pestilences are subject to *laws*, those laws being of the nature of signs, then, no doubt being signs of those laws they are thereby made worthy of human attention; but if they be mere arbitrary brute interruptions of our course of life, let us wrap our cloaks about us, and endure them as we may; for they cannot injure us, though they may strike us down. “But,” some other peerer over the fence may continue — yet no! I will pursue the argument no

* Cf. 5.310ff.

† See 2.251, 2.310.

further; for such cobwebs will not hold them prisoners, once they really desire the liberty of truth.

345. The division of modes of Being needs, for our purposes, to be carried a little further. A feeling so long as it remains a mere feeling is absolutely simple. For if it had parts, those parts would be something different from the whole, in the presence of which the being of the whole would consist. Consequently, the being of the feeling would consist of something beside itself, and in a relation. Thus it would violate the definition of feeling as that mode of consciousness whose being lies wholly in itself and not in any relation to anything else. In short, a pure feeling can be nothing but the total unanalyzed impression of the *tout ensemble* of consciousness. Such a mode of being may be called *simple monadic Being*.

346. *Blind existential being* may possibly not occur at all; since we know nothing with absolute certainty of existent things, and are especially in the dark as to their modes of being, and above all know extremely little about the ultimate parts of matter, beyond the fact that electricity, itself a most mysterious sort of existent, is an ingredient of them. In the book about God and religion upon which I have been at work for several years, and hope to write, one of the questions which will come up for fair consideration is whether either the monotheistic, absolute God or the polytheistic, finite God of the pseudo-pragmatists could know the nature of blind existence, as He must, if he had created it. It is an unexplored passage in the mammoth cave of metaphysics; and various questions concerning it suggest themselves. This much, however, seems clear about such existence; namely, that there ought to be two grades of it; a lower kind, approximating to the inner being of a simple quality, yet existential, instead of being merely potential, consisting in the action of the thing upon itself, a sort of embryonic self-consciousness; and a higher grade consisting in the action of a thing upon all the other things of the same universe, and measuring by its intensity its remoteness from each of them. A whole universe of such existents can only have the lower, or internal grade of existence.

347. Of triadic Being the multitude of forms is so terrific that I have usually shrunk from the task of enumerating them; and for the present purpose such an enumeration would be

worse than superfluous: it would be a great inconvenience. In another paper, I intend to give the formal definition of a sign, which I have worked out by arduous and long labour.* I will omit the explanation of it here. Suffice it to say that a sign endeavours to represent, in part at least, an Object, which is therefore in a sense the cause, or determinant, of the sign even if the sign represents its object falsely. But to say that it represents its Object implies that it affects a mind, and so affects it as, in some respect, to determine in that mind something that is mediately due to the Object. That determination of which the immediate cause, or determinant, is the Sign, and of which the mediate cause is the Object may be termed the *Interpretant*. . . .

348. Modern thought has been extravagantly Ockhamistic, owing to the accidental circumstance that, at the revival of learning, the obscurantists, the fogeys, were adherents of Duns, of whom the politician Ockham was the typical opponent. But this had come about because, in those days of precise, if shallow, thinking, the Scotistic doctrine had emerged triumphant from all the scholastic disputations, of which the reformers of learning had but the dimmest idea. Get rid, thoughtful Reader, of the Ockhamistic prejudice of political partizanship that in thought, in being, and in development the indefinite is due to a degeneration from a primary state of perfect definiteness. The truth is rather on the side of the scholastic realists that the unsettled is the primal state, and that definiteness and determinateness, the two poles of settledness, are, in the large, approximations, developmentally, epistemologically, and metaphysically.

§7. REALITY AND EXISTENCE†

349. C. S. P. In the first place, I call your attention to the fact that *reality* and *existence* are two different things.

* See 2.230, 2.274.

† §§7 and 8 form a digression in ch. 4 of the *Minute Logic* (1902-3). The Velian is the stranger of Plato's *Sophist*, a dialogue which Peirce characterizes in the preceding, unpublished portion of the manuscript (see 1.584n) as being "purely a logical dialogue" with "all Hegel's faults and more than a glimmer of Hegel's merit." The present section is part of an attempt to give the Velian stranger "a little dose of his own cathartic."

VELIAN. How, then, would you define existence?

C. S. P. It will not be necessary to go into that question, which is one of great delicacy. It will be sufficient to point out certain respects in which reality and existence differ. Let us suppose two seeds to be exactly alike. I do not say that two seeds ever are so; but we are now merely considering the meanings of two words, and, therefore, we are free to imagine any state of things we can. We will suppose, then, that not merely to our senses, but to any conceivable senses, those seeds are precisely alike, except that they are in different places. But now we will suppose that I am really resolved to plant those two seeds in such different soil, and to treat them so differently, that they will grow into plants whose flowers will have different colors. They really will be different, whatever anybody may say or think. I have made certain dispositions, so that I myself could not now have it otherwise. Their future difference is then a *reality*, already. For the time has already passed at which anybody's *dictum* could make the fact otherwise. Yet I have not decided what the colors of the flowers of each are to be; for one of the two seeds will be taken *at random*, and placed in one soil and the other in another. Now, when it comes to the *existence* of those flowers, the colors will be absolutely what they will be. There can be no uncertainty or ambiguity about existence. The reality, however, of my determination of the colors is not altogether certain. Existence, then, is a special mode of reality, which, whatever other characteristics it possesses, has that of being absolutely determinate. Reality, in its turn, is a special mode of being, the characteristic of which is that things that are real are whatever they really are, independently of any assertion about them. If Man is the measure of things, as Protagoras said, then there is no complete reality; but being there certainly is, even then.

My dear Velian, some god suggests to me that, thousands of years after you and I have left this earth, a physicist by the name of Thomson* will prove that all matter consists of corpuscles. Now each of those corpuscles must, I suppose, have a center of mass, which is an absolute point. But no matter how

* "Cathode Rays," *Philosophical Magazine*, October 1897, pp. 293-310; "On Bodies Smaller than Atoms," *Popular Science Monthly*, August 1901, pp. 323-337.

infinite the multitude of those centers, they cannot in all time pass through every place. There must, then, remain places where no center has been or ever will be. Yet, for my part, I believe that the laws of motion, the law of gravitation, etc. are as real in those places as anywhere. I may be wrong; but we are considering only the meanings of words; and if my belief has any sense or meaning, although no matter ever exists in those places, those laws are real there. There are many other kinds of reality distinct from existence. But have I not said enough to show that the meanings of the three terms, being, reality, and existence, are distinguishable?

VELIAN. More than enough.

§8. TRUTH, BEING, AND NOTHING

350. C. S. P. Now let us consider the nature of truth. Before anything can be true or false, it is necessary, is it not, that something should be said, whether by writing, by speech, or in thought?

VELIAN. Undoubtedly.

C. S. P. And this must be said concerning something, some *subject*, must it not?

VELIAN. Yes.

C. S. P. And something definite must be said of that subject, some *predicate*, must it not?

VELIAN. Yes.

C. S. P. The subject must be designated by a word or other sign, must it not?

VELIAN. Yes.

C. S. P. And the predicate must be signified by some word or other sign, must it not?

VELIAN. Yes.

C. S. P. If it is said that the predicate-sign is [in-]applicable to something to which the subject-sign is applicable, that must be true or false, must it not?

VELIAN. Yes.

C. S. P. If this is false, then whatever there may be to which the subject-sign is applicable the predicate-sign is also applicable, is this not so?

VELIAN. Yes.

C. S. P. While if the former is true, the latter is false?

VELIAN. Yes.

C. S. P. Thus, if it is said that to whatever there may be to which the subject-sign is applicable the predicate-sign is also applicable, this must be either true or false.

VELIAN. Yes.

C. S. P. Now is there anything which is true or false which is not of one or other of those forms of assertion, or else of a form a mixture of those two?

VELIAN. What of the assertion "It rains"?

C. S. P. In order to be true or false, this assertion must refer to some time and place, and the circumstances under which the assertion was made must have indicated a time and place. That indicating circumstance, of which speaker and auditor had experience, was the subject-sign; and we may presume that the assertion was in meaning equivalent to these two: first, there is some time and place indicated by these circumstances to which the description "it rains" is applicable; and secondly, whatever time and place these circumstances indicate is an occasion to which the description "it rains" is applicable.

VELIAN. That will do; but what of the assertion "If I had upset my inkstand I should have spoiled my manuscript"?

C. S. P. The first clause suggests that a certain past occasion or series of past occasions have been otherwise indicated to which the meaning is limited, and it further calls to mind the proposition "I upset my inkstand"; and now it asserts positively one thing and virtually asserts another. The first is that whatever connected series of occurrences there may be among the series of occurrences alluded to, to which the description "I upset my inkstand" would be applicable, is a series of occurrences to which "I spoiled my Ms." is applicable. But the second virtual assertion modifies this by adding that whatever series of past occurrences there may be is a series to which the description "I did not upset my inkstand" is applicable.

351. VELIAN. Let your analysis of that which is true or false be granted, provisionally, what then?

C. S. P. Then it follows that that which can be true or false must be one or the other.

VELIAN. How so?

C. S. P. In order that my explanation may be fully understood, a little preface is desirable. Suppose that this is true: "Under some circumstances, every possible course of action will prove fatal." If that is true, then it is true that every possible course of action will prove fatal, is it not?

VELIAN. Only under some very peculiar circumstances.

C. S. P. Yes; but I wish my description of what is true or false, to apply to what is not only true or false generally, but also to what is true or false under conditions already assumed. Whatever may be the limitations previously imposed, that to which the truth or falsity is limited may be called the *universe of discourse*.^{*} For example, at the mention of a certain name, every person initiated into the Eleusinian mysteries invariably experiences a feeling of awe. This is true. It is therefore true that every person initiated into the Eleusinian mysteries always experiences a sentiment of awe; not universally, but only under the limitations already understood before this is said.

VELIAN. That is clear.

C. S. P. Another point to be noticed is that given any sign whatever, which we may call *P*, we can always frame a sign which shall be applicable to every object of the universe of discourse to which *P* is inapplicable and which shall be inapplicable to every object to which *P* is applicable. If *P* is a word, this sign may be formed by simply prefixing *not*, μή; as *man*, *not-man*; *righteous*, *not-righteous*; *I*, *not-I*. The relation between *P* and not-*P*, therefore, is that that to which *P* and not-*P* both apply is not in the universe of discourse, and that to everything in the universe of discourse either *P* or not-*P* is applicable.

VELIAN. I do not know that that is true.

C. S. P. But you must allow me to define my own terms as I choose. I propose to define not-*P* as such a sign that it is applicable to everything in the universe of discourse unless *P* is applicable to it; while it shall be inapplicable to everything in the universe of discourse to which *P* is applicable. That is not a statement of fact, but simply of my use of the word "not." If you dispute it, you must show that I do not so use the word "not." . . . †

* See 2.536.

† Cf. 2.487n1, 2.550, 2.596f.

Now, S and P being any two signs, I propose, in case there really is something in the universe of discourse to which both S and P are applicable, that is, something to which S is applicable but not- P inapplicable, to use the word *true* in such a sense that it is "true" that to something to which S is applicable P is applicable; and to use the phrase *particularly true* in such a sense that in this case P shall be said to be "particularly true" of S ; while I propose to use the word *false* in such a sense that under the same circumstances it shall be "false" that to whatever there may be to which S is applicable [not-] P is applicable. But if there is not really any object of the universe of discourse to which S and P are both applicable, that is, if there is nothing to which S is applicable unless not- P be also applicable to it, then I propose to use the word *false* in such a sense that it shall be "false" that to something to which S is applicable P is applicable, and I propose to use the word *true* in such a sense that in that case it shall be "true" that to whatever there may be to which S is applicable, not- P is applicable; and I propose to use the phrase *universally true* in such a sense that not- P shall be said to be "universally true" of S . Furthermore, if A and B are two assertions, and if there is a third assertion C which is equivalent to asserting both A and B , then I say that the copulative assertion, C , is true in case both A is true and B is true, but is false in every other case, whether A is false or B is false; but if D is equivalent to asserting that C is false, then I say that the *disjunctive* assertion, D , is false in case both not- A and not- B are false, but is true in every other case whether not- A or not- B be true.

VELIAN. What next?

352. C. S. P. Now let us suppose that in the whole universe of discourse there is not really a single black tulip. In that case, according to the rules just laid down, green, blue, white, reality, non-existence, and anything else you please are universally true of black tulip, while not even being black or being a tulip is particularly true of black tulip. Everything is universally true of it, but universally nothing is false of it. Nothing is particularly true of it, but particularly everything is false of it. You assent?

VELIAN. Yes.

C. S. P. All this is so, because in the case supposed a black

tulip is *nothing*. Therefore, instead of nothing being unutterable, and all that, as you say, universally it is real and non-real, utterable and unutterable, etc. But particularly it is none of these.

VELIAN. In that case, of Being everything should be universally false, and particularly true.

C. S. P. My dear Velian, leave rattles to babes, and jingles of words to Germans; for to an Italian and a Greek, reason is more becoming. Since of nothing, everything is true, it follows that of everything, being is true universally, but not at all that everything is universally true of being.* Moreover being is particularly true of everything of which anything is particularly true; but not of everything. But if you choose to extend the name *being* to everything which can be invented or suggested *or cannot*, you will have the notion of a non-notion, which is not even universally itself, and of which what you say may be feigned to be true. For the whole thing does not even rise to the level of a figment. It is a dream within a dream.

VELIAN. Why, Pure Being is the very foundation of all wisdom.

C. S. P. Say rather of that love which winds itself up in needless and senseless paradoxes. But to return to nothing. Good father Parmenides was quite right when he said "You will never get over this, that nothing is." Why should we wish to? Whatever is nothing *is*, of course. But when he adds the advice to keep your mind from the path of a certain inquiry, that is bad advice for a philosopher, no matter what the inquiry is.

VELIAN. But to say that nothing is, is a contradiction in terms!

C. S. P. Of course, why should it not be?

VELIAN. But [it] is absurd!

C. S. P. It is certainly absurd that nothing should be. Being nothing, it is not adequately described until it is shown to be absurd. But there is nothing absurd in saying so. In geometry we often prove the non-existence of something by showing that it would have contrary attributes. That proved, it follows that it is nothing, because nothing, and nothing alone,

* See 2.412.

possesses contrary attributes. It is, therefore, an important truth, and not absurd, that nothing is absurd.

VELIAN. You astonish me.

C. S. P. You say that the name "nothing," $\mu\eta\ \delta\nu$, is not applicable to anything that is. I grant you that, with pleasure. Particularly, everything is false of it. Moreover, you say, the word "something" refers exclusively to existing things. You are quite right there. It is the same thing, otherwise expressed. But when you conclude that the word "nothing" expresses nothing, you are entirely wrong. What a thing "expresses," λέγει, is whatever is universally true of it. Thus, to say that something is a man is to say that it is an animal and that it reasons. And it is still more absurd to say that he who uses the word "nothing" does not speak. It would be far truer to say that he who uses the word "being" does not speak; for to say that whatever may be a man *is*, may be said, exactly or approximately, to convey no information, true or false; so that it is all the same as if nothing were said.

VELIAN. As if *nothing* were said! So you confess that saying nothing is saying nothing.

C. S. P. My dear Velian, does your whole stock in trade consist of such bagatelles as that? Or are you really upon such an intellectual level as to think there is anything in such a confusion?

VELIAN. No; I admit that having nothing as what was uttered and having nothing as one's meaning may be different.

C. S. P. You do not draw the distinction accurately; but let it go. You proceeded to say that nothing which exists is in a relation to a thing that does not exist. Understood in a "particular" sense, that is true. For example, loving is a relation, and lovers of females are fewer than lovers of animals; because there are other animals besides females who are loved. Lovers of women are still fewer; and of lovers of pea-green women there are none, because whatever there may be which is a pea-green woman is nothing. But taking what you say in a "universal" sense, it is not true. Thus, there are many men each of whom loves all women; but those who love all females, including female mosquitoes, are much fewer, and when it comes to loving whatever pea-green woman there may be, this may be said of every object in the universe. For since there is no

falsity in it, and every assertion not false is true, this is true. Again, you say number is the totality of things that exist. You can use number in that sense, if you like. Only in that sense, *number* is not a sign but a collection of things. In the sense in which *number* is an attribute, it is a sign, and, like other signs, it does not prove that a thing exists because this sign would be applicable to it if it did exist. But even if it did, that would not prevent number from being true of "nothing," since existence and everything else is true of nothing. Thus, your proof, that whatever be said of nothing is not true, utterly fails. Whatever is said universally of nothing is true: whatever is said particularly of nothing is false.

VELIAN. But let us take an object, say an inkstand. Take away from it its visibility, its impenetrability, and every character by which it could manifest itself to any sentient being with our senses or with any conceivable senses; so that the very gods could not perceive it or any effects of it. It would be reduced to nothing; and it would be false and not true that it was visible and impenetrable, and equally false that it was invisible or penetrable.

C. S. P. Yes; I grant that. But this is because you are making those assertions in the particular sense. In the very act of denying that these things are true in that sense, you are asserting them universally. To say that it is not true that there is an invisible nothing, and not true that there is a visible nothing, is just the same as to say that it is true that whatever there may be that is nothing is both visible and invisible.

VELIAN. But it is nonsense to say that it is false that the inkstand deprived of existence is invisible and at the same time that it is false to say that it is visible. For everything is either visible or invisible.

C. S. P. Everything is either visible or invisible, and every nothing there may be is both visible and invisible. The rule only applies to things of which it is true that they exist and false that they do not exist. There are even realities, if we admit the reality of generals (which is, at least, not to be refuted by mere definition), which are indeterminate in respect to the applicability of many signs.*

* Cf. 5.505.

§9. MATTER AND FORM*

353. The word matter (Lat. *materia*, which was used to translate the Gr. ὕλη) is often employed where the more appropriate Greek word would be σώμα *corpus*, body; or τὸ ὑποκείμενον, *subjectum*, or even ἡ ὑπόστασις, translated *person* in theology. Form (Lat. *forma*, used to translate the Gr. μορφή and εἶδος, though the latter is more exactly represented by *species*) is often employed where σχῆμα, figure, or τύπος, shape, would be near equivalents. The Greek expressions μορφή, παραδείγμα, εἶδος, ἰδέα, τὸ τί ἐστί, τὸ τί ἦν εἶναι, are pretty nearly synonymous.

354. The distinction of matter and form was first made, apparently, by Aristotle. It almost involves his metaphysical doctrine; and as long as his reign lasted it was dominant. Afterwards it was in disfavour; but Kant applied the terms, as he did many others drawn from the same source, to an analogous but widely different distinction. In many special phrases the Aristotelian and Kantian senses almost coalesce, in others they are quite disconnected. It will, therefore, be convenient to consider: (1) the Aristotelian distinction; (2) the Kantian distinction; and (3) special applications.

355. *The Aristotelian distinction.* Not only was the distinction originated by Aristotle, but one of the two conceptions, that of *matter*, is largely due to him. Indeed, it is perhaps true that the Greek word for matter in the sense of material, ὕλη, was never understood in that general sense before Aristotle came to Athens. For the first unquestionable cases of that meaning occur in certain dialogues of Plato, concerning which — though there are no dates that are not open to dispute — it seems to the present writer that it is as certain as any such fact in the history of Greek philosophy that the earliest of them was written about the time of Aristotle's arrival. It is true that, as Aristotle himself says, *matter* was the earliest philosophical conception.† For the first Ionian philosophers directed their thoughts to the question what the world was made of. But the extreme vagueness of the notion with them is shown by their calling it ἡ ἀρχή, the beginning, by the nonsense of the ques-

* From Baldwin's *Dictionary of Philosophy and Psychology*, The Macmillan Co., New York, vol. 2, pp. 50–55 (1902).

† See *Metaphysica*, A3, 983b, 7.

tion, and by many more special symptoms. If the philosophical conception of matter distinguished the metaphysics of Aristotle that of Plato had been no less marked by its extraordinary development of the notion of form, to which the mixed morality and questioning spirit of Socrates had naturally led up; the morality, because the form is the complex of characters that a thing ought to have; the questioning, because it drew attention to the difference between those elements of truth which experience brutally forces upon us, and those of which reason persuades us, which latter make up the form. But Aristotle's distinction set form, as well as matter, in a new light.

356. It must not be forgotten that Aristotle was an Asclepiad, that is, that he belonged to a family which for generation after generation, from prehistoric times, had had their attention turned to vital phenomena; and he is almost as remarkable for his capacity as a naturalist as he is for his incapacity in physics and mathematics. He must have had prominently before his mind the fact that all eggs are very much alike, and all seeds are very much alike, while the animals that grow out of the one, the plants that grow out of the other, are as different as possible. Accordingly, his *dunamis* is germinal being, not amounting to existence; while his *entelechy* is the perfect thing that ought to grow out of that germ. Matter, which he associates with stuff, timber, metal, is that undifferentiated element of a thing which it must possess to have even germinal being. Since matter is, in itself, indeterminate, it is also in itself unknowable; but it is both determinable by form and knowable, even sensible, through form. The notion that the form can antecede matter is, to Aristotle, perfectly ridiculous.* It is the result of the development of matter. He looks upon the problem from the point of view of a naturalist. In particular, the soul is an outgrowth of the body.†

357. The scholastics, who regarded Aristotle as all but infallible, yet to whom the ideas of a naturalist were utterly foreign, who were thoroughly theological in their notions, admitted that the soul was a form. But then they had great difficulty with those opinions of their master which depended upon his conceiving of matter as more primitive than form.

* *Metaphysica*, *θ*, 8, 1050a, 15.

† *De Anima*, 415a, 25.

Their notions of form were rather allied to those of Plato. The mode of being that, in some sense, anteceded individual existence, they would have held to be one in which there was form without matter, if awe of Aristotle had not caused them to modify the proposition in one way or another. A question, for example, which exercised them greatly was, how the form was restricted to individual existence? For Aristotle there could not be any such question, because he did not conceive of a form taking on individuality, but of an undifferentiated matter taking on, or rather developing, form, and individuality, perhaps, with it (412a, 7).

358. *The Kantian distinction.* Aristotle refuses to consider any proposition as *science* which is not universal. He does not go so far as to say that all knowledge involves synthesis, but he often approaches doing so. In particular, he holds that matter is something in itself beyond our knowledge, but the existence of which has to be assumed in order to synthesize the opposites that are involved in all change. He expressly defines that as the function of the conception of matter.* With Kant, the view that all knowledge involves synthesis — various acts of synthesis one over another — is vastly more developed; and he, too, employs the terms *matter* and *form* as called for by such synthesis. But it is curious that while with Aristotle it is matter that is the quasi-hypothesis imported into the facts that the mind may synthesize, with Kant, on the other hand, it is form which performs this function. The matter of cognition consists of those elements which are brutally and severally forced upon us by experience. By the form he means the rational or intelligible elements of cognition, which he wishes, as far as possible, to regard as independent contributions of the mind itself, which we have no right to suppose are duplicated by anything corresponding to them in the thing. For the Aristotelian, all pure matter is exactly alike, equally devoid of all predicates, while the forms make all the variety of the universe. For the Kantian, on the other hand, matter is the manifold, while the pure forms are the few different modes of unity. Nevertheless, the Kantians — indeed, Kant himself (see the *Critic of the Pure Reason*, 1st ed., 266) — argued that they were using the terms in their old and accepted sense. What enabled

* *Metaphysica*, H, 1, 1042a 31.

them to give some speciousness to their contention was the circumstance that during the full century and more of neglect of the Aristotelian doctrine that had intervened, certain secondary senses of the term *matter*, especially that of corporeal matter, and that of a species of corporeal matter, had become relatively prominent.

359. *Special senses.* Although there is only one *first* or *primary* matter, absolutely indeterminate, yet Aristotle often uses the term in a modified sense as that which is relatively indeterminate; so that the *last* or *second* matter is the same as the form. But these phrases are also used in quite other senses, which need not here be specially noticed. Matter being taken relatively, the same thing can have this or that as its matter in different respects; and so matter is distinguished into *materia ex qua*, *in qua*, and *circa quam*. *Materia ex qua* is the material; silver is the *materia ex qua* of a dime. *Materia in qua* is the subject in which the form inheres; *materia circa quam* is the object. Aquinas* illustrates the distinction by virtue, which is a form, and, as such, has no *materia ex qua*; but it has a subject in which it inheres and an object upon which it is exercised. Aquinas introduced the term *signate matter*.† Matter of composition, or *proximate matter*, is that of which a thing consists; matter of generation, or *remote matter*, that from which it is developed, as a seed or egg.

360. The varieties of form are so numerous that they may best be taken in alphabetical order.

Absolute form: form abstracted from matter.

Accidental form: an accident, or that the presence of which constitutes an accident; as music is the accidental form of the musician.

Advenient form: a form subsequent to the final form.

Apprehended form = apprehended species.

Artificial form: a form superinduced by art.

Assistant form: an agent aiding in the realization of a form, especially of that whose essential character is to move; as the angel who turns the heavens round once every twenty-four hours, or the captain of a ship.

Astral form. According to Gilbert (*De Magnete*), phenom-

* *Summa Theologica*, I, II, 55, 4, c.

† *Summa Theologica*, I, 75, 4, c.

ena of electricity are produced by a material effluvium, while the action of a magnet takes place directly at a distance. Whatever it may be then which constitutes the magnetic field, not being matter, must be called form. Gilbert names it *forma prima radicalis et astralis*.

Common form: a form belonging to a species.

Completive form: used by Aquinas* in the sense of the last of the series of forms which gradually bring a thing to fully developed existence. By Aristotle called *last form*.†

Composite form: the form of a collective whole, so far as it is different from its parts.

Corporeal form: a form of a corporeal nature. This is used by Aquinas, *Summa Theologica*, pars I. qu. lxxv. art. 4. See *Material form*.

Disponent form: a form rendering matter apt to receive another, *principal*, form. Thus, dryness in wood disposes it to receive combustibility.

Elementary form: one of the four combinations of hot and cold with moist and dry which were supposed to characterize the four elements.

Exemplar form: an idea.

Final form: see *Completive form*.

General form: the form of a genus; as we should now say a *generic form*.

Immaterial form: a form which neither depends upon matter while it is being made nor after it is made; a term employed in the theological doctrine of creation.

Incorruptible form: a form not subject to corruption.

Individual form: in one of the theories of individuation, was a form which by existing in matter acquired the power of individuating another form.

Informant form: a form which is a part of the thing of which it is the form.

Inherent form: a form which can only exist in a state of inherence in matter.

Intellective form: the mind as form.

Intelligible form: see *Sensible form*.

* *Ibid.*, I, II, 50, 2, c.

† *Metaphysica*, Δ, 10, 1018b 5. K., 3, 1061a 23.

Intermediate form: a form having a middle position between an elementary and a completive form.

Material form: a term of Scotus, who defines it as follows: "Formam materialem dico esse omnem illam, quae ex natura sua necessario inclinatur naturaliter, ut sit actus materiae, sive sit substantialis, sive accidentalis." (*Op. Oxon.*, IV, i, 1); "Ideo dici potest tertio modo." But elsewhere (*ibid.*, I Post. qu. ii.) he distinguishes two senses of the term: "Forma materialis potest intelligi dupliciter. Uno modo dicitur, quae educitur de potentia materiae, vel quia utitur organo corporeo in operando: et isto modo forma intellectiva non est forma materialis. Alio modo dicitur forma materialis, quia perfectio materiae, et isto modo anima intellectiva est forma materialis, ideo aliquam variationem potest accipere a materia, quam perficit, quia ex materia et forma fit vere unum." Perhaps the most accessible book from which to gain a hint of the nature of the difficulty which gives rise to this distinction is Bridges' edition of what is called *The Opus Majus of Roger Bacon*, vol. II, pp. 507-511, cap. ii.

Mathematical form: an object of mathematical contemplation, and the result of mathematical abstraction.

Metaphysical form: form in the philosophical sense.

Native or natural form, forma in natura existens, forma naturae, form of a nature, is a term going back to John of Salisbury (*Opera*, ed. Giles, v. 92), and closely connected, if not synonymous, with *material form*. Certain questions started by Aristotle* in Book V of the *Metaphysics* (of which there is an admirable periphrastic translation by Grote, *Aristotle*, 2d ed., pp. 619 ff.) gave rise to discussions in which the doctrine was compared with Christian beliefs; and the *natural form* plays a considerable part in such discussions.

Bacon† adopted the term *forma naturae*. He did not grossly depart from the received meaning of the term but, owing to his occupying himself with inquiries quite antipodal to those of the scholastics, the two parties did not understand one another. Bacon means the physical explanation of a phenomenon, its occult *modus operandi*. Among the followers of Bacon we, at first, hear a great deal about forms. Boyle wrote whole

* *Metaphysica*, E, 1, 1025b 30, 1026a 27.

† *Novum Organum*, II, 5.

books about them. But the distinction of matter and form was not calculated to further such inquiries as theirs. It is adapted to expressing phenomena of life. It might be twisted to such a purpose as Gilbert put it to (see *Astral form*), but it was not suited to the mechanical philosophy of Boyle, and only led to wordy and fruitless discussions.

Participate form: a form considered as it is united with matter.

Preparatory form: a term used by Boyle where *disponent* form would be more technical. He says, "The preparatory form is but (if I may so speak) a harbinger that disposes the matter to receive a more perfect form, which, if it be not to be succeeded by any other more noble, is entitled the specific form of that body; as in the embryo, the vegetative and the sensitive soul is but preparatory to the rational, which alone is said to be the specific form of man" (*Free Considerations about Subordinate Forms*).

Physical form: such forms as may form the object of physical inquiries. Of course, the term was very differently understood during scholastic times and in the 17th century. But the above definition covers both uses.

Primary form. There is no such well-recognized term of metaphysics; but a remark of William Gilbert leads us to suppose that medical men attached some meaning to it.

Principal form is that which *per se* constitutes a species. Called also *specific form*.

Radical form: see *Astral form*.

Sensible form. Though it chances that Aristotle nowhere distinguishes *μορφή* into *αἰσθητή* and *νοητή*, yet his followers did. Sensible forms are those which the outward senses distinguish; intelligible are those which the intellect alone can distinguish.

Significate form: a Thomistic term, a form distinguished by a name.

Simple form: form without matter. "Forma simplex, quae est purus actus, est solus deus," says St. Thomas.*

Specific form: see *Principal form*.

Subsistent form: a form capable of existing separate from

* *Summa Theologica*, I, 54, 3, ad. 2.

matter, as Aquinas* holds that the angels and departed spirits are.

361. *Substantial form*: a form which constitutes a *nature*, i.e. a species or genus. Thus, the accidental form of a musician is music; but his substantial form is the rational soul which makes him a man. When men's thoughts became turned from theology to the investigation of physics, those who were animated by the new spirit found themselves confronted with objections based upon allegations of substantial forms. That these substantial forms, so used, were merely a hindrance to the progress of science, was quite plain to them. But the objections were urged with a logical accuracy, born of centuries of study, with which the new men were utterly incapable of coping. Their proper course would have been quietly to pursue their own inquiries, and leave the theologians to square their results with philosophy as best they could. But circumstances did not permit this. The theologians had the popular intelligence and the arm of power on their side; and, when an apparent opposition arose, they naturally exerted themselves to put it down. Thus, the innovators were led to protest against these senseless and harmful substantial forms; and they had to formulate their objections to them—a business for which they were entirely unfitted. But since the discoveries of the physicists were plainly adding to man's knowledge and power, while their antagonists were simply obstructive, the former soon carried the day in the general opinion of mankind. The history proves that there was something vicious about the theological application of *substantial forms*; but it in no degree goes to show that the physicists accurately defined the objection to that application. In reviewing the arguments at the present day, when the position of the mechanical philosophers is becoming almost as obsolete as that of the scholastic doctors, we first note that when the new men denied that the substantial forms were "entities," what they really had in mind was that those forms had not such a mode of being as would confer upon them the power dynamical to react upon things. The Scotists, for it was they upon whom, as being in possession of the universities, the brunt of the battle fell, had in fact never called the substantial forms "entities," a word sounding like a Scotistic term, but in

* *Ibid.*, I, 61, 1.

fact the mere caricature of such a term. But had they used the word, nothing more innocent than the only meaning it could bear for them could be imagined. To call a form an "entity" could hardly mean more than to call it an abstraction. If the distinction of matter and form could have any value at all, it was the substantial forms that were, properly speaking, forms. If the Scotists could really specify any natural class, say man — and physics was at that time in no condition to raise any just doubt upon that score — then they were perfectly justified in giving a name to the intelligible characteristic of that class, and that was all the substantial form made any pretension to being. But the Scotists were guilty of two faults. The first — great enough, certainly, but relatively inconsiderable — was often referred to, though not distinctly analyzed and brought home to them. It was that they were utterly uncritical in accepting classes as natural, and seemed to think that ordinary language was a sufficient guarantee in the matter. Their other and principal fault, which may with justice be called a sin, since it involved a certain moral delinquency, was that they set up their idle logical distinctions as precluding all physical inquiry. The physicists and Scotists, being intent upon widely discrepant purposes, could not understand one another. There was a tolerably good excuse for the physicist, since the intention of the Scotist was of an abstract and technical kind, not easily understood. But there was no other excuse for the Scotist than that he was so drugged with his metaphysics that ordinary human needs had lost all appeal to him. All through the eighteenth century and a large part of the nineteenth, exclamations against the monstrousness of the scholastic dogma that substantial forms were entities continued to be part of the stock-in-trade of metaphysicians, and it accorded with the prevalent nominalism. But nowadays, when it is clearly seen that physical science gives its assent much more to scholastic realism (limited closely to its formal statement) than it does to nominalism, a view of the history more like that here put forward is beginning to prevail.

362. In the following terms, mostly Kantian, prepositional phrases express the qualifications.

Form of corporeity: a very common term of scholasticism, originating with Avicenna, and used by Aquinas (*Summa*

Theol., pars i. cap. lxvi. art. 2), but more particularly by Scotus (in his great discussion *Opus Oxon.*, IV. dist. xi. 9.3, beginning "De secundo articulo dico") and by all his followers. The point is, that the rational soul, being purely spiritual, cannot confer corporeity upon the human body, but a special form, the form of corporeity, is requisite. Suarez and others, generally Thomists, as well as Henry of Ghent, denied this on the ground that a species has but one form. Thus a great metaphysical dispute arose. It sprung from the study of the doctrine of transubstantiation. See Cavellus, *Suppl. ad quaest. Scoti in De Anima*, disp. i, which is in the Lyons ed. of Scotus, tom. ii.

Form of cognition, in Kant's doctrine, is that element of knowledge which the matter of experience must assume in order to be apprehended by the mind. Kant seems to have been thinking of legal forms which must be complied with in order to give standing before a court. So an English sovereign, in order to be crowned, must, as a "matter of form," swear to an intensity of loathing for Romish dogmas which he probably regards with great coolness. Kant's definitions are chiefly the following:

"In the phenomenon, that which corresponds to the impression of sense, I call the matter of it; while that which constitutes the fact that manifoldness of the phenomenon is intuited as ordered in certain relations, I call the form of the phenomenon" (*Krit. d. Reinen Vernunft*, 1st ed., p. 20).

"All cognition requires a concept, be it as imperfect and dark as you will; and this, in respect to its form, is always a universal which serves as a rule" (*ibid.*, p. 106).

"The transcendental unity of the synthesis of the imagination is the pure form of all possible cognition, through which, consequently, all objects of possible experience must *a priori* be represented" (*ibid.*, p. 118).

"There are two factors in cognition: first, the concept by which any object is thought — that is, the category; and secondly, the intuition by which that object is given. For if the concept had had no corresponding intuition, it would be a thought, no doubt, as far as its form goes; but having no object, no cognition whatsoever [he means, whether true or false] of anything would be possible by it; since, so far as I should know,

there would be nothing, and perhaps could be nothing, to which such a concept would be applicable" (2d ed. of the *Deduction of the Categories*, § 22).

"It is not more surprising that the laws of phenomena in nature must agree with the understanding and its *a priori* form, i.e. with its power of combining any manifold, than that the phenomena themselves must agree with the *a priori* form of sensuous intuition. For just as phenomena have no existence in themselves, but are merely relative to the mind, as having senses, so laws do not exist in the phenomena, but are merely relative to the mind in which the phenomena inhere, that mind exercising understanding" (and see the rest of this passage, *ibid.*, § 26).

Form of forms. Francis Bacon says "the soul may be called the form of forms," which would be a pretty conceit, were it not plagiarized from the serious doctrine of Aristotle: *ὁ νοῦς εἶδος εἰδῶν* (432 a, 2).

363. The terms *matter* and *form* are used in certain peculiar ways in logic. Speaking *materialiter*, the matter of a proposition is said to be its subject and predicate, while the copula is its form. But speaking *formaliter*, the matter of a proposition is, as we familiarly say, the "matter of fact" to which the proposition relates; or as defined by the scholastics, "habitus extremorum adinvicem." The second tractate of the *Summulae* of Petrus Hispanus begins with the words: "Propositionum triplex est materia; scilicet, naturalis, contingens, et remota. Naturalis est illa in qua praedicatum essentia subiecti vel proprium eius; ut, homo est animal; vel, homo est risibilis. Contingens est illa in qua praedicatum potest adesse et abesse subiecto praeter subiecti corruptionem; ut, homo est albus, homo non est albus. Remota est illa in qua praedicatum non potest convenire cum subiecto; ut, homo est asinus."

Of a syllogism, the proximate matter is the three propositions; the remote, the three terms. The form, which ought to be the *ergo*, by the same right by which the copula is recognized as the form of the proposition, is said to be "apta trium propositionum dispositio ad conclusionem ex praemissis necessario colligendam." But Kant, in the *Logik* by Jäsche, § 59, makes the premisses the matter, and the conclusion the form.

§10. POSSIBILITY, IMPOSSIBILITY,
AND POSSIBLE*

364. The term is used to express a variety of meanings which, although distinct in themselves, yet flow readily into one another. These meanings may best be grouped according as they have (1) an ontological objective value, or a logical subjective value; and (2) according as they are used antithetically to actuality or necessity. The antithetical point of view is the most convenient from which to begin.

365. Possibility may mean that something is (1) not actual, or (2) that, while it possesses actual existence, that existence lacks causal or rational necessity.

(1) As opposed to the actual, the phrase has again a double meaning. (a) Taken objectively, it may mean something as yet undeveloped, since not presenting itself in actually objectified form, but capable of doing so at some future time, when all the conditions of its realization occur: latent, potential being. This implies capacity for realization; and, if this capacity be taken in an active sense, connotes some inherent tendency to actuality, which, if not thwarted, leads to final completeness of being. This involves the active sense of potentiality, of force, etc. It is close to the literal sense of the term (*posse, can* be). This is the dominating sense in Greek philosophy, being connected with Aristotle's teleological theory of development. (b) Taken logically, it denotes that there is some ground for asserting actuality, but not sufficient to justify a positive statement: *may*, as distinct from *can*, be. Thus, possibly it will rain tomorrow. It has to do with degrees of certainty in judging.

366. (2) As opposed to the necessary, the term has also a double sense. (a) It may mean chance, contingency, as an objective fact. Chance again, has a double meaning: (i) something not derivable or explainable causally by reference to antecedent facts. There are those who assert the reality of such chance. On this view there are many *possibilities* in store in the future which no amount of knowledge would enable us to foresee or forestall. Indeterministic theories of the will assert possibilities of this sort also. (ii) Chance may mean that which, while necessary causally, is not necessary

* Baldwin's *Dictionary of Philosophy and Psychology*, vol. 2, pp. 313-315. Cf. 3.527, 4.65ff.

teleologically; the unplanned, the fatalistic. From this point of view the "possible" is that which unexpectedly prevents the carrying-out of a purpose or intention. It leads up to the logical sense (b), according to which the possible, as opposed to the necessary, is anything whose existence cannot be derived from reason; that, the existence of which, rationally speaking, might be otherwise. It is opposed to mathematical or metaphysical necessity, where existence cannot be otherwise than as it is. In this sense the objective actual may be only (logically) possible; the present rain-storm is actual, but since it does not follow from a necessity of thought, but only from empirical antecedents, it is not necessary, and hence just a contingent possibility. This distinction goes back also to Aristotle, being found in his logical writings,* as the possible, as potential meaning, is found in his metaphysical.† It has played a large part in modern rationalism, especially in the philosophy of Leibnitz,‡ being identical with his distinction of "truths of reason" and "truths of fact." In the sphere of mathematics, logic, and metaphysics there is no possibility in the strict sense; all that exists exists of necessity. In the physical and practical spheres which deal with the space and time world the notion of possibility has full sway. Everything is possible which does not contradict the laws of reason; that which is inconceivable, which violates the law of reason, is impossible. The impossible is the self-contradictory. Kant's§ criticism of rational conceivability as a criterion of truth, to the effect that it is only formal, resting upon the principle of identity and contradiction, and when applied to existence must be supplemented by appeal to sense, made Leibnitz's distinctions of hardly more than historic interest.

367. The nominalistic definition (nominalistic in its real character, though generally admitted by realists, as Scotus, i. dist. 7, qu. unica) that that is possible which is not known not to be true in a real or assumed state of information is, like many nominalistic definitions, extremely helpful up to a certain point, while in the end proving itself quite superficial. It

* *Analytica Priora*, I, 13, 32a, 18.

† *Metaphysica*, Δ 12, 1019a, 32.

‡ *Monadology*, 33.

§ *Kritik der Reinen Vernunft*, A151, B191.

is not that certain things are possible because they are not known not to be true, but that they are not known not to be true because they are, more or less clearly, seen to be possible.

For example, one collection may be said to be greater than another if, and only if, there is no *possible* relation in which every member of the former collection stands to a member of the latter, to which no other member of the former stands in the same relation. Now, the question arises — whether or not it is possible for two collections to be, under this definition, each greater than the other. In advance of an investigation, the *proposition* is possibly true, in the sense that we do not know that it is impossible. But is the *fact* possible? That is, can we in any way suppose such a state of things without involving ourselves in contradiction? It is that positive supposition which will constitute the possibility, not the mere ignorance of whether such a supposition can be made or not. In order to make two such collections possible, we must make some positive assumption in regard to the possibility of collections; while in order to make such a relation between two collections impossible, we have to make a positive assumption of the possibility of a certain description of relation. It is not a question of ignorance, since nothing but pure hypothesis is concerned. The question is whether it is possible in every case to suppose distinct pairs, each composed of a member of either collection and such as completely to exhaust one of the collections. If this is always possible, then two collections each greater than the other are impossible. It is evidently desirable to state the logical principles of this general kind of possibility, which does not consist in ignorance, but, as it would seem, in hypothetical indetermination or disjunctive determination.

368. Nominalists uniformly speak of Aristotle's view of future contingents as really absurd. It may be so; but it is certainly the only doctrine which their principles leave room for. A certain event either will happen or it will not. There is nothing now in existence to constitute the truth of its being about to happen, or of its being about not to happen, unless it be certain circumstances to which only a law or uniformity can lend efficacy. But that law or uniformity, the nominalists say, has no real being; it is only a mental representation. If

so, neither the being about to happen nor the being about not to happen has any reality at present; and the most that we can say is that the disjunction is true, but neither of the alternatives. If, however, we admit that the law has a real being, not of the mode of being of an individual, but even more real, then the future necessary consequent of a present state of things is as real and true as that present state of things itself.

369. By the old logicians, possibility is usually defined as non-repugnancy to existence. Kant defines it as that which satisfies the formal conditions of experience (*Krit. d. Reinen Vernunft*, 1st ed., pp. 218, 234).

370. The possible proposition, or problematic judgment, as it is called by German logicians, is said by many logicians, especially Sigwart, not to be any proposition at all, because it does not draw a sharp line between truth and falsity. It seems to be necessary to distinguish between a proposition which asserts that under such and such general conditions a certain thing is possible, of which an example is the proposition that of any two collections one is not greater than the other, and a proposition which pretends to be no more than a conjecture. If a conjecture can be absolutely baseless, which may be doubted, a proposition which pretended to be no more than that may be said to be no proposition at all. But it can hardly be maintained that, when Poincaré says that there is no physical law whatever which will not be rendered more certain by every new confirmatory experiment, he is depriving those laws of all meaning as propositions.

371. *Logical possibility*: that of a hypothesis not involving any self-contradiction.

Mere possibility: that of a state of things which might come to pass, but, in point of fact, never will. In common language, exaggerated to the "merest possibility."

Metaphysical possibility ought to mean a possibility of existence, nearly a potentiality; but the phrase does not seem to be used in that sense, but rather in the sense of possibility by supernatural power.

Moral possibility one might expect should be the opposite of moral impossibility, meaning, therefore, something reasonably free from extreme improbability. But, in fact, it seems to be used to mean what is morally permissible.

Physical possibility: (1) that which a knowledge of the laws of nature would not enable a person to be sure was not true; (2) that which might be brought about if psychological and spiritual conditions did not prevent, such as the Pope's pronouncing *ex cathedra* as an article of faith the fallibility of all his own utterances.

Practical possibility: that which lies within the power of a person or combination of persons under external conditions likely to be fulfilled, and questionable chiefly because internal conditions may not be fulfilled.

Proximate possibility. It is very difficult to make out what is meant by this; but the phrase is evidently modelled on *potentia proxima*, which is a state of high preparedness for existence; so that proximate possibility would be a high grade of possibility in a proposition amounting almost to positive assertion.

Real possibility is possibility in the thing, as contradistinguished from mere logical possibility (Scotus, *Opus Oxon.*, I. ii. 7, *Ad secundam probationem maioris*).

Remote possibility: the possibility of a proposition which is far from being positively asserted. Also used in common speech.

Substantive possibility: the admissibility of a pure hypothesis (as illustrated above).

§11. VIRTUAL*

372. (1) A virtual *X* (where *X* is a common noun) is something, not an *X*, which has the efficiency (*virtus*) of an *X*.

This is the proper meaning of the word; but (2) it has been seriously confounded with "potential," which is almost its contrary. For the potential *X* is of the nature of *X*, but is without actual efficiency. A virtual velocity is something *not* a velocity, but a displacement; but equivalent to a velocity in the formula, "what is gained in velocity is lost in power."

So *virtual representation* was the non-representation of the American colonies in the British Parliament, which was supposed to be replaced by something. So Milton asks whether the angels have *virtual* or immediate touch. So, too, the sun was said to be *virtualiter* on earth, that is, in its efficiency.

* Baldwin's *Dictionary of Philosophy and Psychology*, vol. 2, pp. 763-764.

(3) *Virtual* is sometimes used to mean pertaining to virtue in the sense of an ethical habit.

Virtual knowledge: a term of Scotus defined by him (*Opus Oxon.*, Pt. I. iii. 3). . . .

§12. UNITY AND PLURALITY*

373. (1) A universally accepted understanding as to the formation of Latin words would require *unity* to mean that which is essential to the number one.

If we consider the number one, irrespective of the possibility of two, three, etc., it involves no idea of number (and therefore not of totality or collection), nor even any idea of relation. The idea would, therefore, be found in a pure state only in an immediate consciousness which should make no distinction of any kind, whether between subject and object, or of the parts of the object. But the term is never used in this sense, unless with an accompanying explanation.

(2) The oneness element of experience which involves a positive assignment of the number one, and which must be originally one, and not a total.

374. Much may be said for the opinion that we are thus brought to the event of acting and being acted upon; for that must be *one*, and is the only element of experience whose essential peculiarity is entirely lost in any generalization of it. The negative oneness of immediate consciousness — as, for example, it appears in the idea of any particular colour — does not resist generalization, the idea of redness in general having the same sort of unity as that of the scarlet of mercuric iodide or the colour of aniline red (magenta). But the moment I pass from the idea of a particular item of my experience, such as seeing a boat with a couple of men going over Niagara, to the slightest generalization of it, such as that of the *memory* of seeing the event, or the general conception of going over Niagara, the positive oneness entirely disappears.

375. Nevertheless, the word unity is seldom applied to this sort of oneness, which goes by the name of *individuality*. There is no individuality in a quality of immediate consciousness such as magenta or solferino, because there is no setting

* *Ibid.*, vol. 2, pp. 734-736.

of object over against subject, which is requisite before oneness can be positively assigned to an idea (positive oneness thus involving duality); but neither is there any generality in the immediate consciousness, as long as it remains nothing more than what it first was. The purest oneness does not involve the least reference to plurality, and is therefore not positively opposed to generalization, and is not destroyed when generalization takes place. But positive and insistent oneness necessarily involves, or rather springs out of, the idea of duality, and distinctly denies it; so that generalization destroys it; it is the otherness of otherness, the negation of negation.

376. (3) The idea which the word unity is usually employed in philosophy to express is that of a general (in the most general sense) in its relation to particulars, which would be much more accurately called "totality."

Unity is thus used, not to express pure oneness, nor yet positive oneness, but to express the negation of multitude in the object to which it is attributed. Thus it involves a distinct reference to the possibility, not of duality merely, as positive unity does, but of *plurality* (in the sense of more than two). The first unity might be named *simplicity* or *firstness*; the second is very appropriately termed *individuality*; the third, which is nearly what Kant* terms *synthetical unity*, ought to have some better designation than *totality* or *universality*.

377. Unity in certain old books (as in the *Institutiones Metaphysicae* of Burgersdicius, 1647) is divided into *singular* and *universal unity*, the former belonging to singulars, the latter to universals. Singular unity is either *material* (or *numerical*) or *formal*. *Material unity* is defined as that which belongs to the singulars in so far as they are considered as units with individualizing differences; which is an awkward attempt to define individuality. *Formal unity* is "the unity which belongs to singulars abstractedly from their individualizing differences." These definitions depend upon a particular theory of individuation. *Universal unity* is distinguished from *communicability*, which is the reference to the plurality of singulars; and these two elements together make up *univer-*

* *Kritik der Reinen Vernunft*, A118, B131.

sality. *Numerical unity* implies repugnance to multiplication; *formal unity*, indifference to multiplication; *universal unity*, non-repugnance to multiplication. The nature of the *fundamentum universalitatis* distinguishes the mediaeval realist from the nominalist. The nominalists generally do not admit that there is any similarity in things apart from the mind; but they may admit that this exists, provided they deny that it constitutes any unity among the things apart from the mind. They cannot admit the latter and remain consistent nominalists. Thus, a nominalist may admit that there is in the events themselves an agreement consisting in the uniformity with which all stones dropped from the hand fall to the ground; but if he admits that there is anything at all, except the mere fact that they happen to do so, that should in any sense *determine* the different stones to fall every time they are dropped, he ceases to be a good nominalist and becomes a mediaeval realist. *Unity* is further divided (by Burgersdicius, whom we continue to follow) into *unity of simplicity* and *unity of composition*. *Simplicity* is said to be unity devoid of all multitude; *composition* is the union of a plurality of things. This definition of simplicity is confessedly defective in representing this mode of unity as having a reference to multitude. *Composition* is divided into *real*, *rational*, and *modal*. *Real composition* is the union of distinct entities in the real thing itself. It is either *actual* or *potential*. *Actual composition* is either *per compositionem*, as when water and alcohol are mixed, or *per aggregationem* (as in an army). *Potential composition* is when one thing is united *in potentia* to another. It is either *per informationem* or *per inhaerentiam*; a distinction peculiar to a certain kind of Aristotelianism. *Rational composition* is either of things which differ by reason alone, or of things brought together in one concept; it includes, firstly, genera, species, etc.; secondly, equality, similitude, etc.; thirdly, agreement in effects, external causes, etc. *Modal composition* is composition from a thing and a mode. Most of the above distinctions go back to Scotus, and a few are still earlier.

378. *Unity* is divided by Kant into *analytical* and *synthetical*. He never defines or explains these terms; but if we remember that, in his use of words, multiplicity of elements is essential to unity, it is easy to see that what he means by

analytical unity is the unity of that which is given in its combined state and is analyzed by ordinary reflection. Thus we perceive a fact; and in order to express or think it we analyze it, and the relation of the percept to the elements resulting from this analysis is very inappropriately called *analytical unity*. But when in the formation of the percept different sense impressions are put together, so that ordinary thought cannot proceed from whole to parts, but an operation more or less subconscious is supposed to manufacture the whole out of the parts, the relation of the whole to the parts is called *synthetical unity*. Three kinds of transcendental synthesis are recognized in the first edition of the *Krit. d. Reinen Vernunft*, each resulting in a *synthetical unity*: they are the synthesis of apprehension in the intuition, which produces one representation; the synthesis of reproduction in the imagination; and the synthesis of recognition in the concept, which gives the unity of the rule. The *transcendental unity of apperception* is the unity which belongs to all my cognitions arising from a correlative *unity* of consciousness. It is transcendental, objective, and original. Besides these modes of transcendental unity, Kant recognizes other kinds of synthetical unity, some of which are empirical and contingent. There are also different modes of rational unity, some speculative, others moral.

That which the Scholastics meant by *transcendental unity* was unity in the sense in which it is said *Quodlibet ens est unum*, that is, is self-consistent.

379. We must not forget the three *dramatic unities of time, place, and action*, requiring the events represented to be included in one day, in one scene, and all to relate to one plot. Unity of action is set forth by Aristotle (*Poetics*, chaps. viii, ix, xviii). Unity of time is mentioned by him. That is, the action of a tragedy should, when convenient, be compressed into one day (*Poetics*, chap. v). The unity of place was remarked by French critics to have been observed by the Greek tragedians.

380. A *unity* in mathematics is a quantity which multiplied by any other gives that other. There can thus be but one unity in an algebra, although there may be many units.

§13. WHOLE AND PARTS*

381. The old definition is: "Totum est quod constat plurimum rerum unione." Psychologically, whatever is treated as a single object, though capable of treatment as two or more objects (parts of the whole): by "treated" meaning "thought of," "attended to," or otherwise "acted upon."†

382. We may say that a whole is an *ens rationis* whose being consists in the copulate being of certain other things, either not *entia rationis* or not so much so as the whole; so that a whole is analogous to a *collection*, which is, in fact, a special kind of whole. There can be no doubt that the word whole always brings before the mind the image of a collection, and that we interpret the word whole by analogy with collection. The idea of a collection is itself, however, by no means an easy one to analyze. It is an *ens rationis*, abstraction, or fictitious subject (but the adjective must be understood in a broad sense, to be considered below), which is individual, and by means of which we are enabled to transform universal propositions into singular propositions. Thus, the proposition "all men are mortal," with a new subject and new predicate, appears as "The collection of men is a collection of mortals"; just as, for other purposes, and by means of other abstractions, we transform the same proposition into "The character of mortality is possessed by every man"; and the members of the collection are regarded as less fictitious than the collection. It very often happens that an object given indirect perception as an individual is, on closer scrutiny, seen to be identifiable with a collection of parts. But it does not seem to be strictly accurate to say that the larger object of perception is identical with that abstraction, the collection of the smaller objects. It is rather something perceived which agrees in its relations with the abstraction so well that, for convenience, it is regarded as the same thing. No doubt the parts of a perceived object are virtually objects of consciousness in the first percept; but it is useless to try to extend logical relations to the sort of thought which antecedes the completion of the percept. By the time we conceive an object as a collection, we conceive that the first reality belongs to the members of the collection

* Baldwin's *Dictionary of Philosophy and Psychology*, vol. 2, pp. 814-815.

† This paragraph is signed by Peirce, J. M. Baldwin, and G. F. Stout.

and that the collection itself is a mere intellectual aspect, or way of regarding these members, justified, in ordinary cases, by certain facts. We may, therefore, define a collection as a fictitious (thought) individual, whose being consists in the being of certain less fictitious individuals.*

383. Many adjectives are used to distinguish different kinds of wholes. Certain of the phrases may be defined.

Actual whole: any whole which cannot exist without the existence of its parts. Usually identified with the *Constitute whole*. Monboddo's definition (*Ancient Met.*, i. 479) is not quite accurate.

Collective whole, or *aggregate whole*: defined by Chauvin as "that which has material parts separate and accidentally thrown together into one, as an army," etc. But the example shows that organization does not disqualify a whole from being called *collective*, although the term *totum per aggregationem* will no longer be applied to it, in that case. In so far as a whole is collective, any other relation between its parts is put out of view.

Composite whole: a term of Burgersdicius, who (*Inst. Met.*, I. xxii. §7) defines it as "quod ex duabus partibus constat quarum una est in potentia ad alterum et altera vice versa actus est alterius." It includes the whole by information and the whole by inherence.

Comprehensive whole: a whole of logical comprehension.

Constituent whole: a whole which is essential to its parts.

Constitute whole: a whole whose parts are essential to it. See *Actual whole* (above).

Continuous whole: a continuum regarded as a whole. In order to define it, it would first be necessary to define continuity. Now we have, perhaps, not yet succeeded in analyzing the conception of continuity; for what the mathematicians call by that name, such as the relations of all real quantities capable of being designated to an indefinite degree of approximation by means of a whole number and a decimal, does not answer the requisites of the problem.

Copulative whole: a whole consisting of a sign which is essentially applicable to whatever certain signs, called its parts, are all applicable, but is essentially inapplicable to anything to which any one of these signs is inapplicable.

* Cf. 3.537n.

Definite whole: a whole constituted by genus and difference.

Definitive whole: see *Definite whole* (above).

Discrete whole: the same as a *Collective whole* (above).

Disjunctive whole: a whole consisting of a sign which is essentially applicable to whatever any one of certain signs, called its parts, is applicable, but is essentially inapplicable to anything to which none of these parts is applicable.

Dissimilar whole: same as *Heterogeneous whole* (below).

Essential whole: great confusion exists in the use of this very common expression. Aquinas (*Summa Theol.*, Pt. I. lxxvi. 8) uses it in a broad sense which would make it about equivalent to Burgersdicius' composite whole, or perhaps broader. On the other hand, it is sometimes restricted to the whole *per informationem*, and this is perhaps the best settled use. But others make it include the physical and the metaphysical whole as its two species.

Extensive whole: a whole of logical extension, usually called a subjective or logical whole.

Formal whole: a comprehensive whole, especially of essential comprehension. See *Actual whole* (above).

Heterogeneous whole: a term of Aquinas; a whole whose parts are dissimilar from the whole.

Homogeneous whole: a term of Aquinas; a whole whose parts are similar to the whole, as the parts of a whole of water are.

Integral whole (a term in common use since Abélard's time): Blundevile (1599) says, "Whole integral is that which consisteth of integral parts, which though they cleave together, yet they are distinct and severall in number, as man's body, consisting of head, brest, belly, legs, etc." The usual definition is "quod habet partem extra partem," which restricts it to space. Burgersdicius, however, says that parts which differ in their ordinal places are *partes extra partes*.

Integrate whole: a pedantic variant of *Integral whole* (above).

Logical whole: same as *Universal whole* (below).

Mathematical whole: same as *Integral whole* (above).

Metaphysical whole: a whole in that respect in which a species is the whole of its genus and difference. See *Formal whole* (above).

Natural whole: a term proposed by Hamilton* to replace

* *Lectures on Metaphysics*, XXXVII, vol. 2, p. 340, Edinburgh (1858).

Comprehensive or Metaphysical whole; as if that were not sufficiently provided with aliases under which to hide itself.

Negative whole: a unit regarded as a whole, as in the phrases "deus totus est ubique," and "anima est tota in toto corpore."

Physical whole: a whole compounded of substance and accident; but some say of matter and form; and some that both come to the same thing. In the peripatetic view, however, substance is form, not matter.

Positive whole: a whole consisting of parts. See *Negative whole* (above).

Potential whole: same as *Universal whole* (below); so called because the genus does not actually, but only potentially, contain the species, etc.

Potestative whole: a term of Aquinas; equivalent to *Potential whole* (above).

Predicative whole: a whole of logical depth.

Quantitative whole: same as *Integral whole* (above).

Similar whole: see *Homogeneous whole* (above).

Subject whole: same as *Subjective whole* (below).

Subjective whole: a very venerable name for *Universal whole* (below).

Substantial whole: a whole of logical breadth.

Universal whole: see Universal.

Whole by accident: such a whole as neither essentially belongs to the parts nor the parts to it.

Whole by aggregation or *aggregative whole*: same as *Collective whole* (above) in an exclusive sense.

Whole by information: a compound of act and power in the same kind, such as man, according to the Aristotelian theory of the soul.

Whole by inherence: same as *Physical whole* (above).

Whole by itself or *per se*: a whole which essentially belongs to its parts or its parts to it.

§14. KIND*

384. Before "class" acquired its logical signification in Queen Anne's reign, kind was sometimes used for any collection of objects having a common and peculiar general character, simple or complex.

* Baldwin's *Dictionary of Philosophy and Psychology*, vol. 1, p. 600 (1901).

Thus, in Blundevile's *Arte of Logicke*, we read: "*Genus* is a generall kind which may be spoken of many things differing in speciall kind." At other times, and more accurately, it was restricted to the species, or narrowest recognized class, or that which was supposed to be derived from one stock. Thus Wilson's *Rule of Reason* (1551) has: "*Genus* is a generall woorde vnder the whiche diuerse kindes or sortes of thinges are comprehended."

But before persons who picked their words had become ready to use "class" as a mere logical extension, they had begun to avoid "kind," except when the emphasis of attention was placed upon the logical depth rather than the breadth.* Watts's *Logick* (1724) illustrates this. This last is the ordinary popular sense of the word today; so that "of this kind," "of this nature," "of this character" are interchangeable phrases. J. S. Mill, however, in his *System of Logic*, Bk. I, chap. vii, §4, erected the word into a technical term of logic, at the same time introducing the term "real kind." His meaning, so far as it was determinate, was that classes are of two orders, the first comprising those which, over and above the characters which are involved in their definitions and which serve to delimit their extension, have, at most, but a limited number of others, and those following as "consequences, under laws of nature," of the defining characters; and the second, the real kinds, comprising those each of which has innumerable common properties independent of one another. As instances of real kinds, he mentions the class of animals and the class of sulphur; as an instance of a kind not real, the class of white things. It is important for the understanding of Mill's thought here, as throughout his work, to note that when he talks of "properties," he has in mind, mainly, characters interesting to us. Otherwise, it would not be true that all white things have few properties in common. By a "law of nature" he means any absolute uniformity; so that it is hardly enough to assert that if all white things had any property *P*, this would be a "consequence, under a law of nature," of their whiteness; for it would be itself an absolute and ultimate uniformity. Mill says that if the common properties of a class thus follow from a small number of primary characters "which, as the

* See 2.407ff.

phrase is, *account for all the rest,*" it is not a real kind. He does not remark that the man of science is bent upon ultimately thus accounting for each and every property that he studies. The following definition might be proposed: Any class which, in addition to its defining character, has another that is of permanent interest and is common and peculiar to its members, is destined to be conserved in that ultimate conception of the universe at which we aim, and is accordingly to be called "real."

§15. PERSEITY AND PER SE*

385. Scotus says there are two kinds of "perseity," that of a demonstration and that of a predicate which belongs immediately to its subject.

Per se translates καθ' αὐτό, καθ' αὐτόν, etc. Similar phrases occur in ordinary Greek. Plato, for example, in the *Theaetetus*, † speaks of ἐπιστήμη ἐν ἐκείνω τῷ ὀνόματι, ὃ τι ποτ' ἔχει ἢ ψυχὴ ὅταν αὐτὴ καθ' αὐτὴν πραγματεύηται περὶ τὰ ὄντα. But in Aristotle it first becomes a term of art (see Bonitz under εἰαυτοῦ). He enumerates four or five different meanings of it, from which we are led to infer that he did not himself invent it. Two such passages are *Met.*, Δ. xviii. 2, and *Anal. Post.*, iv. There are others, but they are less clear. *Per se* cannot very well be understood without some understanding of the phrase *secundum quid* (καθ' ὃ). Aristotle ‡ says:

"*Secundum quid* is said in several senses. In one sense it is the species (εἶδος) and essence of anything; thus, that *secundum quid* a man is good is itself good. Another sense is in what anything first comes into existence, as colour in a surface. In the first sense the *secundum quid* is the form (εἶδος); in the second it is the matter and first subject of anything. And, generally speaking, *secundum quid* refers to a cause. 'Secundum quid comes a man' is 'on what account comes he?' and 'secundum quid does he paralogize,' or 'does he syllogize,' is 'what is the cause of the paralogism' or 'the syllogism?' Furthermore, *secundum quid* is said in reference to position in

* *Ibid.*, vol. 2, pp. 281-282.

† 187A.

‡ *Metaphysica*, Δ, c. XVIII; 1022a 14-36.

space; as 'secundum quid stands he,' or 'secundum quid is he walking.' In such phrases it denotes position and place.

"Consequently, *per se* is necessarily said in different senses. In one sense, *per se* refers to the essence (τὸ τί ἦν εἶναι) of anything; as 'Callias is *per se* Callias,' that is, the very essence of Callias. It also refers to whatever is involved in the definition of anything (ὅσα ἐν τῷ τί ἐστὶν ὑπάρχει), as 'Callias is *per se* an animal'; that is, that he is an animal is implied in the word, or animal is what Callias is. The phrase is further applied in case anything in its origin assumes any character in itself or in what belongs to it (εἰ ἐν αὐτῷ δέδεκται πρῶτῳ ἢ τῶν αὐτοῦ τι); thus white is *per se* a surface, and man is *per se* alive, since the soul, which is part of man, receives life in its very origin. Further, that is *per se* which has nothing else as its cause. Thus there are many causes of man, such as being an animal, being biped, etc.; yet still man is *per se* man. Further, whatever belongs to one thing alone, and in so far as it is alone, is *per se*; so that what is abstract (κεχώρισμένον) is *per se*."

These five senses are, then: (1) that a substance exists *per se* and not *per accidens*; (2) that an analytical proposition is true *per se*, or formally, and not as matter of fact; (3) that any character which a thing necessarily assumes by virtue of existing, belongs to it *per se*, and not *secundum quid*; (4) that which a thing causes of itself it does *per se*, and not *per aliud*; and (5) that which any abstraction, *qua* that which it is, is, does, or suffers, is *per se* and not *secundum quid*.

The second of the above senses is called *per se primo modo*; the third is called *per se secundo modo*; but a different explanation from the above is often given. In reliance particularly on a passage in Aristotle's *Met.*, Z. v, it is said that a predication is *per se secundo modo* where the definition of the predicate contains the subject.

Another important expression is "known *per se*." A proposition is known *per se* if, and only if, it is cognoscible from its own terms but not cognoscible in any other way. For instance, that the letters on this page are black is not known *per se*, because it may be proved by testimony. Nor, on the other hand, is the doctrine of the Trinity *per se*, though it cannot be proved; for it is not self-evident. It has to be received on faith.

But there was a great controversy between the Thomists on the one hand and the Scotists with the Nominalists on the other, as to whether, in the above definition, the word "terms" was to be taken *objective* or *formaliter*. See the *Conimbricenses* in I. *Anal. Post.*, iii.

§16. PRIORITY, PRIOR, AND PRIUS*

386. These words are used in about a dozen different senses in philosophy, although only five are specially recognized. They are enumerated in the mnemonic verses,

"Tempore, Natura, prius Ordine, dic et Honore,
Effecto Causam dicimus esse prius."

387. (1) *Priority in time* is considered by Kant to be dependent upon the peculiar constitution of the internal sense (though he does not attempt any inquiry into the constitution further than that it places objects in time). Now, so far as effects in the outer world are due to forces, it seems to be proved that they follow the law of energy. In that case, though connection and continuity in time are important, yet the flow of time one way rather than in the reverse way is unmeaning. There is no effect that follows after its cause. The law of energy amounts to this, that the instantaneous accelerations of the motions of particles depend solely upon the relative positions of those particles at that same instant; and what follows after depends upon what now is, in the same way precisely, and is calculated by the same laws, as what went before depends upon what now is. Thus, in respect to the direction of its flow, time seems to be, if not purely a psychological affair, at any rate not purely a dynamical affair. Those physical phenomena which proceed in one direction and not in the reverse direction, and which seem to be well explained, such as the viscosity, diffusion, and conduction of gases, may all be explained by principles of probability.

From the point of view of causality exercised by our ideas and upon our ideas, the relations of *prius* and *posterius* present a different problem. Our wishes and endeavors cannot change the past in the least degree; and the future cannot affect our senses. The past affects the senses, and more and

* Baldwin's *Dictionary of Philosophy and Psychology*, vol. 2, pp. 342-343.

more strongly the nearer it is; our will can affect the future, and more and more strongly the nearer it is. The consequence is that the whole procedure of investigating the past and the future is different from the problem as regards real time.

This kind of priority is divided by the schoolmen into priority *quoad existentiam* and *quoad generationem* (that is, the older of two is the prior).

388. (2) In a meaning allied to temporal priority, Aristotle sometimes speaks of sense as *prior* to reason.*

(3) That which is at an earlier stage of development is also called prior to that which is more matured; boyhood is said by Aristotle† to be prior to manhood.

(4) So matter is prior to form; and potency to energy.

(5) The simple is prior to the complex; as a point to a line, a line to a surface, a surface to a solid.

(6) The rudimentary is prior to the recondite in order of exposition.

(7) In order of arrangement, the thing reached sooner is prior to that reached later.

(8) The relatively independent is prior to the relatively dependent, as substance to accident, and parts to whole.

(9) That caused thing which is nearer the cause, in any of the four senses of cause, is prior to that which is further from the cause.

(10) That is "prior in illation" from which the posterior follows as a rational consequence.

(11) The more general is prior to the more special.

(12) That which is more honorable or higher in rank or dignity is prior to that which is less so.

389. *Prius natura*, as practically used by Aristotle,‡ seems often to convey no clear notion. But he certainly calls the *prius dignitate* and *prius causalitate* both *prius natura*. The usage of the Aristotelians is to call that *prius natura* which is prior in consecution or in causality. That is prior in consecution which is such that if something else is supposed it is supposed, but which being supposed something else is not thereby supposed. Thus, if two are supposed, one is supposed;

* *Anal. Post.*, I, 2, 72a 1.

† *Metaphysica*, Δ, 11, 1018b 21.

‡ *Metaphysica* A, 8, 989a 16; *Categoriae*, 12, 14b 3.

but one being supposed, two is not thereby supposed. Hence, one is prior to two. *Prius causalitate* is either *prius natura generantis* or *prius natura intendente*. *Prius natura generantis* is the priority of the simple to the complex, as of the parts to the whole; *prius natura intendente* is the priority of the perfect to the imperfect, as of the whole to the parts. But this hardly seems to agree with Aristotle (646 a 25). *Prius nobis* (πρὸς ἡμᾶς πρότερον) is what is prior in the order of learning, or more easily known.

§17. PROXIMATE*

390. Lat. past participle of *proximare*, to approach, but it is used to translate *proximus*, next. The word occurs in Glanvil's *Vanity of Dogmatizing*, but in no English treatise on logic before Watts. In philosophy, synonymous with IMMEDIATE, though not so strong.

391. *Proximate cause and effect*: an obscure term, like most of the terms of Aristotelianism, which acquired some practical importance owing to the courts holding that a man was responsible for the proximate effects of his actions, not for their remote effects. This ought to determine what should be meant by *proximate cause and effect*; namely, that that which a man ought to have foreseen might result from his action is its *proximate effect*. The idea of making the payment of considerable damages dependent upon a term of Aristotelian logic or metaphysics is most shocking to any student of those subjects, and well illustrates the value of PRAGMATISM. Burgersdicius, who is one of the clearest of the Aristotelians, says: "*Proximate cause* is taken in two senses, to wit *in suo genere* and absolutely. An absolutely proximate cause is one which constitutes its effect, not merely immediately, but by its mere existence; so that, if it exists, its effect (*causatum*, for Burgersdicius is not limiting his remarks to efficient causes) necessarily exists. The proximate cause *in suo genere* is that which immediately constitutes its effect, that is to say, without the intervention of anything else of the same order concurring to produce the effect." Interpreting this in the light of pragmatism, the man should be held responsible for what might

* Baldwin's *Dictionary of Philosophy and Psychology*, vol 2, pp. 281-282.

naturally be expected, or feared, as the result of his action; but not for effects depending upon subsequent occurrences which he could not anticipate. Burgersdicius continues: "One thing may have many causes, proximate *in suo genere*, but only one absolutely proximate. . . . So the proximate material cause of man is his body; the efficient, his father; the formal, his rational soul; the final, *bene esse*."

392. *Proximate knowledge* is direct knowledge of a thing, not knowledge through something else. Better called *direct knowledge*.

Proximate matter is matter in a state in which it is prepared for the reception of a form. The proximate matter of a syllogism consists in its propositions, as distinct from the remote matter, which consists in the terms.

Proximate object of a directive (as we now say, normative) science is a certain one of the objects of practice, as distinguished from the object of doctrine. In speculative sciences there is only one object, the object of doctrine. In practical sciences there is besides an object of practice, which is that upon which it is designed to produce an effect. In a normative science, such as logic, there are two objects of practice — *the proximate*, which is the operation or action which is regulated, such as reasoning, and the remote, which is that in which that action takes place, such as a mind or a science conducted by many minds.

Proximate witness, testimony. There is hardly any such thing in English law. It is the witness who testifies, not to his own experience, but to facts which he knows by the immediate testimony of others.

§18. SUFFICIENT REASON*

393. (1) This phrase was made a term of philosophy, if not invented, by Leibnitz. In the *Principes de la Nature et de la Grâce*, he says (but this is far from being the first time in which he signalizes the principle): "It is necessary to resort to metaphysics and to make use of a *great principle*, not much employed, to the effect that nothing takes place without reason (*rien ne se fait sans raison suffisante*); that is to say, that

* *Ibid.*, vol. 2, pp. 616-617.

nothing occurs for which one having sufficient knowledge might not be able to give a reason sufficient to determine why it is as it is and not otherwise."

It is impossible to understand what Leibnitz means by this, without careful study of his works. There are two difficulties. In the first place, Leibnitz confounded under this phrase two entirely different ideas which he failed to discriminate. In the second place, in order to understand Leibnitz's position here, it is necessary to take into account, on the one hand, the thorough individualistic nominalism, with which he began his philosophical life and never consciously surrendered, and on the other hand his recognition of intellectual relations in the universe of which that nominalistic metaphysics involves the denial. His singular and complicated metaphysics is the outcome of his struggle to reconcile those two incompatible positions.

His sufficient reason is not an efficient cause, but a utility, or, in a broad sense, a final cause. But a nominalist cannot admit that an immediate final cause *exists*. Leibnitz, however, makes it *true*. For a realist, the real is nothing but the immediate object of that which is true. But Leibnitz has another notion of truth. Thus, in a letter to Arnauld (quoted in Latta's accurate and convenient exposition, p. 61, *note* beginning p. 60), he says: "Always in every true affirmative proposition, whether necessary or contingent, universal or singular, the notion of the predicate is in some way comprehended in that of the subject, *praedicatum inest subiecto*; otherwise I know not what truth is"; and in other passages he shows that for him truth is a relation between notions. Yet, as a nominalist, he could not hold that those notions immediately correspond to anything real. Consequently, he does not say that there really is a sufficient reason, but that anybody favorably situated would be able to render a sufficient reason. There is nothing real that corresponds to it immediately. Remotely, the purpose of God may correspond to it. Thus, the world of reality and the world of truth are completely sundered; for the former, Leibnitz is a pure individualistic nominalist; for the latter, on the contrary, he is an intellectualist. When he says, for example, that that which has no sufficient reason is "necessarily" non-existent, he uses the adverb of logical not

of metaphysical modality. He does not hold that real things are either emanations or entelechies of anything corresponding to a sufficient reason, but that is how the mind is affected. But when he comes to the ultimate sufficient reason of contingent truths, which is God, he ceases to draw the distinction between the world of thought and the world of being; and this exception introduces difficulties into his system. But Leibnitz confounds two things under his word "reason." The idea which principally governs his doctrine is that a reason is an explanation of the utility of that of which it is a reason; but he includes under the same word any explanation of the logical necessity of the object, the why it follows from a general law. Hence, in many cases, his sufficient reason fulfills the function of an efficient cause. It would be quite possible to quote passages from Leibnitz which conflict with this account of his conception. In order that the reader should apprehend it as he did, it would be requisite that his mind should be in the same unclear condition, which is not possible after one has once attained a superior grade of clearness. We can account for his implicit contradictions, but cannot reproduce his apprehension of them when we once see them to be contradictions.

It is to be remarked that Renouvier and Prat, in their rehabilitation of Leibnitzianism, reject the principle of sufficient reason (*La Nouvelle Monadologie*, p. 41, note 29).

394. The principle of sufficient reason may very well be understood to express our natural expectation or hope to find each unexpected phenomenon to be subject to reason and so to be intelligible. But to entertain this hope for *each* is not necessarily to entertain it for *all*. At any rate, it is easy to see that, however strong the tendency may be, it does not amount to any such absolute and ineluctable necessity as attaches to the law of contradiction, by the side of which Leibnitz and many Germans have placed it. Moreover, however important this tendency of thought and this truth about the universe may be in reference to the development of science, nevertheless, like the principle of the uniformity of nature, its strictly logical application to add force to arguments is very limited indeed. The *modus ponens* and *modus tollens* stand in no need of any such general principle to be perfectly apodictic. It is

essential to no broad division of reasoning. As a general rule, when we infer that a particular phenomenon, or set of phenomena, which seemed surprising at first, is to be explained as a consequence of a fact or law not directly observable, the argument is not appreciably strengthened by a separate assumption that the phenomenon has *some* explanation; although there are special cases in which it can be fortified by a similar, but more definite, premiss.

BOOK II
RELIGION

CHAPTER 1

THE ORDER OF NATURE^{*E}

§1. THE SIGNIFICANCE OF ORDER

395. Any proposition whatever concerning the order of Nature must touch more or less upon religion. In our day, belief, even in these matters, depends more and more upon the observation of facts. If a remarkable and universal orderliness be found in the universe, there must be some cause for this regularity, and science has to consider what hypotheses might account for the phenomenon. One way of accounting for it, certainly, would be to suppose that the world is ordered by a superior power. But if there is nothing in the universal subjection of phenomena to laws, nor in the character of those laws themselves (as being benevolent, beautiful, economical, etc.), which goes to prove the existence of a governor of the universe, it is hardly to be anticipated that any other sort of evidence will be found to weigh very much with minds emancipated from the tyranny of tradition.

396. Nevertheless, it cannot truly be said that even an absolutely negative decision of that question could altogether destroy religion, inasmuch as there are faiths in which, however much they differ from our own, we recognize those essential characters which make them worthy to be called religions, and which, nevertheless, do not postulate an actually existing Deity. That one, for instance, which has had the most numerous and by no means the least intelligent following of any on earth, teaches that the Divinity in his highest perfection is wrapped away from the world in a state of profound and eternal sleep, which really does not differ from non-existence, whether it be called by that name or not. No candid mind who has followed the writings of M. Vacherot can well deny that his religion is as earnest as can be. He worships the Per-

* *Popular Science Monthly*, vol. 13, pp. 203-217 (1878); the fifth of a series of six articles called "Illustrations of the Logic of Science." For the first and second articles see vol. 5, bk. II, chs. 4 and 5; for the third, fourth, and sixth see vol. 2, bk. III, chs. 6, 7, and 5.

fect, the Supreme Ideal; but he conceives that the very notion of the Ideal is repugnant to its real existence.* In fact, M. Vacherot finds it agreeable to his reason to assert that non-existence is an essential character of the perfect, just as St. Anselm and Descartes found it agreeable to theirs to assert the extreme opposite. I confess that there is one respect in which either of these positions seems to me more congruous with the religious attitude than that of a theology which stands upon evidences; for as soon as the Deity presents himself to either Anselm or Vacherot, and manifests his glorious attributes, whether it be in a vision of the night or day, either of them recognizes his adorable God, and sinks upon his knees at once; whereas the theologian of evidences will first demand that the divine apparition shall identify himself, and only after having scrutinized his credentials and weighed the probabilities of his being found among the totality of existences will he finally render his circumspect homage, thinking that no characters can be adorable but those which belong to a real thing.

397. If we could find out any general characteristic of the universe, any mannerism in the ways of Nature, any law everywhere applicable and universally valid, such a discovery would be of such singular assistance to us in all our future reasoning that it would deserve a place almost at the head of the principles of logic. On the other hand, if it can be shown that there is nothing of the sort to find out, but that every discoverable regularity is of limited range, this again will be of logical importance. What sort of a conception we ought to have of the universe, how to think of the *ensemble* of things, is a fundamental problem in the theory of reasoning.

§2. UNIFORMITIES^E

398. It is the legitimate endeavor of scientific men now, as it was twenty-three hundred years ago, to account for the formation of the solar system and of the cluster of stars which forms the galaxy, by the fortuitous concourse of atoms. The greatest expounder of this theory, when asked how he could write an immense book on the system of the world without one mention of its author, replied, very logically, "Je

* Cf. *La Religion* (1869), bk. II, ch. 5.

n'avais pas besoin de cette hypothèse-là." But, in truth, there is nothing atheistical in the theory, any more than there was in this answer. Matter is supposed to be composed of molecules which obey the laws of mechanics and exert certain attractions upon one another; and it is to these regularities (which there is no attempt to account for) that general arrangement of the solar system would be due, and not to hazard.

399. If anyone has ever maintained that the universe is a pure throw of the dice, the theologians have abundantly refuted him. "How often," says Archbishop Tillotson, "might a man, after he had jumbled a set of letters in a bag, fling them out upon the ground before they would fall into an exact poem, yea, or so much as make a good discourse in prose! And may not a little book be as easily made by chance as this great volume of the world?"* The chance-world, here shown to be so different from that in which we live, would be one in which there were no laws, the characters of different things being entirely independent; so that, should a sample of any kind of objects ever show a prevalent character, it could only be by accident, and no general proposition could ever be established. Whatever further conclusions we may come to in regard to the order of the universe, this much may be regarded as solidly established, that the world is not a mere chance-medley.

But whether the world makes an exact poem or not, is another question. When we look up at the heavens at night, we readily perceive that the stars are not simply splashed onto the celestial vault; but there does not seem to be any precise system in their arrangement either. It will be worth our while, then, to inquire into the degree of orderliness in the universe; and, to begin, let us ask whether the world we live in is any more orderly than a purely chance-world would be.

400. Any uniformity, or law of Nature, may be stated in the form, "Every *A* is *B*"; as, every ray of light is a non-curved line, every body is accelerated toward the earth's center, etc. This is the same as to say, "There does not exist any *A* which is not *B*"; there is no curved ray; there is no body not accelerated toward the earth; so that the uniformity consists in the non-occurrence in Nature of a certain combination of characters (in this case, the combination of being *A*

* *Works*, vol. 1, p. 346, London (1820).

with being non-*B*).¹ And, conversely, every case of the non-occurrence of a combination of characters would constitute a uniformity in Nature. Thus, suppose the quality *A* is never found in combination with the quality *C*: for example, suppose the quality of idiocy is never found in combination with that of having a well-developed brain. Then nothing of the sort *A* is of the sort *C*, or everything of the sort *A* is of the sort non-*C* (or say, every idiot has an ill-developed brain), which, being something universally true of the *A*'s, is a uniformity in the world. Thus we see that, in a world where there were no uniformities, no logically possible combination of characters would be excluded, but every combination would exist in some object. But two objects not identical must differ in some of their characters, though it be only in the character of being in such and such a place. Hence, precisely the same combination of characters could not be found in two different objects; and, consequently, in a chance-world every combination involving either the positive or negative of every character would belong to just one thing. Thus, if there were but five simple characters in such a world,² we might denote them by *A*, *B*, *C*, *D*, *E*, and their negatives by *a*, *b*, *c*, *d*, *e*; and then, as there would be 2⁵ or 32 different combinations of these characters, completely determinate in reference to each of them, that world would have just 32 objects in it, their characters being as in the following table:

TABLE I

ABCDE	AbCDE	aBCDE	abCDE
ABCDe	AbCDe	aBCDe	abCDe
ABCdE	AbCdE	aBCdE	abCdE
ABCde	AbCde	aBCde	abCde
ABcDE	AbcDE	aBcDE	abcDE
ABcDe	AbcDe	aBcDe	abcDe
ABcdE	AbcdE	aBcdE	abcdE
ABcde	Abcde	aBcde	abcde

¹ For the present purpose, the negative of a character is to be considered as much a character as the positive, for a uniformity may either be affirmative or negative. I do not say that no distinction can be drawn between positive and negative uniformities.

² There being 5 simple characters, with their negatives, they could be compounded in various ways so as to make 241 characters in all, without counting the characters *existence* and *non-existence*, which make up 243 or 3⁵.

For example, if the five primary characters were *hard, sweet, fragrant, green, bright*, there would be one object which reunited all these qualities, one which was hard, sweet, fragrant, and green, but not bright; one which was hard, sweet, fragrant, and bright, but not green; one which was hard, sweet, and fragrant, but neither green nor bright; and so on through all the combinations.

401. This is what a thoroughly chance-world would be like, and certainly nothing could be imagined more systematic. When a quantity of letters are poured out of a bag, the appearance of disorder is due to the circumstance that the phenomena are only partly fortuitous. The laws of space are supposed, in that case, to be rigidly preserved, and there is also a certain amount of regularity in the formation of the letters. The result is that some elements are orderly and some are disorderly, which is precisely what we observe in the actual world. Tillotson, in the passage of which a part has been quoted, goes on to ask, "How long might 20,000 blind men which should be sent out from the several remote parts of England, wander up and down before they would all meet upon Salisbury Plains, and fall into rank and file in the exact order of an army? And yet this is much more easy to be imagined than how the innumerable blind parts of matter should rendezvous themselves into a world."* This is very true, but in the actual world the *blind men* are, as far as we can see, *not* drawn up in any particular order at all. And, in short, while a certain amount of order exists in the world, it would seem that the world is not so orderly as it might be, and, for instance, not so much so as a world of pure chance would be.

402. But we can never get to the bottom of this question until we take account of a highly-important logical principle¹ which I now proceed to enounce. This principle is that any plurality or lot of objects whatever have some character in common (no matter how insignificant) which is peculiar to them and not shared by anything else. The word "character" here is taken in such a sense as to include negative characters,

* *Op. cit.*, p. 347.

¹ This principle was, I believe, first stated by Mr. De Morgan. [See his "On the Syllogism, no. V, etc." *Transactions of the Cambridge Philosophical Society*, vol. 10, pp. 456, 467 (1864); *Formal Logic*, p. 39, London (1847).]

such as incivility, inequality, etc., as well as their positives, civility, equality, etc. To prove the theorem, I will show what character any two things, A and B , have in common, not shared by anything else. The things, A and B , are each distinguished from all other things by the possession of certain characters which may be named A -ness and B -ness. Corresponding to these positive characters are the negative characters un- A -ness, which is possessed by everything except A , and un- B -ness, which is possessed by everything except B . These two characters are united in everything except A and B ; and this union of the characters un- A -ness and un- B -ness makes a compound character which may be termed A - B -lessness. This is not possessed by either A or B , but it is possessed by everything else. This character, like every other, has its corresponding negative un- A - B -lessness, and this last is the character possessed by both A and B , and by nothing else. It is obvious that what has thus been shown true of two things is *mutatis mutandis*, true of any number of things. Q. E. D.

403. In any world whatever, then, there must be a character peculiar to each possible group of objects. If, as a matter of nomenclature, characters peculiar to the same group be regarded as only different aspects of the same character, then we may say that there will be precisely one character for each possible group of objects. Thus, suppose a world to contain five things, α , β , γ , δ , ϵ . Then it will have a separate character for each of the 31 groups (with *non-existence* making up 32 or 2^5) shown in the following table:

TABLE II

	$a\beta$	$a\beta\gamma$	$a\beta\gamma\delta$	$a\beta\gamma\delta\epsilon$
a	$a\gamma$	$a\beta\delta$	$a\beta\gamma\epsilon$	
β	$a\delta$	$a\beta\epsilon$	$a\beta\delta\epsilon$	
γ	$a\epsilon$	$a\gamma\delta$	$a\gamma\delta\epsilon$	
δ	$\beta\gamma$	$a\gamma\epsilon$	$\beta\gamma\delta\epsilon$	
ϵ	$\beta\delta$	$a\delta\epsilon$		
	$\beta\epsilon$	$\beta\gamma\delta$		
	$\gamma\delta$	$\beta\gamma\epsilon$		
	$\gamma\epsilon$	$\beta\delta\epsilon$		
	$\delta\epsilon$	$\gamma\delta\epsilon$		

404. This shows that a contradiction is involved in the very idea of a chance-world, for in a world of 32 things, instead of there being only 3^5 or 243 characters, as we have seen that the notion of a chance-world requires, there would, in fact, be no less than 2^{32} , or 4,294,967,296 characters, which would not be all independent, but would have all possible relations with one another.

405. We further see that so long as we regard characters abstractly, without regard to their relative importance, etc., there is no possibility of a more or less degree of orderliness in the world, the whole system of relationship between the different characters being given by mere logic; that is, being implied in those facts which are tacitly admitted as soon as we admit that there is any such thing as reasoning.

406. In order to descend from this abstract point of view, it is requisite to consider the characters of things as relative to the perceptions and active powers of living beings. Instead, then, of attempting to imagine a world in which there should be no uniformities, let us suppose one in which none of the uniformities should have reference to characters interesting or important to us. In the first place, there would be nothing to puzzle us in such a world. The small number of qualities which would directly meet the senses would be the ones which would afford the key to everything which could possibly interest us. The whole universe would have such an air of system and perfect regularity that there would be nothing to ask. In the next place, no action of ours, and no event of Nature, would have important consequences in such a world. We should be perfectly free from all responsibility, and there would be nothing to do but to enjoy or suffer whatever happened to come along. Thus there would be nothing to stimulate or develop either the mind or the will, and we consequently should neither act nor think. We should have no memory, because that depends on a law of our organization. Even if we had any senses, we should be situated toward such a world precisely as inanimate objects are toward the present one, provided we suppose that these objects have an absolutely transitory and instantaneous consciousness without memory — a supposition which is a mere mode of speech, for that would be no consciousness at all. We may, therefore, say that a

world of chance is simply our actual world viewed from the standpoint of an animal at the very vanishing-point of intelligence. The actual world is almost a chance-medley to the mind of a polyp. The interest which the uniformities of Nature have for an animal measures his place in the scale of intelligence.

407. Thus, nothing can be made out from the orderliness of Nature in regard to the existence of a God, unless it be maintained that the existence of a finite mind proves the existence of an infinite one.

§3. INDUCTION^E

408. In the last of these papers* we examined the nature of inductive or synthetic reasoning. We found it to be a process of sampling. A number of specimens of a class are taken, not by selection within that class, but at random. These specimens will agree in a great number of respects. If, now, it were likely that a second lot would agree with the first in the majority of these respects, we might base on this consideration an inference in regard to any one of these characters. But such an inference would neither be of the nature of induction, nor would it (except in special cases) be valid, because the vast majority of points of agreement in the first sample drawn would generally be entirely accidental, as well as insignificant. To illustrate this, I take the ages at death of the first five poets given in Wheeler's *Biographical Dictionary*. They are:

Aagard, 48.
Abeille, 70.
Abulola, 84.
Abunowas, 48.
Accords, 45.

These five ages have the following characters in common:

1. The difference of the two digits composing the number, divided by three, leaves a remainder of *one*.
2. The first digit raised to the power indicated by the second, and divided by three, leaves a remainder of *one*.
3. The sum of the prime factors of each age, including one, is divisible by three.

* See vol. 2, bk. III, ch. 7.

409. It is easy to see that the number of accidental agreements of this sort would be quite endless. But suppose that, instead of considering a character because of its prevalence in the sample, we designate a character before taking the sample, selecting it for its importance, obviousness, or other point of interest. Then two considerable samples drawn at random are extremely likely to agree approximately in regard to the proportion of occurrences of a character so chosen. *The inference that a previously designated character has nearly the same frequency of occurrence in the whole of a class that it has in a sample drawn at random out of that class is induction.* If the character be not previously designated, then a sample in which it is found to be prevalent can only serve to suggest that it *may be* prevalent in the whole class. We may consider this surmise as an inference if we please — an inference of possibility; but a second sample must be drawn to test the question of whether the character actually is prevalent. Instead of designating beforehand a single character in reference to which we will examine a sample, we may designate two, and use the same sample to determine the relative frequencies of both. This will be making two inductive inferences at once; and, of course, we are less certain that both will yield correct conclusions than we should be that either separately would do so. What is true of two characters is true of any limited number. Now, the number of characters which have any considerable interest for us in reference to any class of objects is more moderate than might be supposed. As we shall be sure to examine any sample with reference to these characters, they may be regarded not exactly as predesignated, but as predetermined (which amounts to the same thing); and we may infer that the sample represents the class in all these respects if we please, remembering only that this is not so secure an inference as if the particular quality to be looked for had been fixed upon beforehand.

410. The demonstration of this theory of induction rests upon principles and follows methods which are accepted by all those who display in other matters the particular knowledge and force of mind which qualify them to judge of this. The theory itself, however, quite unaccountably seems never to have occurred to any of the writers who have undertaken to

explain synthetic reasoning. The most widely-spread opinion in the matter is one which was much promoted by Mr. John Stuart Mill*—namely, that induction depends for its validity upon the uniformity of Nature — that is, on the principle that what happens once will, under a sufficient degree of similarity of circumstances, happen again as often as the same circumstances recur. The application is this: The fact that different things belong to the same class constitutes the similarity of circumstances, and the induction is good, provided this similarity is “sufficient.” What happens once is, that a number of these things are found to have a certain character; what may be expected, then, to happen again as often as the circumstances recur consists in this, that all things belonging to the same class should have the same character.

411. This analysis of induction has, I venture to think, various imperfections, to some of which it may be useful to call attention.† In the first place, when I put my hand in a bag and draw out a handful of beans, and, finding three-quarters of them black, infer that about three-quarters of all in the bag are black, my inference is obviously of the same kind as if I had found any larger proportion, or the whole, of the sample black, and had assumed that it represented in that respect the rest of the contents of the bag. But the analysis in question hardly seems adapted to the explanation of this *proportionate* induction, where the conclusion, instead of being that a certain event uniformly happens under certain circumstances, is precisely that it does not uniformly occur, but only happens in a certain proportion of cases. It is true that the whole sample may be regarded as a single object, and the inference may be brought under the formula proposed by considering the conclusion to be that any similar sample will show a similar proportion among its constituents. But this is to treat the induction as if it rested on a single instance, which gives a very false idea of its probability.

412. In the second place, if the uniformity of Nature were the sole warrant of induction, we should have no right to draw one in regard to a character whose constancy we knew nothing

* *A System of Logic*, bk. III, ch. 3, §1.

† Cf. 2.766f.

about. Accordingly, Mr. Mill says* that, though none but white swans were known to Europeans for thousands of years, yet the inference that all swans were white was "not a good induction," because it was not known that color was a usual generic character (it, in fact, not being so by any means). But it is mathematically demonstrable that an inductive inference may have as high a degree of probability as you please independent of any antecedent knowledge of the constancy of the character inferred. Before it was known that color is not usually a character of genera, there was certainly a considerable probability that all swans were white. But the further study of the genera of animals led to the induction of their non-uniformity in regard to color. A deductive application of this general proposition would have gone far to overcome the probability of the universal whiteness of swans before the black species was discovered. When we do know anything in regard to the general constancy or inconstancy of a character, the application of that general knowledge to the particular class to which any induction relates, though it serves to increase or diminish the force of the induction, is, like every application of general knowledge to particular cases, deductive in its nature and not inductive.

413. In the third place, to say that inductions are true because similar events happen in similar circumstances — or, what is the same thing, because objects similar in some respects are likely to be similar in others — is to overlook those conditions which really are essential to the validity of inductions. When we take all the characters into account, any pair of objects resemble one another in just as many particulars as any other pair. If we limit ourselves to such characters as have for us any importance, interest, or obviousness, then a synthetic conclusion may be drawn, but only on condition that the specimens by which we judge have been taken at random from the class in regard to which we are to form a judgment, and not selected as belonging to any sub-class. The induction only has its full force when the character concerned has been designated before examining the sample. These are the essentials of induction, and they are not recognized in attributing the validity of induction to the uniformity of Nature. The explanation of

* *Ibid.*, bk. III, ch. 3, §3.

induction by the doctrine of probabilities, given in the last of these papers, is not a mere metaphysical formula, but is one from which all the rules of synthetic reasoning can be deduced systematically and with mathematical cogency. But the account of the matter by a principle of Nature, even if it were in other respects satisfactory, presents the fatal disadvantage of leaving us quite as much afloat as before in regard to the proper method of induction. It does not surprise me, therefore, that those who adopt this theory have given erroneous rules for the conduct of reasoning, nor that the greater number of examples put forward by Mr. Mill in his first edition, as models of what inductions should be, proved in the light of further scientific progress so particularly unfortunate that they had to be replaced by others in later editions. One would have supposed that Mr. Mill might have based an induction on *this* circumstance, especially as it is his avowed principle that, if the conclusion of an induction turns out false, it cannot have been a good induction. Nevertheless, neither he nor any of his scholars seem to have been led to suspect, in the least, the perfect solidity of the framework which he devised for securely supporting the mind in its passage from the known to the unknown, although at its first trial it did not answer quite so well as had been expected.

§4. MIND AND NATURE^B

414. When we have drawn any statistical induction — such, for instance, as that one-half of all births are of male children — it is always possible to discover, by investigation sufficiently prolonged, a class of which the same predicate may be affirmed universally; to find out, for instance, *what sort of* births are of male children. The truth of this principle follows immediately from the theorem that there is a character peculiar to every possible group of objects. The form in which the principle is usually stated is, that *every event must have a cause*.

415. But, though there exists a cause for every event, and that of a kind which is capable of being discovered, yet if there be nothing to guide us to the discovery; if we have to hunt among all the events in the world without any scent; if,

for instance, the sex of a child might equally be supposed to depend on the configuration of the planets, on what was going on at the antipodes, or on anything else — then the discovery would have no chance of ever getting made.

416. That we ever do discover the precise causes of things, that any induction whatever is absolutely without exception, is what we have no right to assume. On the contrary, it is an easy corollary, from the theorem just referred to, that every empirical rule has an exception. But there are certain of our inductions which present an approach to universality so extraordinary that, even if we are to suppose that they are not strictly universal truths, we cannot possibly think that they have been reached merely by accident. The most remarkable laws of this kind are those of *time* and *space*. With reference to space, Bishop Berkeley first showed, in a very conclusive manner, that it was not a thing *seen*, but a thing *inferred*.* Berkeley chiefly insists on the impossibility of directly seeing the third dimension of space, since the retina of the eye is a surface. But, in point of fact, the retina is not even a surface; it is a conglomeration of nerve-needles directed toward the light and having only their extreme points sensitive, these points lying at considerable distances from one another compared with their areas. Now, of these points, certainly the excitation of no one singly can produce the perception of a surface, and consequently not the aggregate of all the sensations can amount to this. But certain relations subsist between the excitations of different nerve-points, and these constitute the premisses upon which the hypothesis of space is founded, and from which it is inferred.† That space is not immediately perceived is now universally admitted; and a mediate cognition is what is called an inference, and is subject to the criticism of logic. But what are we to say to the fact of every chicken as soon as it is hatched solving a problem whose data are of a complexity sufficient to try the greatest mathematical powers? It would be insane to deny that the tendency to light upon the conception of space is inborn in the mind of the chicken and of every animal. The same thing is equally true of time. That time is not directly perceived is evident, since

* *A New Theory of Vision*, Sections 2 and 3.

† Cf. 5.223.

no lapse of time is present, and we only perceive what is present. That, not having the idea of time, we should never be able to perceive the flow in our sensations without some particular aptitude for it, will probably also be admitted. The idea of force — at least, in its rudiments — is another conception so early arrived at, and found in animals so low in the scale of intelligence, that it must be supposed innate. But the innateness of an idea admits of degree, for it consists in the tendency of that idea to present itself to the mind. Some ideas, like that of space, do so present themselves irresistibly at the very dawn of intelligence, and take possession of the mind on small provocation, while of other conceptions we are prepossessed, indeed, but not so strongly, down a scale which is greatly extended. The tendency to personify every thing, and to attribute human characters to it, may be said to be innate; but it is a tendency which is very soon overcome by civilized man in regard to the greater part of the objects about him. Take such a conception as that of gravitation varying inversely as the square of the distance. It is a very simple law. But to say that it is simple is merely to say that it is one which the mind is particularly adapted to apprehend with facility. Suppose the idea of a quantity multiplied into another had been no more easy to the mind than that of a quantity raised to the power indicated by itself — should we ever have discovered the law of the solar system?

417. It seems incontestable, therefore, that the mind of man is strongly adapted to the comprehension of the world; at least, so far as this goes, that certain conceptions, highly important for such a comprehension, naturally arise in his mind; and, without such a tendency, the mind could never have had any development at all.

418.* How are we to explain this adaptation? The great utility and indispensableness of the conceptions of time, space, and force, even to the lowest intelligence, are such as to suggest that they are the results of natural selection. Without something like geometrical, kinetical, and mechanical conceptions, no animal could seize his food or do anything which might be necessary for the preservation of the species. He might, it is true, be provided with an instinct which would

* Cf. 491, 1.118, 5.47, 5.586, 5.591.

generally have the same effect; that is to say, he might have conceptions different from those of time, space, and force, but which coincided with them in regard to the ordinary cases of the animal's experience. But, as that animal would have an immense advantage in the struggle for life whose mechanical conceptions did not break down in a novel situation (such as development must bring about), there would be a constant selection in favor of more and more correct ideas of these matters. Thus would be attained the knowledge of that fundamental law upon which all science rolls; namely, that forces depend upon relations of time, space, and mass. When this idea was once sufficiently clear, it would require no more than a comprehensible degree of genius to discover the exact nature of these relations. Such an hypothesis naturally suggests itself, but it must be admitted that it does not seem sufficient to account for the extraordinary accuracy with which these conceptions apply to the phenomena of Nature, and it is probable that there is some secret here which remains to be discovered.

§5. DESIGN^z

419. Some important questions of logic depend upon whether we are to consider the material universe as of limited extent and finite age, or quite boundless in space and in time. In the former case, it is conceivable that a general plan or design embracing the whole universe should be discovered, and it would be proper to be on the alert for some traces of such a unity. In the latter case, since the proportion of the world of which we can have any experience is less than the smallest assignable fraction, it follows that we never could discover any *pattern* in the universe except a repeating one; any design embracing the whole would be beyond our powers to discern, and beyond the united powers of all intellects during all time. Now, what is absolutely incapable of being known is, as we have seen in a former paper,* not real at all. An absolutely incognizable existence is a nonsensical phrase. If, therefore, the universe is infinite, the attempt to find in it any design embracing it as a whole is futile, and involves a false way of looking at the subject. If the universe never had

* 5.405ff.

any beginning, and if in space world stretches beyond world without limit, there is no *whole* of material things, and consequently no general character to the universe, and no need or possibility of any governor for it. But if there was a time before which absolutely no matter existed, if there are certain absolute bounds to the region of things outside of which there is a mere void, then we naturally seek for an explanation of it, and, since we cannot look for it among material things, the hypothesis of a great disembodied animal, the creator and governor of the world, is natural enough.

420. The actual state of the evidence as to the limitation of the universe is as follows: As to time, we find on our earth a constant progress of development since the planet was a red-hot ball; the solar system seems to have resulted from the condensation of a nebula, and the process appears to be still going on. We sometimes see stars (presumably with systems of worlds) destroyed and apparently resolved back into the nebulous condition, but we have no evidence of any existence of the world previous to the nebulous stage from which it seems to have been evolved. All this rather favors the idea of a beginning than otherwise. As for limits in space, we cannot be sure that we see anything outside of the system of the Milky Way. Minds of theological predilections have therefore no need of distorting the facts to reconcile them with their views.

421. But the only scientific presumption is, that the unknown parts of space and time are like the known parts, occupied; that, as we see cycles of life and death in all development which we can trace out to the end, the same holds good in regard to solar systems; that as enormous distances lie between the different planets of our solar system, relatively to their diameters, and as still more enormous distances lie between our system relatively to its diameter and other systems, so it may be supposed that other galactic clusters exist so remote from ours as not to be recognized as such with certainty. I do not say that these are strong inductions; I only say that they are the presumptions which, in our ignorance of the facts, should be preferred to hypotheses which involve conceptions of things and occurrences totally different in their character from any of which we have had any experience, such

as disembodied spirits, the creation of matter, infringements of the laws of mechanics, etc.

422. The universe ought to be presumed too vast to have any character. When it is claimed that the arrangements of Nature are benevolent, or just, or wise, or of any other peculiar kind, we ought to be prejudiced against such opinions, as being the offspring of an ill-founded notion of the finitude of the world. And examination has hitherto shown that such beneficences, justice, etc., are of a most limited kind—limited in degree and limited in range.

423. In like manner, if anyone claims to have discovered a plan in the structure of organized beings, or a scheme in their classification, or a regular arrangement among natural objects, or a system of proportionality in the human form, or an order of development, or a correspondence between conjunctions of the planets and human events, or a significance in numbers, or a key to dreams, the first thing we have to ask is whether such relations are susceptible of explanation on mechanical principles, and if not they should be looked upon with disfavor as having already a strong presumption against them; and examination has generally exploded all such theories.

424. There are minds to whom every prejudice, every presumption, seems unfair. It is easy to say what minds these are. They are those who never have known what it is to draw a well-grounded induction, and who imagine that other people's knowledge is as nebulous as their own. That all science rolls upon presumption (not of a formal but of a real kind) is no argument with them, because they cannot imagine that there is anything solid in human knowledge. These are the people who waste their time and money upon perpetual motions and other such rubbish.

425. But there are better minds who take up mystical theories (by which I mean all those which have no possibility of being mechanically explained). These are persons who are strongly prejudiced in favor of such theories. We all have natural tendencies to believe in such things; our education often strengthens this tendency; and the result is, that to many minds nothing seems so antecedently probable as a theory of this kind. Such persons find evidence enough in favor

of their views, and in the absence of any recognized logic of induction they cannot be driven from their belief.

But to the mind of a physicist there ought to be a strong presumption against every mystical theory; and therefore it seems to me that those scientific men who have sought to make out that science was not hostile to theology have not been so clear-sighted as their opponents.

426. It would be extravagant to say that science can at present disprove religion; but it does seem to me that the spirit of science is hostile to any religion except such a one as that of M. Vacherot. Our appointed teachers inform us that Buddhism is a miserable and atheistical faith, shorn of the most glorious and needful attributes of a religion; that its priests can be of no use to agriculture by praying for rain, nor to war by commanding the sun to stand still. We also hear the remonstrances of those who warn us that to shake the general belief in the living God would be to shake the general morals, public and private. This, too, must be admitted; such a revolution of thought could no more be accomplished without waste and desolation than a plantation of trees could be transferred to new ground, however wholesome in itself, without all of them languishing for a time, and many of them dying. Nor is it, by the way, a thing to be presumed that a man would have taken part in a movement having a possible atheistical issue without having taken serious and adequate counsel in regard to that responsibility. But, let the consequences of such a belief be as dire as they may, one thing is certain: that the state of the facts, whatever it may be, will surely get found out, and no human prudence can long arrest the triumphal car of truth — no, not if the discovery were such as to drive every individual of our race to suicide!

427. But it would be folly to suppose that any metaphysical theory in regard to the mode of being of the perfect is to destroy that aspiration toward the perfect which constitutes the essence of religion. It is true that, if the priests of any particular form of religion succeed in making it generally believed that religion cannot exist without the acceptance of certain formulas, or if they succeed in so interweaving certain dogmas with the popular religion that the people can see no essential analogy between a religion which accepts these points

of faith and one which rejects them, the result may very well be to render those who cannot believe these things irreligious. Nor can we ever hope that any body of priests should consider themselves more teachers of religion in general than of the particular system of theology advocated by their own party. But no man need be excluded from participation in the common feelings, nor from so much of the public expression of them as is open to all the laity, by the unphilosophical narrowness of those who guard the mysteries of worship. Am I to be prevented from joining in that common joy at the revelation of enlightened principles of religion which we celebrate at Easter and Christmas because I think that certain scientific, logical, and metaphysical ideas which have been mixed up with these principles are untenable? No; to do so would be to estimate those errors as of more consequence than the truth — an opinion which few would admit. People who do not believe what are really the fundamental principles of Christianity are rare to find, and all but these few ought to feel at home in the churches.

CHAPTER 2

A RELIGION OF SCIENCE^E

§1. THE MARRIAGE OF RELIGION AND SCIENCE*

428. What is science? The dictionary will say that it is systematized knowledge. Dictionary definitions, however, are too apt to repose upon derivations; which is as much as to say that they neglect too much the later steps in the evolution of meanings. Mere knowledge, though it be systematized, may be a dead memory; while by science we all habitually mean a living and growing body of truth. We might even say that knowledge is not necessary to science. The astronomical researches of Ptolemy, though they are in great measure false, must be acknowledged by every modern mathematician who reads them to be truly and genuinely scientific. That which constitutes science, then, is not so much correct conclusions, as it is a correct method. But the method of science is itself a scientific result. It did not spring out of the brain of a beginner: it was a historic attainment and a scientific achievement. So that not even this method ought to be regarded as essential to the beginnings of science. That which is essential, however, is the scientific spirit, which is determined not to rest satisfied with existing opinions, but to press on to the real truth of nature. To science once enthroned in this sense, among any people, science in every other sense is heir apparent.

429. And what is religion? In each individual it is a sort of sentiment, or obscure perception, a deep recognition of a something in the circumambient All, which, if he strives to express it, will clothe itself in forms more or less extravagant, more or less accidental, but ever acknowledging the first and last, the A and Ω , as well as a relation to that Absolute of the individual's self, as a relative being. But religion cannot reside in its totality in a single individual. Like every species of

* *The Open Court*, vol. 7, pp. 3559-60 (1893).

reality, it is essentially a social, a public affair. It is the idea of a whole church, welding all its members together in one organic, systemic perception of the Glory of the Highest — an idea having a growth from generation to generation and claiming a supremacy in the determination of all conduct, private and public.

430. Now, as science grows, it becomes more and more perfect, considered as science; and no religionist can easily so narrow himself as to deny this. But as religion goes through the different stages of its history, it has, I fear we must confess, seldom been seen so vitalized as to become more and more perfect, even as judged from its own standpoint. Like a plucked flower, its destiny is to wilt and fade. The vital sentiment that gave it birth loses gradually its pristine purity and strength, till some new creed treads it down. Thus it happens quite naturally that those who are animated with the spirit of science are for hurrying forward, while those who have the interests of religion at heart are apt to press back.

431. While this double change has been taking place, religion has found herself compelled to define her position; and, in doing so, has inevitably committed herself to sundry propositions, which, one by one, have been, first questioned, then assailed, and finally overthrown by advancing science. Seeing such a chasm open before her feet, religion has at first violently recoiled, and at last has leapt it; satisfying herself as best she might with an altered creed. In most cases the leap has not seemed to hurt her; yet internal injuries may have been sustained. Who can doubt that the church really did suffer from the discovery of the Copernican system, although infallibility, by a narrow loophole, managed to escape? In this way, science and religion become forced into hostile attitudes. Science, to specialists, may seem to have little or nothing to say that directly concerns religion; but it certainly encourages a philosophy which, if in no other respect, is at any rate opposed to the prevalent tendency of religion, in being animated by a progressive spirit. There arises, too, a tendency to pooh-pooh at things unseen.

432. It would be ridiculous to ask to whose fault this situation is chargeable. You cannot lay blame upon elemental forces. Religion, from the nature of things, refuses to go

through her successive transformations with sufficient celerity to keep always in accord with the convictions of scientific philosophy. The day has come, however, when the man whom religious experience most devoutly moves can recognize the state of the case. While adhering to the essence of religion, and so far as possible to the church, which is all but essential, say, penessential, to it, he will cast aside that religious timidity that is forever prompting the church to recoil from the paths into which the Governor of history is leading the minds of men, a cowardice that has stood through the ages as the landmark and limit of her little faith, and will gladly go forward, sure that truth is not split into two warring doctrines, and that any change that knowledge can work in his faith can only affect its expression, but not the deep mystery expressed.

433. Such a state of mind may properly be called a religion of science. Not that it is a religion to which science or the scientific spirit has itself given birth; for religion, in the proper sense of the term, can arise from nothing but the religious sensibility. But it is a religion, so true to itself, that it becomes animated by the scientific spirit, confident that all the conquests of science will be triumphs of its own, and accepting all the results of science, as scientific men themselves accept them, as steps toward the truth, which may appear for a time to be in conflict with other truths, but which in such cases merely await adjustments which time is sure to effect. This attitude, be it observed, is one which religion will assume not at the dictate of science, still less by way of a compromise, but simply and solely out of a bolder confidence in herself and in her own destiny.

434. Meantime, science goes unswervingly its own gait. What is to be its goal is precisely what it must not seek to determine for itself, but let itself be guided by nature's strong hand. Teleological considerations, that is to say ideals, must be left to religion; science can allow itself to be swayed only by efficient causes; and philosophy, in her character of queen of the sciences, must not care, or must not seem to care, whether her conclusions be wholesome or dangerous.

§2. WHAT IS CHRISTIAN FAITH?*

435. It is easy to chop logic about matters of which you have no experience whatever. Men colour blind have more than once learnedly discussed the laws of colour-sensation, and have made interesting deductions from those laws. But when it comes to positive knowledge, such knowledge as a lawyer has of the practice of the courts, that can only rest on long experience, direct or indirect. So, a man may be an accomplished theologian without ever having felt the stirring of the spirit; but he cannot answer the simple question at the head of this article except out of his own religious experience.

436. There is in the dictionary a word, *solipsism*, meaning the belief that the believer is the only existing person. Were anybody to adopt such a belief, it might be difficult to argue him out of it. But when a person finds himself in the society of others, he is just as sure of their existence as of his own, though he may entertain a metaphysical theory that they are all hypostatically the same *ego*. In like manner, when a man has that experience with which religion sets out, he has as good reason — putting aside metaphysical subtleties — to believe in the living personality of God as he has to believe in his own. Indeed, *belief* is a word inappropriate to such direct perception.

437. Seldom do we pass a single hour of our waking lives away from the companionship of men (including books); and even the thoughts of that solitary hour are filled with ideas which have grown in society. Prayer, on the other hand, occupies but little of our time; and, of course, if solemnity and ceremony are to be made indispensable to it (though why observe manners toward the Heavenly Father that an earthly father would resent as priggish?, nothing more is practicable. Consequently, religious ideas never come to form the warp and woof of our mental constitution, as do social ideas. They are easily doubted, and are open to various reasons for doubt, which reasons may all be comprehended under one, namely, that the religious phenomenon is sporadic, not incessant.

438. This causes a degeneration in religion from a perception to a trust, from a trust to a belief, and a belief continually becoming more and more abstract. Then, after a religion

* *The Open Court*, vol. 7, pp. 3743-45 (1893).

has become a public affair, quarrels arise, to settle which watchwords are drawn up. This business gets into the hands of theologians: and the ideas of theologians always appreciably differ from those of the universal church. They swamp religion in fallacious logical disputations. Thus, the natural tendency is to the continual drawing tighter and tighter of the narrowing bounds of doctrine, with less and less attention to the living essence of religion, until, after some *symbolum quodcumque* has declared that the salvation of each individual absolutely and almost exclusively depends upon his entertaining a correct metaphysics of the godhead, the vital spark of inspiration becomes finally quite extinct.

439. Yet it is absurd to say that religion is a mere belief. You might as well call society a belief, or politics a belief, or civilization a belief. Religion is a life, and can be identified with a belief only provided that belief be a living belief — a thing to be lived rather than said or thought.

440. The Christian religion, if it has anything distinctive — and must not aspire to be the necessary ultimate outcome of *every* path of religious progress — is distinguished from other religions by its precept about the Way of Life. I appeal to the typical Christian to answer out of the abundance of his spirit, without dictation from priests, whether this be not so. In the recently discovered book, *The Teaching of the Twelve Apostles*,¹ which dates from about A.D. 100, we see that, long before the Apostles' or any other creed was insisted upon, or at all used, the teaching of the Lord was considered to consist in the doctrine of the Two Ways — the Way of Life and the Way of Death. This it was that at that date was regarded as the saving faith — not a lot of metaphysical propositions. This is what Jesus Christ taught; and to believe in Christ is to believe what he taught.

441. Now what is this way of life? Again I appeal to the universal Christian conscience to testify that it is simply love. As far as it is contracted to a rule of ethics, it is: Love God, and love your neighbour; “on these two commandments hang all the law and the prophets.” It may be regarded in a higher

¹ Edited with translation and notes by Roswell D. Hitchcock and Francis Brown, New York, Scribners (1884). Also, by Philip Schaff, 3d edition, New York, Funk and Wagnalls (1890).

point of view with St. John as the universal evolutionary formula. But in whatever light it be regarded or in whatever direction developed, the belief in the law of love is the Christian faith.

442. "Oh," but it may be said, "that is not distinctive of Christianity! That very idea was anticipated by the early Egyptians, by the Stoics, by the Buddhists, and by Confucius." So it was; nor can the not insignificant difference between the negative and the positive precept be properly estimated as sufficient for a discrimination between religions. Christians may, indeed, claim that Christianity possesses that earmark of divine truth—namely, that it was anticipated from primitive ages. The higher a religion the more catholic.

443. Man's highest developments are social; and religion, though it begins in a seminal individual inspiration, only comes to full flower in a great church coextensive with a civilization. This is true of every religion, but supereminently so of the religion of love. Its ideal is that the whole world shall be united in the bond of a common love of God accomplished by each man's loving his neighbour. Without a church, the religion of love can have but a rudimentary existence; and a narrow, little exclusive church is almost worse than none. A great catholic church is wanted.

444. The invisible church does now embrace all Christendom. Every man who has been brought up in the bosom of Christian civilization does really believe in some form of the principle of love, whether he is aware of doing so, or not.

445. Let us, at any rate, get all the good from the vital element in which we are all at one that it can yield: and the good that it can yield is simply all that is anyway possible, and richer than is easily conceivable. Let us endeavour, then, with all our might to draw together the whole body of believers in the law of love into sympathetic unity of consciousness. Discountenance as immoral all movements that exaggerate differences, or that go to make fellowship depend on formulas invented to exclude some Christians from communion with others.

446. A sapient critic has recently blamed me for defective cocksureness in my metaphysical views. That is no less than an indictment for practicing just as I have always preached.

Absurd was the epithet ever coming to my tongue for persons very confident in opinions which other minds, as good as they, denied. Can you induce the philosophic world to agree upon any assignable creed, or in condemning any specified item in the current creeds of Christendom? I believe not; though doubtless you can gather a sequacious little flock, quite disposed to follow their bell-bearer into every vagary — if you will be satisfied so. For my part, I should think it more lovely to patch up such peace as might be with the great religious world. This happens to be easy to an individual whose unbiased study of scientific logic has led him to conclusions not discordant with traditional dogmas. Unfortunately, such a case is exceptional; and guilt rests on you who insist on so tautening the lines of churches as to close them against the great body of educated and thinking men, pure and undefiled though the religion of many of them (you are obliged to acknowledge it) be. Surely another generation will witness a sweeping reform in this respect. You will not be permitted to make of those churches a permanent laughing-stock for coming ages. Many things are essential to religion which yet ought not to be insisted on: the law of love is not the rule of angry and bullying insistence. Thus, it seems plain to me, I confess, that miracles are intrinsic elements of a genuine religion.* But it is not half so important to emphasize this as it is to draw into our loving communion almost the entire collection of men who unite clear thought with intellectual integrity. And who are you, anyway, who are so zealous to keep the churches small and exclusive? Do you number among your party the great scholars and the great saints? Are you not, on the other hand, egged on by all the notorious humbugs — votaries of Mammon or of Ward McAllister — who deem the attitude of a church-caryatid to be a respectable or a genteel thing? Your voting-power, too, is repleted with many who, as soon as they are a little better informed and educated, will drop away from you; and in these days that education will come speedily.

447. To those who for the present are excluded from the churches, and who, in the passionate intensity of their religious desire, are talking of setting up a church for the scientifically

* Cf. 511ff, 522ff.

educated, a man of my stripe must say, Wait, if you can; it will be but a few years longer; but if you cannot wait, why then Godspeed! Only, do not, in your turn, go and draw lines so as to exclude such as believe a little less — or, still worse, to exclude such as believe a little more — than yourselves. Doubtless, a lot of superstition clings to the historical churches; but superstition is the grime upon the venerable pavement of the sacred edifice, and he who would wash that pavement clean should be willing to get down on his knees to his work inside the church.

448. A religious organization is a somewhat idle affair unless it be sworn in as a regiment of that great army that takes life in hand, with all its delights, in grimmest fight to put down the principle of self-seeking, and to make the principle of love triumphant. It has something more serious to think about than the phraseology of the articles of war. Fall into the ranks then; follow your colonel. Keep your one purpose steadily and alone in view, and you may promise yourself the attainment of your sole desire, which is to hasten the chariot wheels of redeeming love!

§3. THE CHURCH*

449. Many a scientific man and student of philosophy recognizes that it is the Christian church which has made him a man among men. To it he owes consolations, enjoyments, escapes from great perils, and whatever rectitude of heart and purpose may be his. To the monks of the medieval church he owes the preservation of ancient literature; and without the revival of learning he can hardly see how the revival of science would have been possible. To them he owes the framework of his intellectual system, and if he speaks English, a most important part of his daily speech. The law of love which, however little it be obeyed, he holds to be the soul of civilization, came to Europe through Christianity. Besides, religion is a great, perhaps the greatest, factor of that social life which extends beyond one's own circle of personal friends. That life is everything for elevated, and humane, and democratic civilization; and if one renounces the Church, in what other way

* From "Religion and Politics," c. 1895; apparently a proposed letter to a newspaper.

can one as satisfactorily exercise the faculty of fraternizing with all one's neighbours?

450. On the other hand, owe what one may to the Church, the truth claims paramount allegiance; and above the importance of any particular truth, or body of truths, is that of the right methods of reaching the truth. Now the Church requires subscription to a platform — a Creed. And how has that platform been made? With strict party regularity, no doubt. Yet whether it be that of Trent, Lambeth, Geneva, or what, there is not one plank in it that has not, as a matter of historical fact, been inserted with a view of proclaiming the damnation and of procuring the persecution of some body of convinced Christians. Hence it is that the central doctrine of love is not to be found in any one of them. Granting for a moment that exact theology is a vital matter, as all creeds agree to make it (though had it been so deemed by the founder of Christianity he would have laid down his own formula in set terms), can anybody who understands the procedure of science, or has so much as read the first book of Bacon's *Novum Organum*, assent for a moment to the idea that any science, be it theology or any other, can be rightly developed under the impulses of ecclesiastical ambition and the *odium* of priests? Truth is the fruit of free inquiry and of such docility toward facts as shall make us always willing to acknowledge that we are wrong, and anxious to discover that we have been so.

451. The *raison d'être* of a church is to confer upon men a life broader than their narrow personalities, a life rooted in the very truth of being. To do that it must be based upon and refer to a definite and public experience. Fears of hell and hopes of paradise have no such reference; they are matters all sane men confess they know nothing about. Even for the greatest saints, the active motives were not such hopes and fears, but the prospect of leaving behind them fertile seeds of desirable fruits here on earth. It is not the question whether miracles and answers to prayer are abstractly possible. The question is whether they are appreciable constituents of human experiences, worth taking into account in comparison with those great facts of life that no man either doubts or ever will doubt.

CHAPTER 3

A NEGLECTED ARGUMENT FOR THE REALITY OF GOD*

§1. MUSEMENT^E

452. The word "God," so "capitalized" (as we Americans say), is *the* definable proper name, signifying *Ens necessarium*; in my belief Really creator of all three Universes of Experience.

Some words shall herein be capitalized when used, not as vernacular, but as terms defined. Thus an "idea" is the substance of an actual unitary thought or fancy; but "Idea," nearer Plato's idea of *ιδέα*, denotes anything whose Being consists in its mere capacity for getting fully represented, regardless of any person's faculty or impotence to represent it.

453. "Real" is a word invented in the thirteenth century to signify having Properties, *i.e.* characters sufficing to identify their subject, and possessing these whether they be anywise attributed to it by any single man or group of men, or not. Thus, the substance of a dream is not Real, since it was such as it was, merely in that a dreamer so dreamed it; but the fact of the dream is Real, if it was dreamed; since if so, its date, the name of the dreamer, etc. make up a set of circumstances sufficient to distinguish it from all other events; and these belong to it, *i.e.* would be true if predicated of it, whether *A*, *B*, or *C* Actually ascertains them or not. The "Actual" is that which is met with in the past, present, or future.

454. An "Experience" is a brutally produced conscious effect that contributes to a habit, self-controlled, yet so satisfying, on deliberation, as to be destructible by no positive exercise of internal vigour. I use the word "self-controlled" for "controlled by the thinker's self," and not for "uncontrolled" except in its own spontaneous, *i.e.* automatic, self-development, as Professor J. M. Baldwin† uses the word. Take for illustration the sensation undergone by a child that

* *Hibbert Journal*, vol. 7, pp. 90-112 (1908).

† See his *Thought and Things*, p. 261, London (1906).

puts its forefinger into a flame with the acquisition of a habit of keeping all its members out of all flames. A compulsion is "Brute," whose immediate efficacy nowise consists in conformity to rule or reason.

455. Of the three Universes of Experience familiar to us all*, the first comprises all mere Ideas, those airy nothings to which the mind of poet, pure mathematician, or another *might* give local habitation and a name within that mind. Their very airy-nothingness, the fact that their Being consists in mere capability of getting thought, not in anybody's Actually thinking them, saves their Reality. The second Universe is that of the Brute Actuality of things and facts. I am confident that their Being consists in reactions against Brute forces, notwithstanding objections redoubtable until they are closely and fairly examined. The third Universe comprises everything whose being consists in active power to establish connections between different objects, especially between objects in different Universes. Such is everything which is essentially a Sign — not the mere body of the Sign, which is not essentially such, but, so to speak, the Sign's Soul, which has its Being in its power of serving as intermediary between its Object and a Mind. Such, too, is a living consciousness, and such the life, the power of growth, of a plant. Such is a living constitution — a daily newspaper, a great fortune, a social "movement."

456. An "Argument" is any process of thought reasonably tending to produce a definite belief.† An "Argumentation" is an Argument proceeding upon definitely formulated premisses.

457. If God Really be, and be benign, then, in view of the generally conceded truth that religion, were it but proved, would be a good outweighing all others, we should naturally expect that there would be some Argument for His Reality that should be obvious to all minds, high and low alike, that should earnestly strive to find the truth of the matter; and further, that this Argument should present its conclusion, not as a proposition of metaphysical theology, but in a form directly applicable to the conduct of life, and full of nutrition

* Cf. 4.545ff.

† Cf. 2.266ff, 3.160.

for man's highest growth. What I shall refer to as the N.A. — the Neglected Argument — seems to me best to fulfill this condition, and I should not wonder if the majority of those whose own reflections have harvested belief in God must bless the radiance of the N.A. for that wealth. Its persuasiveness is no less than extraordinary; while it is not unknown to anybody. Nevertheless, of all those theologians (within my little range of reading) who, with commendable assiduity, scrape together all the sound reasons they can find or concoct to prove the first proposition of theology, few mention this one, and they most briefly. They probably share those current notions of logic which recognize no other Arguments than Argumentations.

458. There is a certain agreeable occupation of mind which, from its having no distinctive name, I infer is not as commonly practiced as it deserves to be; for indulged in moderately — say through some five to six per cent of one's waking time, perhaps during a stroll — it is refreshing enough more than to repay the expenditure. Because it involves no purpose save that of casting aside all serious purpose, I have sometimes been half-inclined to call it reverie with some qualification; but for a frame of mind so antipodal to vacancy and dreaminess such a designation would be too excruciating a misfit. In fact, it is Pure Play. Now, Play, we all know, is a lively exercise of one's powers. Pure Play has no rules, except this very law of liberty. It bloweth where it listeth. It has no purpose, unless recreation. The particular occupation I mean — a *petite bouchée* with the Universes — may take either the form of æsthetic contemplation, or that of distant castle-building (whether in Spain or within one's own moral training), or that of considering some wonder in one of the Universes, or some connection between two of the three, with speculation concerning its cause. It is this last kind — I will call it "Musement" on the whole — that I particularly recommend, because it will in time flower into the N. A. One who sits down with the purpose of becoming convinced of the truth of religion is plainly not inquiring in scientific singleness of heart, and must always suspect himself of reasoning unfairly. So he can never attain the entirety even of a physicist's belief in electrons, although this is avowedly but pro-

visional. But let religious meditation be allowed to grow up spontaneously out of Pure Play without any breach of continuity, and the Muser will retain the perfect candour proper to Musement.

459. If one who had determined to make trial of Musement as a favorite recreation were to ask me for advice, I should reply as follows: The dawn and the gloaming most invite one to Musement; but I have found no watch of the nychthemeron that has not its own advantages for the pursuit. It begins passively enough with drinking in the impression of some nook in one of the three Universes. But impression soon passes into attentive observation, observation into musing, musing into a lively give and take of communion between self and self. If one's observations and reflections are allowed to specialize themselves too much, the Play will be converted into scientific study; and that cannot be pursued in odd half hours.

460. I should add: Adhere to the one ordinance of Play, the law of liberty. I can testify that the last half century, at least, has never lacked tribes of Sir Oracles, colporting brocards to bar off one or another roadway of inquiry; and a Rabelais would be needed to bring out all the fun that has been packed in their airs of infallibility. Auguste Comte, notwithstanding his having apparently produced some unquestionably genuine thinking, was long the chief of such a band. The vogue of each particular maxim of theirs was necessarily brief. For what distinction can be gained by repeating saws heard from all mouths? No bygone fashion seems more grotesque than a *panache* of obsolete wisdom. I remember the days when a pronouncement all the rage was that no science must borrow the methods of another; the geologist must not use a microscope, nor the astronomer a spectroscope. Optics must not meddle with electricity, nor logic with algebra. But twenty years later, if you aspired to pass for a commanding intellect, you would have to pull a long face and declare that "It is not the business of science to search for origins." This maxim was a masterpiece, since no timid soul, in dread of being thought naive, would dare inquire what "origins" were, albeit the secret confessor within his breast compelled the awful self-acknowledgment of his

having no idea into what else than "origins" of phenomena (in some sense of that indefinite word) man can inquire. That human reason can comprehend some causes is past denial, and once we are forced to recognize a given element in experience, it is reasonable to await positive evidence before we complicate our acknowledgment with qualifications. Otherwise, why venture beyond direct observation? Illustrations of this principle abound in physical science. Since, then, it is certain that man is able to understand the laws and the causes of some phenomena, it is reasonable to assume, in regard to any given problem, that it would get rightly solved by man, if a sufficiency of time and attention were devoted to it. Moreover, those problems that at first blush appear utterly insoluble receive, in that very circumstance, as Edgar Poe remarked* in his "The Murders in the Rue Morgue," their smoothly-fitting keys. This particularly adapts them to the Play of Musement.

461. Forty or fifty minutes of vigorous and unslackened analytic thought bestowed upon one of them usually suffices to educe from it all there is to educe, its general solution. There is no kind of reasoning that I should wish to discourage in Musement; and I should lament to find anybody confining it to a method of such moderate fertility as logical analysis. Only, the Player should bear in mind that the higher weapons in the arsenal of thought are not playthings but edge-tools. In any mere Play they can be used by way of exercise alone; while logical analysis can be put to its full efficiency in Musement. So, continuing the counsels that had been asked of me, I should say, "Enter your skiff of Musement, push off into the lake of thought, and leave the breath of heaven to swell your sail. With your eyes open, awake to what is about or within you, and open conversation with yourself; for such is all meditation." It is, however, not a conversation in words alone, but is illustrated, like a lecture, with diagrams and with experiments.

462. Different people have such wonderfully different ways of thinking that it would be far beyond my competence

* "It appears to me that this mystery is considered insoluble for the very reason which should cause it to be regarded as easy of solution. I mean the outré character of its features."

to say what courses Musements might not take; but a brain endowed with automatic control, as man's indirectly is, is so naturally and rightly interested in its own faculties that some psychological and semi-psychological questions would doubtless get touched; such, in the latter class, as this: Darwinians, with truly surprising ingenuity, have concocted, and with still more astonishing confidence have accepted as proved, one explanation for the diverse and delicate beauties of flowers, another for those of butterflies, and so on; but why is all nature — the forms of trees, the compositions of sunsets — suffused with such beauties throughout, and not nature only, but the other two Universes as well? Among more purely psychological questions, the nature of pleasure and pain will be likely to attract attention. Are they mere qualities of feeling, or are they rather motor instincts attracting us to some feelings and repelling others? Have pleasure and pain the same sort of constitution, or are they contrasted in this respect, pleasure arising upon the forming or strengthening of an association by resemblance, and pain upon the weakening or disruption of such a habit or conception?*

463. Psychological speculations will naturally lead on to musings upon metaphysical problems proper, good exercise for a mind with a turn for exact thought. It is here that one finds those questions that at first seem to offer no handle for reason's clutch, but which readily yield to logical analysis. But problems of metaphysics will inevitably present themselves that logical analysis will not suffice to solve. Some of the best will be motived by a desire to comprehend universe-wide aggregates of unformulated but partly experienced phenomena. I would suggest that the Muser be not too impatient to analyze these, lest some significant ingredient be lost in the process; but that he begin by pondering them from every point of view, until he seems to read some truth beneath the phenomena.

464. At this point a trained mind will demand that an examination be made of the truth of the interpretation; and the first step in such examination must be a logical analysis of the theory. But strict examination would be a task a little too serious for the Musement of hour fractions, and if

* Cf. 1.333.

it is postponed there will be ample remuneration even in the suggestions that there is not time to examine; especially since a few of them will appeal to reason as all but certain.

Let the Muser, for example, after well appreciating, in its breadth and depth, the unspeakable variety of each Universe, turn to those phenomena that are of the nature of homogeneities of connectedness in each; and what a spectacle will unroll itself! As a mere hint of them I may point out that every small part of space, however remote, is bounded by just such neighbouring parts as every other, without a single exception throughout immensity. The matter of Nature is in every star of the same elementary kinds, and (except for variations of circumstance), what is more wonderful still, throughout the whole visible universe, about the same proportions of the different chemical elements prevail. Though the mere catalogue of known carbon-compounds alone would fill an unwieldy volume, and perhaps, if the truth were known, the number of amino-acids alone is greater, yet it is unlikely that there are in all more than about 600 elements, of which 500 dart through space too swiftly to be held down by the earth's gravitation, coronium being the slowest-moving of these. This small number bespeaks comparative simplicity of structure. Yet no mathematician but will confess the present hopelessness of attempting to comprehend the constitution of the hydrogen-atom, the simplest of the elements that can be held to earth.

465. From speculations on the homogeneities of each Universe, the Muser will naturally pass to the consideration of homogeneities and connections between two different Universes, or all three. Especially in them all we find one type of occurrence, that of growth, itself consisting in the homogeneities of small parts. This is evident in the growth of motion into displacement, and the growth of force into motion. In growth, too, we find that the three Universes conspire; and a universal feature of it is provision for later stages in earlier ones. This is a specimen of certain lines of reflection which will inevitably suggest the hypothesis of God's Reality. It is not that such phenomena might not be capable of being accounted for, in one sense, by the action of chance with the smallest conceivable dose of a higher element; for if by God

be meant the *Ens necessarium*, that very hypothesis requires that such should be the case. But the point is that that sort of explanation leaves a mental explanation just as needful as before. Tell me, upon sufficient authority, that all cerebration depends upon movements of neurites that strictly obey certain physical laws, and that thus all expressions of thought, both external and internal, receive a physical explanation, and I shall be ready to believe you. But if you go on to say that this explodes the theory that my neighbour and myself are governed by reason, and are thinking beings, I must frankly say that it will not give me a high opinion of your intelligence. But however that may be, in the Pure Play of Musement the idea of God's Reality will be sure sooner or later to be found an attractive fancy, which the Muser will develop in various ways. The more he ponders it, the more it will find response in every part of his mind, for its beauty, for its supplying an ideal of life, and for its thoroughly satisfactory explanation of his whole threefold environment.

§2. THE HYPOTHESIS OF GOD^E

466. The hypothesis of God is a peculiar one, in that it supposes an infinitely incomprehensible object, although every hypothesis, as such, supposes its object to be truly conceived in the hypothesis. This leaves the hypothesis but one way of understanding itself; namely, as vague yet as true so far as it is definite, and as continually tending to define itself more and more, and without limit. The hypothesis, being thus itself inevitably subject to the law of growth, appears in its vagueness to represent God as so, albeit this is directly contradicted in the hypothesis from its very first phase. But this apparent attribution of growth to God, since it is ineradicable from the hypothesis, cannot, according to the hypothesis, be flatly false. Its implications concerning the Universes will be maintained in the hypothesis, while its implications concerning God will be partly disavowed, and yet held to be less false than their denial would be. Thus the hypothesis will lead to our thinking of features of each Universe as purposed; and this will stand or fall with the hypothesis. Yet a purpose essentially involves growth, and so cannot be

attributed to God. Still it will, according to the hypothesis, be less false to speak so than to represent God as purposeless.

467. Assured as I am from my own personal experience that every man capable of so controlling his attention as to perform a little exact thinking will, if he examines Zeno's argument about Achilles and the tortoise, come to think, as I do, that it is nothing but a contemptible catch,* I do not think that I either am or ought to be less assured, from what I know of the effects of Musement on myself and others, that any normal man who considers the three Universes in the light of the hypothesis of God's Reality, and pursues that line of reflection in scientific singleness of heart, will come to be stirred to the depths of his nature by the beauty of the idea and by its august practicality, even to the point of earnestly loving and adoring his strictly hypothetical God, and to that of desiring above all things to shape the whole conduct of life and all the springs of action into conformity with that hypothesis. Now to be deliberately and thoroughly prepared to shape one's conduct into conformity with a proposition is neither more nor less than the state of mind called Believing that proposition, however long the conscious classification of it under that head be postponed.†

§3. THE THREE STAGES OF INQUIRY^E

468. There is my poor sketch of the Neglected Argument, greatly cut down to bring it within the limits assigned to this article. Next should come the discussion of its logicity; but nothing readable at a sitting could possibly bring home to readers my full proof of the principal points of such an examination. I can only hope to make the residue of this paper a sort of table of contents, from which some may possibly guess what I have to say; or to lay down a series of plausible points through which the reader will have to construct the continuous line of reasoning for himself. In my own mind the proof is elaborated, and I am exerting my energies to getting it submitted to public censure. My present abstract will divide itself into three unequal parts. The first shall give the headings of the different steps of every well-conducted and

* See 177ff.

† See 5.397ff.

complete inquiry, without noticing possible divergencies from the norm. I shall have to mention some steps which have nothing to do with the Neglected Argument in order to show that they add no jot nor tittle to the truth which is invariably brought just as the Neglected Argument brings it. The second part shall very briefly state, without argument (for which there is no room), just wherein lies the logical validity of the reasoning characteristic of each of the main stages of inquiry. The third part shall indicate the place of the Neglected Argument in a complete inquiry into the Reality of God, and shall show how well it would fill that place, and what its logical value is supposing the inquiry to be limited to this; and I shall add a few words to show how it might be supplemented.

469. Every inquiry whatsoever takes its rise in the observation, in one or another of the three Universes, of some surprising phenomenon, some experience which either disappoints an expectation, or breaks in upon some habit of expectation of the *inquisiturus*; and each apparent exception to this rule only confirms it. There are obvious distinctions between the objects of surprise in different cases; but throughout this slight sketch of inquiry such details will be unnoticed, especially since it is upon such that the logic-books descant. The inquiry begins with pondering these phenomena in all their aspects, in the search of some point of view whence the wonder shall be resolved. At length a conjecture arises that furnishes a possible Explanation, by which I mean a syllogism exhibiting the surprising fact as necessarily consequent upon the circumstances of its occurrence together with the truth of the credible conjecture, as premisses.* On account of this Explanation, the inquirer is led to regard his conjecture, or hypothesis, with favor. As I phrase it, he provisionally holds it to be "Plausible"; this acceptance ranges in different cases — and reasonably so — from a mere expression of it in the interrogative mood, as a question meriting attention and reply, up through all appraisals of Plausibility, to uncontrollable inclination to believe. The whole series of mental performances between the notice of the wonderful phenomenon and the acceptance of the hypothesis, during which the usually docile understanding seems to hold the bit between

* Cf. 2.622ff.

its teeth and to have us at its mercy, the search for pertinent circumstances and the laying hold of them, sometimes without our cognizance, the scrutiny of them, the dark laboring, the bursting out of the startling conjecture, the remarking of its smooth fitting to the anomaly, as it is turned back and forth like a key in a lock, and the final estimation of its Plausibility, I reckon as composing the First Stage of Inquiry. Its characteristic formula of reasoning I term Retroduction,* *i.e.* reasoning from consequent to antecedent. In one respect the designation seems inappropriate; for in most instances where conjecture mounts the high peaks of Plausibility — and is *really* most worthy of confidence — the inquirer is unable definitely to formulate just what the explained wonder is; or can only do so in the light of the hypothesis. In short, it is a form of Argument rather than of Argumentation.

470. Retroduction does not afford security. The hypothesis must be tested.

This testing, to be logically valid, must honestly start, not as Retroduction starts, with scrutiny of the phenomena, but with examination of the hypothesis, and a muster of all sorts of conditional experiential consequences which would follow from its truth. This constitutes the Second Stage of Inquiry. For its characteristic form of reasoning our language has, for two centuries, been happily provided with the name Deduction.

471. Deduction has two parts. For its first step must be by logical analysis to Explicate the hypothesis, *i.e.* to render it as perfectly distinct as possible. This process, like Retroduction, is Argument that is not Argumentation. But unlike Retroduction, it cannot go wrong from lack of experience, but so long as it proceeds rightly must reach a true conclusion. Explication is followed by Demonstration, or Deductive Argumentation. Its procedure is best learned from Book I of Euclid's *Elements*, a masterpiece which in real insight is far superior to Aristotle's *Analytics*; and its numerous fallacies render it all the more instructive to a close student. It invariably requires something of the nature of a diagram; that is, an "Icon," or Sign that represents its Object in resembling it. It usually, too, needs "Indices," or Signs that represent their Objects by being actually connected with them. But it is

* Or Abduction. See 2.708ff, 2.755 and vol. 5, bk. I, ch. 7.

mainly composed of "Symbols," or Signs that represent their Objects essentially because they will be so interpreted. Demonstration should be *Corollarial* when it can. An accurate definition of Corollarial Demonstration would require a long explanation; but it will suffice to say that it limits itself to considerations already introduced or else involved in the Explication of its conclusion; while *Theorematic* Demonstration resorts to a more complicated process of thought.*

472. The purpose of Deduction, that of collecting consequents of the hypothesis, having been sufficiently carried out, the inquiry enters upon its Third Stage, that of ascertaining how far those consequents accord with Experience, and of judging accordingly whether the hypothesis is sensibly correct, or requires some inessential modification, or must be entirely rejected. Its characteristic way of reasoning is Induction. This stage has three parts. For it must begin with Classification, which is an Inductive Non-argumentational kind of Argument, by which general Ideas are attached to objects of Experience; or rather by which the latter are subordinated to the former. Following this will come the testing-argumentations, the Probations; and the whole inquiry will be wound up with the Sentential part of the Third Stage, which, by Inductive reasonings, appraises the different Probations singly, then their combinations, then makes self-appraisal of these very appraisals themselves, and passes final judgment on the whole result.

473. The Probations, or direct Inductive Argumentations, are of two kinds. The first is that which Bacon ill described as "*inductio illa quæ procedit per enumerationem simplicem.*" So at least he has been understood. For an enumeration of instances is not essential to the argument that, for example, there are no such beings as fairies, or no such events as miracles. The point is that there is no well-established instance of such a thing. I call this Crude Induction.† It is the only Induction which concludes a logically Universal Proposition. It is the weakest of arguments, being liable to be demolished in a moment, as happened toward the end of the eighteenth century to the opinion of the scientific world that no stones

* Cf. 2.267.

† Cf. 2.756ff.

fall from the sky. The other kind is Gradual Induction,* which makes a new estimate of the proportion of truth in the hypothesis with every new instance; and given any degree of error there will *sometime* be an estimate (or would be, if the probation were persisted in) which will be absolutely the last to be infected with so much falsity. Gradual Induction is either Qualitative or Quantitative and the latter either depends on measurements, or on statistics, or on countings.

§4. THE VALIDITY OF THE THREE STAGES^E

474. Concerning the question of the nature of the logical validity possessed by Deduction, Induction, and Retrodution, which is still an arena of controversy, I shall confine myself to stating the opinions which I am prepared to defend by positive proofs. The validity of Deduction was correctly, if not very clearly, analyzed by Kant.† This kind of reasoning deals exclusively with Pure Ideas attaching primarily to Symbols and derivatively to other Signs of our own creation; and the fact that man has a power of Explicating his own meaning renders Deduction valid. Induction is a kind of reasoning that may lead us into error; but that it follows a method which, sufficiently persisted in, will be Inductively Certain (the sort of certainty we have that a perfect coin, pitched up often enough, will *sometime* turn up heads) to diminish the error below any predesignate degree, is assured by man's power of perceiving Inductive Certainty. In all this I am inviting the reader to peep through the big end of the telescope; there is a wealth of pertinent detail that must here be passed over.

475. Finally comes the bottom question of logical Critic,‡ What sort of validity can be attributed to the First Stage of inquiry? Observe that neither Deduction nor Induction contributes the smallest positive item to the final conclusion of the inquiry. They render the indefinite definite; Deduction Explicates; Induction evaluates: that is all. Over the chasm that yawns between the ultimate goal of science and such ideas of Man's environment as, coming over him during his

* Cf. 2.758f.

† *Kritik der Reinen Vernunft*, A154–158; B193–197.

‡ See 2.93.

primeval wanderings in the forest, while yet his very notion of error was of the vaguest, he managed to communicate to some fellow, we are building a cantilever bridge of induction, held together by scientific struts and ties. Yet every plank of its advance is first laid by Retroduction alone, that is to say, by the spontaneous conjectures of instinctive reason; and neither Deduction nor Induction contributes a single new concept to the structure. Nor is this less true or less important for those inquiries that self-interest prompts.

476. The first answer we naturally give to this question is that we cannot help accepting the conjecture at such a valuation as that at which we do accept it; whether as a simple interrogation, or as more or less Plausible, or, occasionally, as an irresistible belief. But far from constituting, by itself, a logical justification such as it becomes a rational being to put forth, this pleading, that we *cannot help* yielding to the suggestion, amounts to nothing more than a confession of having failed to train ourselves to control our thoughts. It is more to the purpose, however, to urge that the strength of the impulse is a symptom of its being instinctive. Animals of all races rise far above the general level of their intelligence in those performances that are their proper function, such as flying and nest-building for ordinary birds; and what is man's proper function if it be not to embody general ideas in art-creations, in utilities, and above all in theoretical cognition? To give the lie to his own consciousness of divining the reasons of phenomena would be as silly in a man as it would be in a fledgling bird to refuse to trust to its wings and leave the nest, because the poor little thing had read Babinet,* and judged aerostation to be impossible on hydrodynamical grounds. Yes; it must be confessed that *if we knew* that the impulse to prefer one hypothesis to another really were analogous to the instincts of birds and wasps, it would be foolish not to give it play, within the bounds of reason; especially since we must entertain some hypothesis, or else forego all further knowledge than that which we have already gained by that very means. But is it a fact that man possesses this magical faculty? Not, I reply, to the extent of guessing right

* Jacques Babinet (1794-1872), a popular writer on hydrodynamics and many other scientific subjects.

the first time, nor perhaps the second; but that the well-prepared mind has wonderfully soon guessed each secret of nature is historical truth. All the theories of science have been so obtained. But may they not have come fortuitously, or by some such modification of chance as the Darwinian supposes? I answer that three or four independent methods of computation show that it would be ridiculous to suppose our science to have so come to pass. Nevertheless, suppose that it can be so "explained," just as that any purposed act of mine is supposed by materialistic necessitarians to have come about. Still, what of it? Does that materialistic explanation, supposing it granted, show that reason has nothing to do with my actions? Even the parallelists will admit that the one explanation leaves the same need of the other that there was before it was given; and this is certainly sound logic. There is a reason, an interpretation, a logic, in the course of scientific advance, and this indisputably proves to him who has perceptions of rational or significant relations, that man's mind must have been attuned to the truth of things in order to discover what he has discovered. It is the very bedrock of logical truth.

477. Modern science has been builded after the model of Galileo, who founded it, on *il lume naturale*. That truly inspired prophet had said that, of two hypotheses, the *simpler* is to be preferred;* but I was formerly one of those who, in our dull self-conceit fancying ourselves more sly than he, twisted the maxim to mean the *logically* simpler, the one that adds the least to what has been observed, in spite of three obvious objections: first, that so there was no support for any hypothesis; secondly, that by the same token we ought to content ourselves with simply formulating the special observations actually made; and thirdly, that every advance of science that further opens the truth to our view discloses a world of unexpected complications. It was not until long experience forced me to realize that subsequent discoveries were every time showing I had been wrong, while those who understood the maxim as Galileo had done, early unlocked the secret,

* See "Dialogues Concerning the Two Great Systems of the World," in *Mathematical Collections and Translations* of Thomas Salisbury, vol. 1, p. 301, London (1661).

that the scales fell from my eyes and my mind awoke to the broad and flaming daylight that it is the simpler Hypothesis in the sense of the more facile and natural, the one that instinct suggests, that must be preferred; for the reason that, unless man have a natural bent in accordance with nature's, he has no chance of understanding nature at all. Many tests of this principal and positive fact, relating as well to my own studies as to the researches of others, have confirmed me in this opinion; and when I shall come to set them forth in a book, their array will convince everybody. Oh, no! I am forgetting that armour, impenetrable by accurate thought, in which the rank and file of minds are clad! They may, for example, get the notion that my proposition involves a denial of the rigidity of the laws of association: it would be quite on a par with much that is current. I do not mean that logical simplicity is a consideration of no value at all, but only that its value is badly secondary to that of simplicity in the other sense.

If, however, the maxim is correct in Galileo's sense, whence it follows that man has, in some degree, a divinatory power, primary or derived, like that of a wasp or a bird, then instances swarm to show that a certain altogether peculiar confidence in a hypothesis, not to be confounded with rash cocksureness, has a very appreciable value as a sign of the truth of the hypothesis. I regret I cannot give an account of certain interesting and almost convincing cases. The N. A. excites this peculiar confidence in the very highest degree.

§5. PRAGMATICISM*^E

478. We have now to apply these principles to the evaluation of the N. A. Had I space I would put this into the shape of imagining how it is likely to be esteemed by three types of men: the first of small instruction with corresponding natural breadth, intimately acquainted with the N. A., but to whom logic is all Greek; the second, inflated with current notions of logic, but prodigiously informed about the N. A.; the third, a trained man of science who, in the modern spirit, has added to his specialty an exact theoretical and practical study

* In a letter to William James, November 17, 1908, Peirce says, "I had never contemplated the possibility of the last section's being published."

of reasoning and the elements of thought, so that psychologists account him a sort of psychologist, and mathematicians a sort of mathematician.

479. I should, then, show how the first would have learned that nothing has any kind of value in itself — whether æsthetic, moral, or scientific — but only in its place in the whole production to which it appertains; and that an individual soul with its petty agitations and calamities is a zero except as filling its infinitesimal place, and accepting his little futility as his entire treasure. He will see that though his God would not *really* (in a certain sense) adapt means to ends, it is nevertheless quite true that there are relations among phenomena which finite intelligence must interpret, and truly interpret, as such adaptations; and he will macarize himself for his own bitterest griefs, and bless God for the law of growth with all the fighting it imposes upon him — Evil, *i.e.* what it is man's duty to fight, being one of the major perfections of the Universe. In that fight he will endeavour to perform just the duty laid upon him and no more. Though his desperate struggles should issue in the horrors of his rout, and he should see the innocents who are dearest to his heart exposed to torments, frenzy and despair, destined to be smirched with filth, and stunted in their intelligence, still he may hope that it be best *for them*, and will tell himself that in any case the secret design of God will be perfected through their agency; and even while still hot from the battle, will submit with adoration to His Holy will. He will not worry because the Universes were not constructed to suit the scheme of some silly scold.

480. The context of this I must leave the reader to imagine. I will only add that the third man, considering the complex process of self-control, will see that the hypothesis, irresistible though it be to first intention, yet needs Probation; and that though an infinite being is not tied down to any consistency, yet man, like any other animal, is gifted with power of understanding sufficient for the conduct of life. This brings him, for testing the hypothesis, to taking his stand upon Pragmaticism, which implies faith in common sense and in instinct, though only as they issue from the cupel-furnace of measured criticism. In short, he will say that the

N. A. is the First Stage of a scientific inquiry, resulting in a hypothesis of the very highest Plausibility, whose ultimate test must lie in its value in the self-controlled growth of man's conduct of life.

481.* Since I have employed the word *Pragmaticism*, and shall have occasion to use it once more, it may perhaps be well to explain it. About forty years ago, my studies of Berkeley, Kant, and others led me, after convincing myself that all thinking is performed in Signs, and that meditation takes the form of a dialogue, so that it is proper to speak of the "meaning" of a concept, to conclude that to acquire full mastery of that meaning it is requisite, in the first place, to learn to recognize the concept under every disguise, through extensive familiarity with instances of it. But this, after all, does not imply any true understanding of it; so that it is further requisite that we should make an abstract logical analysis of it into its ultimate elements, or as complete an analysis as we can compass. But, even so, we may still be without any living comprehension of it; and the only way to complete our knowledge of its nature is to discover and recognize just what general habits of conduct a belief in the truth of the concept (of any conceivable subject, and under any conceivable circumstances) would reasonably develop; that is to say, what habits would ultimately result from a sufficient consideration of such truth. It is necessary to understand the word "conduct," here, in the broadest sense. If, for example, the predication of a given concept were to lead to our admitting that a given form of reasoning concerning the subject of which it was affirmed was valid, when it would not otherwise be valid, the recognition of that effect in our reasoning would decidedly be a habit of conduct.

482. In 1871, in a Metaphysical Club in Cambridge, Massachusetts, I used to preach this principle as a sort of logical gospel, representing the unformulated method followed by Berkeley, and in conversation about it I called it "Pragmatism."† In December [November] 1877 and January 1878 I set forth the doctrine in the *Popular Science Monthly*; and

* Cf. 3.457, 5.388ff.

† See 5.12f.

the two parts of my essay were printed in French in the *Revue Philosophique*, volumes vi and vii.* Of course, the doctrine attracted no particular attention, for, as I had remarked in my opening sentence, very few people care for logic. But in 1897 Professor James remodelled the matter, and transmogrified it into a doctrine of philosophy,† some parts of which I highly approved, while other and more prominent parts I regarded, and still regard, as opposed to sound logic. About the time Professor Papini‡ discovered, to the delight of the Pragmatist school, that this doctrine was incapable of definition, which would certainly seem to distinguish it from every other doctrine in whatever branch of science, I was coming to the conclusion that my poor little maxim should be called by another name; and accordingly, in April, 1905 I renamed it *Pragmatism*.§ I had never before dignified it by any name in print, except that, at Professor Baldwin's request, I wrote a definition of it for his *Dictionary of Psychology and Philosophy*.¶ I did not insert the word in the *Century Dictionary*, though I had charge of the philosophical definitions of that work;|| for I have a perhaps exaggerated dislike of *réclame*.

483. It is that course of meditation upon the three Universes which gives birth to the hypothesis and ultimately to the belief that they, or at any rate two of the three, have a Creator independent of them, that I have throughout this article called the N. A., because I think the theologians ought to have recognized it as a line of thought reasonably productive of belief. This is the "humble" argument, the innermost of the nest.° In the mind of a metaphysician it will have a metaphysical tinge; but that seems to me rather to detract from its force than to add anything to it. It is just as good an argument, if not better, in the form it takes in the mind of the clodhopper.

* See note to vol. 5, bk. II, Paper No. IV.

† See *The Will to Believe and Other Essays in Popular Philosophy* (1897).

‡ See "What Pragmatism is Like," *Popular Science Monthly*, vol. 71, p. 351 (1907).

§ See 5.414.

¶ See 5.1f.

|| See 1.106n, 5.13n.

° See 486.

484. The theologians could not have *presented* the N. A.; because that is a living course of thought of very various forms. But they might and ought to have *described* it, and should have defended it, too, as far as they could, without going into original logical researches, which could not be justly expected of them. They are accustomed to make use of the principle that that which convinces a normal man must be presumed to be sound reasoning; and therefore they ought to say whatever can truly be advanced to show that the N. A., if sufficiently developed, will convince any normal man. Unfortunately, it happens that there is very little established fact to show that this is the case. I have not pretended to have any other ground for my belief that it is so than my assumption, which each one of us makes, that my own intellectual disposition is normal. I am forced to confess that no pessimist will agree with me. I do not admit that pessimists are, at the same time, thoroughly sane, and in addition are endowed in normal measure with intellectual vigour; and my reasons for thinking so are two. The first is, that the difference between a pessimistic and an optimistic mind is of such controlling importance in regard to every intellectual function, and especially for the conduct of life, that it is out of the question to admit that both are normal, and the great majority of mankind are naturally optimistic. Now, the majority of every race depart but little from the norm of that race. In order to present my other reason, I am obliged to recognize three types of pessimists. The first type is often found in exquisite and noble natures of great force of original intellect whose own lives are dreadful histories of torment due to some physical malady. Leopardi is a famous example. We cannot but believe, against their earnest protests, that if such men had had ordinary health, life would have worn for them the same colour as for the rest of us. Meantime, one meets too few pessimists of this type to affect the present question. The second is the misanthropical type, the type that makes itself heard. It suffices to call to mind the conduct of the famous pessimists of this kind, Diogenes the Cynic, Schopenhauer, Carlyle, and their kin with Shakespeare's Timon of Athens, to recognize them as diseased minds. The third is the philanthropical type, people whose lively sympathies,

easily excited, become roused to anger at what they consider the stupid injustices of life. Being easily interested in everything, without being overloaded with exact thought of any kind, they are excellent raw material for *littérateurs*: witness Voltaire. No individual remotely approaching the calibre of a Leibnitz is to be found among them.

485. The third argument, enclosing and defending the other two, consists in the development of those principles of logic according to which the humble argument is the first stage of a scientific inquiry into the origin of the three Universes, but of an inquiry which produces, not merely scientific belief, which is always provisional, but also a living, practical belief, logically justified in crossing the Rubicon with all the freightage of eternity. The presentation of this argument would require the establishment of several principles of logic that the logicians have hardly dreamed of, and particularly a strict proof of the correctness of the maxim of Pragmaticism. My original essay, having been written for a popular monthly, assumes, for no better reason than that real inquiry cannot begin until a state of real doubt arises and ends as soon as Belief is attained, that "a settlement of Belief," or, in other words, a state of *satisfaction*, is all that Truth, or the aim of inquiry, consists in.* The reason I gave for this was so flimsy, while the inference was so nearly the gist of Pragmaticism, that I must confess the argument of that essay might with some justice be said to beg the question. The first part of the essay, † however, is occupied with showing that, if Truth consists in satisfaction, it cannot be any *actual* satisfaction, but must be the satisfaction which *would* ultimately be found if the inquiry were pushed to its ultimate and indefeasible issue. This, I beg to point out, is a very different position from that of Mr. Schiller and the pragmatists of today.‡ I trust I shall be believed when I say that it is only a desire to avoid being misunderstood in consequence of my relations with pragmatism, and by no means as arrogating any superior immunity from error which I have too good reason to know that I do not enjoy, that leads me to express my personal senti-

* See 5.375.

† See 5.365ff.

‡ See 5.552, 5.555f.

ments about their tenets. Their avowedly undefinable position, if it be not capable of logical characterization, seems to me to be characterized by an angry hatred of strict logic, and even some disposition to rate any exact thought which interferes with their doctrines as all humbug. At the same time, it seems to me clear that their approximate acceptance of the Pragmaticist principle, and even that very casting aside of difficult distinctions (although I cannot approve of it), has helped them to a mightily clear discernment of some fundamental truths that other philosophers have seen but through a mist, and most of them not at all. Among such truths — all of them old, of course, yet acknowledged by few — I reckon their denial of necessitarianism; their rejection of any “consciousness” different from a visceral or other external sensation; their acknowledgment that there are, in a Pragmatistical sense, Real habits (which Really *would* produce effects, under circumstances that may not happen to get actualized, and are thus Real generals); and their insistence upon interpreting all hypostatic abstractions in terms of what they *would* or *might* (not actually *will*) come to in the concrete. It seems to me a pity they should allow a philosophy so instinct with life to become infected with seeds of death in such notions as that of the unreality of all ideas of infinity* and that of the mutability of truth,† and in such confusions of thought as that of active willing (willing to control thought, to doubt, and to weigh reasons) with willing not to exert the will (willing to believe).‡

§6. ADDITAMENT§^P

486. A nest of three arguments for the Reality of God has now been sketched, though none of them could, in the limits of a single article, be fairly presented. The first is that entirely honest, sincere and unaffected, because unpremeditated, meditation upon the Idea of God, into which the Play of Musement will inevitably sooner or later lead, and which, by developing

* F. C. S. Schiller, *Humanism*, p. 314, note, London (1903); *Studies in Humanism*, p. 295, London (1907).

† William James, *Pragmatism*, p. 59ff, New York (1908).

‡ William James, *The Will to Believe*, p. 11, New York (1899).

§ c. 1910; 491 is from an alternative draft.

a deep sense of the adorability of that Idea, will produce a truly religious Belief in His Reality and His nearness. It is a reasonable argument, because it naturally results in the most intense and living determination (*Bestimmung*) of the soul toward shaping the Muser's whole conduct into conformity with the Hypothesis that God is Real and very near; and such a determination of the soul in regard to any proposition is the very essence of a living Belief in such proposition. This is that "humble argument," open to every honest man, which I surmise to have made more worshippers of God than any other.

487. The second of the nest is the argument which seems to me to have been "neglected" by writers upon natural theology, consisting in showing that the humble argument is the natural fruit of free meditation, since every heart will be ravished by the beauty and adorability of the Idea, when it is so pursued. Were the theologians able to perceive the force of this argument, they would make it such a presentation of universal human nature as to show that a latent tendency toward belief in God is a fundamental ingredient of the soul, and that, far from being a vicious or superstitious ingredient, it is simply the natural precipitate of meditation upon the origin of the Three Universes. Of course, it could not, any more than any other theological argumentation, have the value or the religious vitality of the "Humble Argument"; for it would only be an apology — a vindicatory description — of the mental operations which the Humble Argument actually and actively lives out. Though this is properly the neglected argument, yet I have sometimes used the abbreviation "the N. A." for the whole nest of three.

488. The third argument of the nest consists in a study of logical methodetic, illuminated by the light of a first-hand acquaintance with genuine scientific thought — the sort of thought whose tools literally comprise not merely Ideas of mathematical exactitude, but also the apparatus of the skilled manipulator, actually in use. The student, applying to his own trained habits of research the art of logical analysis — an art as elaborate and methodical as that of the chemical analyst, compares the process of thought of the Muser upon the Three Universes with certain parts of the work of scien-

tific discovery, and finds that the "Humble Argument" is nothing but an instance of the first stage of all such work, the stage of observing the facts, or variously rearranging them, and of pondering them until, by their reactions with the results of previous scientific experience, there is "evolved" (as the chemists word it) an explanatory hypothesis. He will note, however, that this instance of Retroduction, undeniable as this character is, departs widely from the ordinary run of instances, especially in three respects. In the first place, the Plausibility of the hypothesis reaches an almost unparalleled height among deliberately formed hypotheses. So hard is it to doubt God's Reality, when the Idea has sprung from Musement, that there is great danger that the investigation will stop at this first stage, owing to the indifference of the Muser to any further proof of it. At the same time, this very Plausibility is undoubtedly an argument of no small weight in favor of the truth of the hypothesis.

489. In the second place, although it is a chief function of an explanatory hypothesis (and some philosophers say the only one) to excite a clear image in the mind by means of which experiential consequences of ascertainable conditions may be predicted, yet in this instance the hypothesis can only be apprehended so very obscurely that in exceptional cases alone can any definite and direct deduction from its ordinary abstract interpretation be made. How, for example, can we ever expect to be able to predict what the conduct would be, even of [an] omniscient being, governing no more than one poor solar system for only a million years or so? How much less if, being also omnipotent, he be thereby freed from all experience, all desire, all intention! Since God, in His essential character of *Ens necessarium*, is a disembodied spirit, and since there is strong reason to hold that what we call consciousness is either merely the general sensation of the brain or some part of it, or at all events some visceral or bodily sensation, God probably has no consciousness. Most of us are in the habit of thinking that consciousness and psychic life are the same thing and otherwise greatly to overrate the functions of consciousness. (See James's paper "Does 'Consciousness' Exist?" in *Jour. Phil., Psy., and Sci. Meth.* I, 477; 1904, Sep. 1. But the negative reply is, in itself, no novelty.)

490. The effects of the second peculiarity of the hypothesis are counteracted by a third, which consists in its commanding influence over the whole conduct of life of its believers. According to that logical doctrine which the present writer first formulated in 1873* and named Pragmatism, the true meaning of any product of the intellect lies in whatever unitary determination it would impart to practical conduct under any and every conceivable circumstance, supposing such conduct to be guided by reflexion carried to an ultimate limit. It appears to have been virtually the philosophy of Socrates. But although it is "an old way of thinking," in the sense that it was practiced by Spinoza, Berkeley, and Kant, I am not aware of its having been definitely formulated, whether as a maxim of logical analysis or otherwise, by anybody before my publication of it in 1878. Naturally, nobody ever heard of pragmatism. People don't care for methods! they want results. Give them all the diamonds you make, and you may have the method of making them for your own. So it was not until in 1898† — Professor James took hold of the old thing, dignified it by calling it by its name in print (which I had never done even when I was in charge of the philosophical part of the *Century Dictionary*), furbished it up, and turned it into a philosophical doctrine — that it had any vogue at all. It did not, however, shine with its present effulgence until Professor Papini‡ made the discovery that it cannot be defined — a circumstance which, I believe, distinguishes it from all other doctrines, of whatsoever natures they may be, that were ever promulgated. Thereupon I thought it high time to give my method a less distinguished designation; and I rechristened it *pragmaticism*.§ Pragmaticism, then, is a theory of logical analysis, or true definition; and its merits are greatest in its application to the highest metaphysical conceptions. At the same time, these merits can only be appreciated as the result of long training. A full exposition

* See 482 and p. v of the Preface to vol. 5.

† "Philosophical Conceptions and Practical Results," *The University of California Chronicle*, pp. 24ff (1898); reprinted in *Collected Essays and Reviews*, pp. 406-437 (1920).

‡ "What Pragmatism is Like," *Popular Science Monthly*, p. 351, vol. 71 (1907).

§ See 5.414.

of the pragmaticistic definition of *Ens necessarium* would require many pages; but some hints toward it may be given. A disembodied spirit, or pure mind, has its being out of time, since all that it is destined to think is fully in its being at any and every previous time. But in endless time it is destined to think all that it is capable of thinking. Order is simply thought embodied in arrangement; and thought embodied in any other way appears objectively as a character that is a generalization of order, and that, in the lack of any word for it, we may call for the nonce, "Super-order." It is something like uniformity. The idea may be caught if it is described as that of which order and uniformity are particular varieties. Pure mind, as creative of thought, must, so far as it is manifested in time, appear as having a character related to the habit-taking capacity, just as super-order is related to uniformity. Now imagine, in such vague way as such a thing can be imagined, a perfect cosmology of the three universes. It would prove all in relation to that subject that reason could desiderate; and of course all that it would prove must, in actual fact, now be true. But reason would desiderate that that should be proved from which would follow all that is in fact true of the three universes; and the postulate from which all this would follow must not state any matter of fact, since such fact would thereby be left unexplained. That perfect cosmology must therefore show that the whole history of the three universes, as it has been and is to be, would follow from a premiss which would not suppose them to exist at all. Moreover, such premiss must in actual fact be true. But that premiss must represent a state of things in which the three universes were completely nil. Consequently, whether in time or not, the three universes must actually be absolutely necessary results of a state of utter nothingness. We cannot ourselves conceive of such a state of nility; but we can easily conceive that there should be a mind that could conceive it, since, after all, no contradiction can be involved in mere non-existence. A state in which there should be absolutely no super-order whatsoever would be such a state of nility. For all Being involves some kind of super-order. For example, to suppose a thing to have any particular character is to suppose a conditional proposition to be true of it, which proposition would

express some kind of super-order, as any formulation of a general fact does. To suppose it to have elasticity of volume is to suppose that if it were subjected to pressure its volume would diminish until at a certain point the full pressure was attained within and without its periphery. This is a super-order, a law expressible by a differential equation. Any such super-order would be a super-habit. Any general state of things whatsoever would be a super-order and a super-habit. In that state of absolute nility, in or out of time, that is, before or after the evolution of time, there must then have been a *tohu bohu* of which nothing whatever affirmative or negative was true universally. There must have been, therefore, a little of everything conceivable. There must have been here and there a little undifferentiated tendency to take super-habits. But such a state must tend to *increase itself*. For a tendency to act in any way, combined with a tendency to take habits, must increase the tendency to act in that way. Now substitute in this general statement for "tendency to act in any way" a tendency to take habits, and we see that that tendency would grow. It would also become differentiated in various ways. But there are some habits that carried beyond a certain point eliminate their subjects from the universe. There are many ways in which this may happen. Thus a tendency to lose mass will end in a total loss of mass. A tendency to lose energy will end in removing its subject from perceptible existence. A tendency to gain energy will end in the body's shooting through the universe too rapidly to produce any effect, etc.

491. Among the many pertinent considerations which have been crowded out of this article, I may just mention that it could have been shown that the hypothesis of God's Reality is logically not so isolated a conclusion as it may seem. On the contrary, it is connected so with a theory of the nature of thinking that if this be proved so is that. Now there is no such difficulty in tracing experiential consequences of this theory of thinking as there are in attempting directly to trace out other consequences of God's reality. In so short an article, it could not be expected that I should take notice of objections. Yet objections, such as they are, are obvious enough, and a few of them wear at first sight a redoubtable aspect. For

example, it may be said that since I compare man's power of guessing at the truth with the instincts of animals, I ought to have noticed that these are entirely explained by the action of natural selection in endowing animals with such powers as contribute to the preservation of their different stocks; and that there is evidence that man's power of penetrating the secrets of nature depends upon this, in the fact that all the successful sciences have been either mechanical in respect to their theories or psychological. Now, some notions of mechanics are needed by all animals to enable them to get food, and are needed most by man; while correct ideas of what passes in his neighbours' minds are needed for the existence of society, and therefore for the propagation of his kind.* Metaphysics, however, cannot adapt the human race to maintaining itself, and therefore the presumption [is] that man has no such genius for discoveries about God, Freedom, and Immortality, as he has for physical and psychical science.

§7. KNOWLEDGE OF GOD†

492. [We] can know nothing except what we *directly* experience. So all that we can anyway know relates to experience. All the creations of our mind are but patchworks from experience. So that all our ideas are but ideas of real or transposed experiences. A word can mean nothing except the idea it calls up. So that we cannot even *talk* about anything but a knowable object. The unknowable about which Hamilton and the agnostics talk can be nothing but an Unknowable Knowable. The absolutely unknowable is a non-existent existence.‡ The Unknowable is a nominalistic heresy. The nominalists in giving their adherence to that doctrine which is really held by all philosophers of all stripes, namely, that experience is all we know, understand experience in their nominalistic sense as the mere first impressions of sense. These "first impressions of sense" are hypothetical creations of nominalistic metaphysics: I for one deny their existence. But anyway even if they exist, it is not in them that experi-

* See 418.

† From an unpaginated fragment, c. 1896.

‡ See 5.255f.

ence consists. By experience must be understood the entire mental product. Some psychologists whom I hold in respect will stop me here to say that, while they admit that experience is more than mere sensation, they cannot extend it to the whole mental product, since that would include hallucinations, delusions, superstitious imaginations and fallacies of all kinds; and that they would limit experience to sense-perceptions. But I reply that my statement is the logical one. Hallucinations, delusions, superstitious imaginations, and fallacies of all kinds are experiences, but experiences misunderstood; while to say that all our knowledge relates merely to sense perception is to say that we can know nothing — not even mistakenly — about higher matters, as honor, aspirations, and love.

493. Where would such an idea, say as that of God, come from, if not from direct experience? Would you make it a result of some kind of reasoning, good or bad? Why, reasoning can supply the mind with nothing in the world except an estimate of the value of a statistical ratio, that is, how often certain kinds of things are found in certain combinations in the ordinary course of experience. And scepticism, in the sense of doubt of the validity of elementary ideas — which is really a proposal to turn an idea out of court and permit no inquiry into its applicability — is doubly condemned by the fundamental principle of scientific method — condemned first as obstructing inquiry, and condemned second because it is treating some other than a statistical ratio as a thing to be argued about. No: as to God, open your eyes — and your heart, which is also a perceptive organ — and you see him. But you may ask, Don't you admit there are any delusions? Yes: I may think a thing is black, and on close examination it may turn out to be bottle-green. But I cannot think a thing is black if there is no such thing to be seen as black. Neither can I think that a certain action is self-sacrificing, if no such thing as self-sacrifice exists, although it may be very rare. It is the nominalists, and the nominalists alone, who indulge in such scepticism, which the scientific method utterly condemns.

CHAPTER 4

ANSWERS TO QUESTIONS CONCERNING MY BELIEF IN GOD*^P

§1. THE REALITY OF GOD

494. The questions can be answered without very long explanations. "Do you believe in the existence of a Supreme Being?" Hume, in his *Dialogues Concerning Natural Religion*, † justly points out that the phrase "Supreme Being" is not an equivalent of "God," since it neither implies infinity nor any of the other attributes of God, excepting only Being and Supremacy. This is important; and another distinction between the two designations is still more so. Namely, "God" is a vernacular word and, like all such words, but more than almost any, is *vague*. No words are so well understood as vernacular words, in one way; yet they are invariably vague; and of many of them it is true that, let the logician do his best to substitute precise equivalents in their places, still the vernacular words alone, for all their vagueness, answer the principal purposes. This is emphatically the case with the very vague word "God," which is not made less vague by saying that it imports "infinity," etc., since those attributes are at least as vague. I shall, therefore, if you please, substitute "God," for "Supreme Being" in the question.

495. I will also take the liberty of substituting "reality" for "existence." This is perhaps overscrupulosity; but I myself always use *exist* in its strict philosophical sense of "react with the other like things in the environment." ‡ Of course, in that sense, it would be fetichism to say that God "exists." The word "reality," on the contrary, is used in ordinary parlance in its correct philosophical sense. It is curious that its legal meaning, in which we speak of "real estate," is the earliest, occurring early in the twelfth century. Albertus Magnus,

* c. 1906.

† See Part IV *ad init.*

‡ See *e.g.* 336, 5.503.

who, as a high ecclesiastic, must have had to do with such matters, imported it into philosophy.* But it did not become at all common until Duns Scotus, in the latter part of the thirteenth century began to use it freely.† I define the *real* as that which holds its characters on such a tenure that it makes not the slightest difference what any man or men may have *thought* them to be, or ever will have *thought* them to be, here using thought to include, imagining, opining, and willing (as long as forcible *means* are not used); but the real thing's characters will remain absolutely untouched.

496. Of any kind of figment, this is not true. So, then, the question being whether I believe in the reality of God, I answer, Yes. I further opine that pretty nearly everybody more or less believes this, including many of the scientific men of my generation who are accustomed to think the belief is entirely unfounded. The reason they fall into this extraordinary error about their own belief is that they *precide*‡ (or render precise) the conception, and, in doing so, inevitably change it; and such precise conception is easily shown not to be warranted, even if it cannot be quite refuted. Every concept that is vague is liable to be self-contradictory in those respects in which it is vague.§ *No* concept, not even those of mathematics, is absolutely precise; and some of the most important for everyday use are extremely vague. Nevertheless, our instinctive beliefs involving such concepts are far more trustworthy than the best established results of science, if these be precisely understood. For instance, we all think that there is an element of order in the universe. Could any laboratory experiments render that proposition more certain than instinct or common sense leaves it? It is ridiculous to broach such a question. But when anybody undertakes to say *precisely* what that order consists in, he will quickly find he outruns all logical warrant. Men who are given to defining too much inevitably run themselves into confusion in dealing with the vague concepts of common sense.

497. They generally make the matter worse by erroneous, not to say absurd, notions of the function of reasoning. Every

* *Physicorum Liber*, I, 1, I.

† See *Sententiarum Libri*, III, Distinctio 34.

‡ See 1.549n.

§ See 5.448.

race of animals is provided with instincts well adapted to its needs, and especially to strengthening the stock. It is wonderful how unerring these instincts are. Man is no exception in this respect; but man is so continually getting himself into novel situations that he needs, and is supplied with, a subsidiary faculty of *reasoning* for bringing instinct to bear upon situations to which it does not directly apply. This faculty is a very imperfect one in respect to fallibility; but then it is only needed to bridge short gaps. Every step has to be reviewed and criticized; and indeed this is so essential that it is best to call an uncriticized step of inference by another name. If one does not at all know how one's belief comes about, it cannot be called even by the name of inference. If, with St. Augustine,* we draw the inference "I think; therefore, I am," but, when asked how we justify this inference, can only say that we are *compelled to think* that, since we think, we are, this uncriticized inference ought not to be called reasoning, which at the very least conceives its inference to be one of a general class of possible inferences on the same model, and all equally valid. But one must go back and criticize the premisses and the *principles* that guide the drawing of the conclusions. If it could be made out that all the ultimate (or first) premisses were percepts; and that all the ultimate logical principles were as clear as the principle of contradiction, then one might say that one's conclusion was *perfectly* rational. Strictly speaking, it would not be quite so, because it is quite possible for perception itself to deceive us, and it is much more possible for us to be mistaken about the indubitableness of logical principles. But as a matter of fact, as far as logicians have hitherto been able to push their analyses, we have *in no single case*, concerning a matter of *fact*, as distinguished from a matter of mathematical conditional possibility, been able to reach this point. We are in every case either forced by the inexorable critic, sooner or later, to declare, "such and such a proposition or mode of inference I *cannot doubt*; it seems perfectly clear that it is so, but I can't say *why*," or else the critic himself tires before the criticism has been pushed to its very end.

498. If you absolutely cannot doubt a proposition —

* *De civitate Dei*, XI, 26.

cannot bring yourself, upon deliberation, to entertain the least suspicion of the truth of it, it is plain that there is no room to desire anything more.* Many and many a philosopher seems to think that taking a piece of paper and writing down "I doubt that" is doubting it, or that it is a thing he can do in a minute as soon as he decides what he wants to doubt. Descartes convinced himself that the safest way was to "begin" by doubting everything, and accordingly he tells us he straightway did so, except only his *je pense*, which he borrowed from St. Augustine. Well I guess not; for genuine doubt does not talk of *beginning* with doubting. The pragmatist knows that doubt is an art which has to be acquired with difficulty; and his genuine doubts will go much further than those of any Cartesian. What he does not doubt, about ordinary matters of everybody's life, he is apt to find that no well matured man doubts. They are part of our instincts. Instincts are now known not to be nearly so unchangeable as used to be supposed; and the present "mutation"-theory, which I have *always* insisted must be the way in which species have arisen,† is, I am confident, the first beginning of the correct theory, and shows that it is no disproof of the instinctive character of a belief that it relates to concepts which the primitive man cannot be supposed to have had. Now, this is no confirmation of what one does not doubt. For what one does not doubt cannot be rendered more satisfactory than it already is. Yet while I may entertain, as far as I can search my mind, no perceptible doubt whatever of any one of a hundred propositions, I may suspect that, among so many, some one that is not true may have slipped in; and, if so, the marvellous inerrancy of instinct may perhaps add a little to my *general* confidence in the whole lot. However, I am far from insisting upon the point. I think the consideration is better adapted to helping us to detect the counterfeit paper doubts, of which so many are in circulation.

499. All the instinctive beliefs, I notice, are vague. The moment they are precided, the pragmatist will begin to doubt them.

500. The fourth part of the first book of Hume's *Treatise*

* See e.g. 5.265, 5.416ff, 5.438ff.

† See 17, 33, 296ff, 1.104.

of Human Nature affords a strong argument for the correctness of my view that reason is a mere succedaneum to be used where instinct is wanting, by exhibiting the intensely ridiculous way in which a man winds himself up in silly paper doubts if he undertakes to throw common sense, i.e. instinct, overboard and be perfectly rational. Bradley's *Appearance and Reality* is another example of the same thing, although Bradley is at the opposite pole from Hume in what he *does* admit. But Bradley is in no way as good a case as Hume. Hume endeavours to modify his conclusion by not stating it in the extreme length to which it ought to carry him. But a careful reader will see that if he proves anything at all by all his reasoning, it is that reasoning, as such, is *ipso facto* and essentially illogical, "illegitimate," and unreasonable. And the reason it is so is that either it is bad reasoning, or rests on doubtful premisses, or else that those premisses have not been thoroughly criticized. Of course not. The moment you come to a proposition which is perfectly satisfactory, so that you can entertain not the smallest suspicion of it, this fact debars you from making any genuine criticism of it. So that what Hume's argument would lead him to is that reasoning is "illegitimate" because its premisses are perfectly satisfactory. He candidly confesses that they are satisfactory to himself. But he seems to be dissatisfied with himself for being satisfied. It is easy to see, however, that he pats himself on the back, and is very well satisfied with himself for being so dissatisfied with being satisfied. Bradley's position is equally ridiculous. Another circumstance which goes toward confirming my view that instinct is the great internal source of all wisdom and of all knowledge is that all the "triumphs of science," of which that poor old nineteenth century used to be so vain, have been confined to two directions. They either consist in physical — that is, ultimately, dynamical — explanations of phenomena, or else in explaining things on the basis of our common sense knowledge of human nature. Now dynamics is nothing but an elaboration of common sense; its experiments are mere imaginary experiments. So it all comes down to common sense in these two branches, of which the one is founded on those instincts about physical forces that are required for the feeding impulsion and the other upon those

instincts about our fellows that are required for the satisfaction of the reproductive impulse. Thus, then all science is nothing but an outgrowth from these two instincts.*

You will see that all I have been saying is not preparatory to any argument for the reality of God. It is intended as an apology for resting the belief upon instinct as the very bed-rock on which all reasoning must be built.

501. I have often occasion to walk at night, for about a mile, over an entirely untravelled road, much of it between open fields without a house in sight. The circumstances are not favorable to severe study, but are so to calm meditation. If the sky is clear, I look at the stars in the silence, thinking how each successive increase in the aperture of a telescope makes many more of them visible than all that had been visible before. The fact that the heavens do not show a sheet of light proves that there are vastly more dark bodies, say planets, than there are suns. They must be inhabited, and most likely millions of them with beings much more intelligent than we are. For on the whole, the solar system seems one of the simplest; and presumably under more complicated phenomena greater intellectual power will be developed. What must be the social phenomena of such a world! How extraordinary are the minds even of the lower animals. We cannot appreciate our own powers any more than a writer can appreciate his own style, or a thinker the peculiar quality of his own thought. I don't mean that a Dante did not know that he expressed himself with fewer words than other men do, but he could not admire himself as we admire him; nor can we wonder at human intelligence as we do at that of wasps. Let a man drink in such thoughts as come to him in contemplating the physico-psychical universe without any special purpose of his own; especially the universe of mind which coincides with the universe of matter. The idea of there being a God over it all of course will be often suggested; and the more he considers it, the more he will be enwrapped with Love of this idea. He will ask himself whether or not there really is a God. If he allows instinct to speak, and searches his own heart, he will at length find that he cannot help believing it. I cannot tell how every man will think. I know

* Cf. 418, 491.

the majority of men, especially educated men, are so full of pedantries — especially the male sex — that they cannot think straight about these things. But I can tell how a man must think if he is a pragmatist. Now the shower of communications that I have been getting during the last two months causes me to share the expectation that I find so many good judges are entertaining, that pragmatism is going to be the dominant philosophical opinion of the twentieth century. . . .

502. If a pragmatist is asked what he means by the word "God," he can only say that just as long acquaintance with a man of great character may deeply influence one's whole manner of conduct, so that a glance at his portrait may make a difference, just as almost living with Dr. Johnson enabled poor Boswell to write an immortal book and a really sublime book, just as long study of the works of Aristotle may make him an acquaintance, so if contemplation and study of the physico-psychical universe can imbue a man with principles of conduct analogous to the influence of a great man's works or conversation, then that analogue of a mind — for it is impossible to say that *any* human attribute is *literally* applicable — is what he means by "God." Of course, various great theologians explain that one cannot attribute *reason* to God, nor perception (which always involves an element of surprise and of learning what one did not know), and, in short, that his "mind" is necessarily so unlike ours, that some — though wrongly — high in the church say that it is only negatively, as being entirely different from everything else, that we can attach any meaning to the Name. This is not so; because the discoveries of science, their enabling us to *predict* what will be the course of nature, is proof conclusive that, though we cannot think any thought of God's, we can catch a fragment of His Thought, as it were.

503. Now such being the pragmatist's answer to the question what he means by the word "God," the question whether there really *is* such a being is the question whether all physical science is merely the figment — the arbitrary figment — of the students of nature, and further whether the *one* lesson the Gautama Boodha, Confucius, Socrates, and all who from any point of view have had their ways of conduct determined by meditation upon the physico-psychical uni-

verse, be only their arbitrary notion or be the Truth behind the appearances which the frivolous man does not think of; and whether the superhuman courage which such contemplation has conferred upon priests who go to pass their lives with lepers and refuse all offers of rescue is mere silly fanaticism, the passion of a baby, or whether it is strength derived from the power of the truth. Now the only guide to the answer to this question lies in the power of the passion of love which more or less overmasters every agnostic scientist and everybody who seriously and deeply considers the universe. But whatever there may be of *argument* in all this is as nothing, the merest nothing, in comparison to its force as an appeal to one's own instinct, which is to argument what substance is to shadow, what bed-rock is to the built foundations of a cathedral.

504. Caldecott's *Philosophy of Religion* explains thirteen different *types* of reasons for believing in God, with different varieties of several of them.* I have examined them all with care, and think each one proves *something*. But I do not think their conclusions always have much to do with *religion*.

§2. CREATION

505. "Do you believe this Supreme Being to have been the creator of the universe?" Not so much *to have been* as to be now creating the universe, concerning which see my articles in the first three volumes of *The Monist*;† and much the same opinion has been entertained by others, especially by Renouvier,‡ the French protagonist of [the monadistic] philosophy. But I object to Renouvier's philosophy as nominalistic and otherwise not thorough. Still, his *Essais de Critique* and particularly his *Nouvelle Monadologie* are very strong books in many respects, which no thoughtful reader can forget. I think that, vain as it is to attempt to bring to light any definite meaning from the idea, it is nevertheless true that *all reality* is due to the creative power of God.

506. I am inclined to think (though I admit that there is

* A. Caldecott, *The Philosophy of Religion in England and America*, p. 9, Macmillan, New York (1901).

† See chs. 1, 2, 5, 9, 11, in bk. I of the present volume.

‡ See *La Nouvelle Monadologie*, Art. CXXX, p. 163, Paris (1899).

no necessity of taking that view) that the process of creation has been going on for an infinite time in the past, and further, during *all* past time, and, further, that past time had no definite beginning, yet came about by a process which in a generalized sense, of which we cannot *easily* get much idea, was a development.* I believe Time to be a reality, and not the figment which Kant's nominalism proposes to explain it as being. As reality, it is due to creative power. People who have had no practice in higher logical analysis are apt to be sceptical as to anybody's being able to attach any idea to such propositions. They are even dumbfounded to hear one say that a part is not necessarily less than its whole; while after one has learned how to think of such things, the marvel is that anybody should ever have deliberately said that the part is necessarily less than the whole or ever should have said "so fast eternity comes on," meaning by "eternity" the infinitely distant future, as if the part of the future that will remain future tomorrow were not just as long as today's or yesterday's future.

I think we must regard Creative Activity as an inseparable attribute of God.

§3. GOD'S PURPOSE

507. "What do you imagine the present functions of this Supreme Being toward the universe to be?" Creation, as just said; and much may also be learned from the book *Substance and Shadow* (1863) by Henry James, the father. The book was presented to me, by the way, by Miss Maria Fay, a very interesting and spiritual lady. In particular, the obvious solution of the problem of evil is there pointed out.† Columbus's egg was not simpler. In general, God is perpetually creating us, that is developing our real manhood, our spiritual reality. Like a good teacher, He is engaged in detaching us from a False dependence upon Him.

§4. OMNISCIENCE

508. "Do you believe Him to be omniscient?" Yes, in a vague sense. Of course, God's knowledge is something so

* Cf. 189ff.

† See 287.

utterly unlike our own that it is more like willing than knowing.* I do not see why we may not assume that He refrains from knowing much. For this thought is creative. But perhaps the wisest way is to say that we do not know how God's thought is performed and that [it] is simply vain to attempt it. We cannot so much as frame any notion of what the phrase "the performance of God's mind" means. Not the faintest! The question is gabble.

§5. OMNIPOTENCE

509. "Do you believe Him to be Omnipotent?" Undoubtedly He is so, vaguely speaking; but there are many questions that might be put of no profit except to the student of logic. Some of the scholastic commentaries consider them. Leibnitz thought that this was the best of "all possible" worlds. That seems to imply some limitation upon Omnipotence. Unless the others were created too, it would seem that, all things considered, this universe was the only possible one. Perhaps others do exist. But we only wildly gabble about such things.

§6. INFALLIBILITY

510. "Do you believe Him to be infallible?" If omniscient, how not? But perhaps this is a slip of the typewriter for *impeccable*. Theologians insist upon sundry questions which are in the highest degree displeasing to me, not to say offensive. I do not presume to know anything about it, but it seems to me that the very meaning of the word "God" implies, not surely *morality*, for He seems to me to be above all self-restraint or law, but to imply aesthetic spiritual perfection.

§7. MIRACLES

511. "Do you believe that He ever modifies or changes the laws of nature or interferes with the course of events in individual cases?" I call your attention to the circumstance that some of the most respected theologians, such as St. Augustine,† and others before him, St. Thomas Aquinas,‡

* Cf. 4.67, 4.583.

† *Contra Faustum*, bk. XXVI, ch. 3.

‡ *Summa Theologica*, I, 105, 6.

Bishop Joseph Butler,* are decidedly of the opinion that God never interfered with what they call the *cursum naturæ*, which is what we call the operations of the laws of nature, "laws of nature" meaning with them the items of the *jus naturæ*, or something which my unlegal ignorance is unable to distinguish from that. Miracles are for them simply what no man can do without special aid from on high, or which at least are signs of some special authority, without being in reality deviations from the regular uniformities of the world. However, my own doctrine of Tychism,† like Renouvier's somewhat similar theory,‡ and those of Fouillée,§ Delboeuf,¶ and others, must, in so far as it is accepted, somewhat weaken that view.

512. I also call your attention to the fact that Hume's|| argument against miracles° has nothing at all to do with whether they are or are not violations of the laws of nature. The argument is based upon a misunderstanding of the doctrine of probabilities, of which some of the early treatises had appeared in his day. It might be corrected, but it would still rest on a complete misunderstanding of the true logic of the criticism of ancient history.**

513. But the German critics (I speak only of those who treat of the history of philosophy, for I have never looked into the Biblical criticisms) are as illogical as Hume and in much the same way.†† Hence, whenever their conclusions have been tested by the spade of the archeologist it has been to their complete discomfiture. Hume's argument is in no particularly intimate relation to the rest of his book, and was evidently inserted as a bid for popularity. For while he was a young fellow of fifteen to seventeen, miracles had been vehemently attacked by a clergyman of the name of Woolston,‡‡ who took

* *The Analogy*, pt. I, ch. 7.

† See 47ff, 264, 302.

‡ *Essais de critique générale*, appendice IX (1854-64).

§ *La Liberté et le déterminisme*, Paris (1872).

¶ "Déterminisme et liberté," *Revue Philosophique*, vol. 13, pp. 433-480, 608-638; vol. 14, pp. 158-189 (1882).

|| *Inquiry*, Section X.

° See the next chapter for a detailed consideration of this question.

** See the long discussion of historical evidence in vol. 8.

†† See e.g. 1.617.

‡‡ *Discourses on the Miracles of Our Savior*, etc., London (1727-29).

the ground of Origen* and other early fathers of the church that the stories in the gospel were simply allegorical. His books had the most stupendous sale in England, completely demonstrating the general disbelief in miracles at that day. In point of fact, there never was a period of history in which the general tone of thought was so absolutely contrary to the supernatural. The state of opinion about the [time of the] French Revolution, and that about 1875, when "agnosticism" was at its [crudest], were pious in comparison with 1730. Therefore, Hume who sacrificed the best parts of his system to make his *Inquiry* popular, undoubtedly stuck in his argument against miracles for that purpose.

514. For my part, I do not see how we can ascertain *a priori* whether *miracles* (be they violations of the laws of nature or not) and special providences take place or not. In so far Hume is entirely in the right. It is simply a question of evidence. His argument has a certain weight. If there are no miracles nowadays, there is a strong presumption against those which took place amidst a rabble of Galileans. But are there no miracles nowadays? I do not feel so sure of it. There is Mrs. Piper and Perry. I do not think it rational not [to] think, for us who know Perry, that that case is of *tremendous*, almost conclusive, weight. There is the blood of St. Januarius which Sir Humphrey Davy—*of his own motion*, and not forced into it at all—undertook to investigate and was given every facility he could think of, and who declared he could not find the least symptom of fraud about the thing. Take such men as Sir William Crookes† and Lord Rayleigh‡—well even Hodgson§—one must confess the case is very strong; so strong that but for one circumstance I should unhesitatingly accept it. That circumstance is that every surprising discovery of science—as for example when Becquerel found those photographic plates which he had put away in a drawer to be affected by the uranium salt that was

* *Commentaries* on the Gospels of Matthew and John. See e.g. on John IV, 46; also in *Exod. Hom.* v. 7.

† See *Researches in the Phenomena of Spiritualism*, London (1874).

‡ For Rayleigh's attitude see A. C. Doyle, *History of Spiritualism*, vol. 1, p. 181, London (1926).

§ "A Further Record of Observations of Certain Phenomena of Trance," *Proceedings of the S. P. R.*, vol. 13, pp. 285-582 (1897-98).

wrapped up in black paper and accidentally laid upon them — every such event, is soon followed by others closely connected with it, so that all possible doubt is swept away together with all surprise at the occurrence. Miracles, on the contrary, are always *sui generis*. The only ones that were not so, the falling of stones out of the heavens, lost all their prestige when it was found how common the occurrence was. The isolatedness of the miracle is really no argument against its reality. It is nearly the same with works of great genius. You have Rafael and Michelangelo together, and then for a long time nothing surprising. Dante stands all alone. Byron was unparalleled before or since; for A. de Musset is surely not to be compared with him. Indeed every branch of art and science can furnish such examples. The isolation, then, is no argument *against* miracles, but it effectively prevents our ever having sufficient evidence of them. I must confess that the gospel miracles appear at this date very far from impressive. It is curious that Origen, no further from Jesus in history than we from the expulsion of James II from England, should have found them so difficult to believe.

§8. PRAYER

515. “Do you believe in the efficacy of prayer?” The only thing connected with that, that I am quite satisfied about, is that the clergy do not believe in it. I mean the influential clergy. The conclusive proof of that is that when Tyndall* proposed to put the matter to the test of experiment, although they had the record of the somewhat similar proposal of the King of Samaria and Elijah's† perfectly frank response, they backed down and pretended that it would be blasphemous. So it is blasphemy to inquire into the truth of religion, is it? No living man thinks it disrespectful to inquire into the authenticity of his signature; and the higher clergy are far more sensitive to their own dignity than God's, and very justly so, since it is quite possible to be disrespectful to an ecclesiastic, while it is absolutely impossible *really* to think of God without awe mingled with love.

* “The Prayer for the Sick, Hints Towards a Serious Attempt to Estimate Its Value,” *Contemporary Review*, vol. 20 (1872).

† I Kings XVIII.

516. But what business is it of mine whether my prayers are to be efficacious or not? We, one and all of us, have an instinct to pray; and this fact constitutes an invitation from God to pray. And in fact there is found to be not only *soulage-ment* in prayer, but great spiritual good and moral strength. I do not see why prayer may not be efficacious, or if not the prayer exactly, the state of mind of which the prayer is nothing more than the expression, namely the soul's consciousness of its relation to God, which is nothing more than precisely the pragmatistic meaning of the name of God; so that, in that sense, prayer is simply calling upon the name of the Lord. To pray for specific things, not merely for the *ἐπιούτιον*, bread, but that it may be better baked than yesterday's, is childish, of course; yet innocent.

517. "Why does not this Omniscient Being see the need and interpose the Omnipotent and Supreme Authority to meet the needs prayed for? Is it because of a vanity which is one of the attributes of fallible man?" I remember two passages in my writings in which I made as much fun as politeness would allow of writers who undertook to tell us what was "conducive to our welfare." Once it was Simon Newcomb who was talking like that in his book on Political Economy;* and I remarked that an economist, far from having any qualifications for exploring this most occult of all matters, was particularly unfit for the task owing to his habit of taking it for granted that wealth was desirable.† The other time it was Karl Pearson, who wanted to found the rules of logic upon that, and I remarked‡ that, for my part, if ever I undertook the supremely difficult inquiry of what was conducive to our welfare I should feel that I needed to arm myself beforehand with whatever resources logic could afford, to speak of no others. What are our "needs"? We know what we have an impulse to seek, and if we have considered the matter deliberately we are convinced that those things are far from being the same as our true needs. Yet if we are going to pray for anything specific, which is once in a long time, on some supreme

* *Principles of Political Economy*, New York (1886).

† See 290f.

‡ See Peirce's review of Pearson's *Grammar of Science* in *Popular Science Monthly*, vol. 58, pp. 296-306 (1901); to be reprinted in vol. 9.

occasion, a permissible frailty, surely we shall add something like, "Fulfill now, O Lord, the desires and petitions of Thy servants, *as may be most expedient for them.*" Not to do so, would, as you seem to suggest, be vanity indeed.

518. "Do you believe that the prayers of several persons for one end are more potent than those of one?" I know of no experiments to ascertain how this may be; but I certainly think that common prayers have some peculiar virtues of their own. As I say, the inquiry into efficacy is distasteful to me because that is not the motive of my prayers. Still, I should like to have an inquiry instituted into the matter.

§9. IMMORTALITY*

519. "Do you believe in a future life?" *Some* kind of a future life there can be no doubt of. A man of character leaves an influence living after him. It is living; it is personal. In my opinion, it is quite proper to call that a future life. Jesus so spoke of it when he said he would always be with us. It is in some respects more fit to be made the subject of a promise than any other kind of future life. For it is something we all desire; while other kinds present nothing alluring that is not excessively vague or else unwholesome and antipractical. In the next place its vivacity and endurance are proportional to the spirituality of the man. How many instances have we seen of that! Beyond that, I simply am content to be in God's hands. If I am in another life it is sure to be most interesting; but I cannot imagine how it is going to be *me*. At the same time, I really don't know anything about it.

520. "Is not every act of memory in the human being the result of the action of that being's material brain. . . . ? If this is true, on the death of the material body . . . does not the memory cease?"†

This is commonly assumed to be the case; and owing to my slight interest in the matter it may well be that there are some facts bearing upon the question that I am not aware of. But my impression is that there is no positive reason for believing it except the general facts of the dependence of mental

* Cf. chapter 6.

† The dots, indicating omissions, occur in the manuscript.

action on the brain. For instance, when Broca's convolution is much diseased we always find the use of language is greatly affected. But I am sure this is not a strong positive reason for an affirmative answer to the first of the two questions. It undoubtedly warrants the assumption in science, until facts to the contrary appear. But your questions are not scientific, but practical questions. From that standpoint I think I must say that the matter is open to some doubt. When a part of the brain is extirpated we find the result is that certain faculties are lost. But after a time they are recovered. How can this be? The answer given is that other parts of the brain learn to perform these functions. But after all, we do not know more than that if anything happens to the hemispheres, memory is deranged. It is a most wonderful thing if all we remember is really preserved in the cells of the cerebrum. However, there can be no doubt, I think, that upon death we soon lose consciousness, at least for the time being.

You will observe that the essential immortality of the soul is not exactly the Christian doctrine, which is that the body is reproduced, and with it presumably the memory. There is nothing at all to prove it except that it was a belief clung to by St. Paul and founded by him upon the resurrection of Jesus.

521. "If the power to remember dies with the material body, has the question of any single person's future life after death any particular interest for him?" As you put the question, it is not whether the matter ought rationally to have an interest, but whether as a fact it has; and perhaps this is the proper question, trusting as it seems to do, rather to instinct, than to reason. Now if we had a drug which would abolish memory for a while, and you were going to be cut for the stone, suppose the surgeon were to say, "You will suffer damnably, but I will administer this drug so that you will during that suffering lose all memory of your previous life. Now you have of course no particular interest in your sufferings as long as you will not remember your present and past life, you know, have you?"*

* The manuscript ends at this point.

CHAPTER 5

HUME ON MIRACLES*^P

§1. THE NATURE OF HYPOTHESIS

522. The science of legitimate inference can only be of practical value provided its propositions are proved with absolute completeness. For they have to carry weight enough to override our instinctive judgments of what is good reasoning. If they cannot do that, they are of no use. But even apparently convincing proofs may be mistaken; and the maxims of this science may be suspected of being so, if they conflict with our instinctive logic.† They must, therefore, not only come to us supported by full proofs, but also by the recommendation of those who have had long experience in the use of them.

In a brief article it is impossible to make the proofs clearly evident; and it would be unjust to them to attempt such a thing, which could only convey the idea that they were of an unintelligible and unconvincing nature. Yet to discuss the legitimacy of inferences on any other than the true scientific grounds is mere trifling. The difficulty is insuperable. All that can be done is to lay down the correct principles, and postpone the proofs to another occasion. It may perhaps be permissible to give some hints as to what the general nature of the proofs is.

All our knowledge may be said to rest upon *observed facts*. It is true that there are psychological states which antecede our observing facts as such. Thus, it is a fact that I see an inkstand before me; but before I can say that I am obliged to have impressions of sense into which no idea of an inkstand, or of any separate object, or of an "I," or of seeing, enter at all; and it is true that my judging that I see an inkstand before me is the product of mental operations upon these impressions of sense. But it is only when the cognition

* c. 1901

† Cf. 2.186ff.

has become worked up into a proposition, or judgment of a fact, that I can exercise any direct control over the process; and it is idle to discuss the "legitimacy" of that which cannot be controlled. Observations of fact have, therefore, to be accepted as they occur.

523. But observed facts relate exclusively to the particular circumstances that happened to exist when they were observed. They do not relate to any future occasions upon which we may be in doubt how we ought to act. They, therefore, do not, in themselves, contain any practical knowledge.

Such knowledge must involve additions to the facts observed. The making of those additions is an operation which we can control; and it is evidently a process during which error is liable to creep in.

524. Any proposition added to observed facts, tending to make them applicable in any way to other circumstances than those under which they were observed, may be called a hypothesis. A hypothesis ought, at first, to be entertained interrogatively. Thereupon, it ought to be tested by experiment so far as practicable. There are two distinct processes, both of which may be performed rightly or wrongly. We may go wrong and be wasting time in so much as entertaining a hypothesis, even as a question. That is a subject for criticism in every case. There are some hypotheses which are of such a nature that they never can be tested at all. Whether such hypotheses ought to be entertained at all, and if so in what sense, is a serious question; but it hardly concerns our present inquiry. The hypotheses with which we shall have in this paper to deal are capable of being put to the test. How this is to be done is a question of extreme importance; but my intention is to consider it only in a very cursory manner, at present. There are, moreover, many hypotheses in regard to which knowledge already in our possession may, at once, quite justifiably either raise them to the rank of opinions, or even positive beliefs, or cause their immediate rejection. This also is a matter to be considered. But it is the first process, that of entertaining the question, which will here be of foremost importance.

525. Before we go further, let us get the points stated above quite clear. By a *hypothesis*, I mean, not merely a sup-

position about an observed object, as when I suppose that a man is a Catholic priest because that would explain his dress, expression of countenance, and bearing, but also any other supposed truth from which would result such facts as have been observed, as when van't Hoff, having remarked that the osmotic pressure of one per cent solutions of a number of chemical substances was inversely proportional to their atomic weights, thought that perhaps the same relation would be found to exist between the same properties of any other chemical substance. The first starting of a hypothesis and the entertaining of it, whether as a simple interrogation or with any degree of confidence, is an inferential step which I propose to call *abduction*. This will include a preference for any one hypothesis over others which would equally explain the facts, so long as this preference is not based upon any previous knowledge bearing upon the truth of the hypotheses, nor on any testing of any of the hypotheses, after having admitted them on probation. I call all such inference by the peculiar name, *abduction*, because its legitimacy depends upon altogether different principles from those of other kinds of inference.

§2. THE TESTING OF HYPOTHESES*

526. The operation of testing a hypothesis by experiment, which consists in remarking that, if it is true, observations made under certain conditions ought to have certain results, and then causing those conditions to be fulfilled, and noting the results, and, if they are favorable, extending a certain confidence to the hypothesis, I call *induction*. For example, suppose that I have been led to surmise that among our colored population there is a greater tendency toward female births than among our whites. I say, if that be so, the last census must show it. I examine the last census report and find that, sure enough, there was a somewhat greater proportion of female births among colored births than among white births in that census year. To accord a certain faith to my hypothesis on that account is legitimate. It is a strong induction. I have taken all the births of that year as a sample of all the births of years in general, so long as general conditions remain

* Cf. 2.708ff, 2.786, 5.171.

as they were then. It is a very large sample, quite unnecessarily so, were it not that the excess of the one ratio over the other is quite small. All induction whatever may be regarded as the inference that throughout a whole class a ratio will have about the same value that it has in a random sample of that class, provided the nature of the ratio for which the sample is to be examined is specified (or virtually specified) in advance of the examination.* So long as the class sampled consists of units, and the ratio in question is a ratio between counts of occurrences, induction is a comparatively simple affair. But suppose we wish to test the hypothesis that a man is a Catholic priest, that is, has all the characters that are common to Catholic priests and peculiar to them. Now characters are not units, nor do they consist of units, nor can they be counted, in such a sense that one count is right and every other wrong. Characters have to be estimated according to their significance. The consequence is that there will be a certain element of guess-work in such an induction; so that I call it an *abductive induction*.† I might say to myself, let me think of some other character that belongs to Catholic priests, beside those that I have remarked in this man, a character which I can ascertain whether he possesses or not. All Catholic priests are more or less familiar with Latin pronounced in the Italian manner. If, then, this man is a Catholic priest, and I make some remark in Latin which a person not accustomed to the Italian pronunciation would not at once understand, and I pronounce it in that way, then if that man is a Catholic priest he will be so surprised that he cannot but betray his understanding of it. I make such a remark; and I notice that he does understand it. But how much weight am I to attach to that test? After all, it does not touch an essential characteristic of a priest or even of a Catholic. It must be acknowledged that it is but a weak confirmation, and all the more so, because it is quite uncertain how much weight should be attached to it. Nevertheless, it does and ought to incline me to believe that the man is a Catholic priest. It is an induction, because it is a test of the hypothesis by means of a prediction, which has been verified. But it

* Cf. 2.735ff.

† Cf. 2.759, 2.772.

is only an abductive induction, because it was a sampling of the characters of priests to see what proportion of them this man possessed, when characters cannot be counted, nor even weighed, except by guess-work. It also partakes of the nature of abduction in involving an original suggestion; while typical induction has no originality in it, but only tests a suggestion already made.

527. In induction, it is not the fact predicted that in any degree necessitates the truth of the hypothesis or even renders it probable. It is the fact that it has been predicted successfully and that it is a haphazard specimen of all the predictions which might be based on the hypothesis and which constitute its practical truth. But it frequently happens that there are facts which, merely as facts, apart from the manner in which they have presented themselves, necessitate the truth, or the falsity, or the probability in some definite degree, of the hypothesis. For example, suppose the hypothesis to be that a man believes in the infallibility of the Pope. Then, if we ascertain in any way that he believes in the immaculate conception, in the confessional, and in prayers for the dead, or on the other hand that he disbelieves all or some of these things, either fact will be almost decisive of the truth or falsity of the proposition. Such inference is *deduction*. So if we ascertain that the man in question is a violent partisan in politics and in many other subjects. If, then, we find that he has given money toward a Catholic institution, we may fairly reason that such a man would not do that unless he believed in the Pope's infallibility. Or again, we might learn that he is one of five brothers whose opinions are identical on almost all subjects. If, then, we find that the other four all believe in the Pope's infallibility or all disbelieve it, this will affect our confidence in the hypothesis. This consideration will be strengthened by our general experience that while different members of a large family usually differ about most subjects, yet it mostly happens that they are either all Catholics or all Protestants. Those are four different varieties of deductive considerations which may legitimately influence our belief in a hypothesis.

528. These distinctions are perfectly clear in principle, which is all that is necessary, although it might sometimes be

a nice question to say to which class a given inference belongs. It is to be remarked that, in pure abduction, it can never be justifiable to accept the hypothesis otherwise than as an interrogation. But as long as that condition is observed, no positive falsity is to be feared; and therefore the whole question of what one out of a number of possible hypotheses ought to be entertained becomes purely a question of economy.

529. Let us suppose that there are thirty-two different possible ways of explaining a set of phenomena. Then, thirty-one hypotheses must be rejected. The most economical procedure, when it is practicable, will be to find some observable fact which, under conditions easily brought about, would result from sixteen of the hypotheses and not from any of the other sixteen. Such an experiment, if it can be devised, at once halves the number of hypotheses. Or if the experiment might give any one of four results each of which would be the necessary consequence of the truth of any one of eight of the hypotheses, the single experiment would divide the number of admissible hypotheses by four. When such an experiment, or anything approaching such an experiment, is possible, it is clear that it is unwise to adopt any other course. But unfortunately, it commonly happens that this method becomes exhausted before the hypotheses are reduced to a single one, so that nothing remains but to test the remainder each by itself.

530. Now the testing of a hypothesis is usually more or less costly. Not infrequently the whole life's labor of a number of able men is required to disprove a single hypothesis and get rid of it. Meantime the number of possible hypotheses concerning the truth or falsity of which we really know nothing, or next to nothing, may be very great. In questions of physics there is sometimes an infinite multitude of such possible hypotheses. The question of economy is clearly a very grave one.*

In very many questions, the situation before us is this: We shall do better to abandon the whole attempt to learn the truth, however urgent may be our need of ascertaining it, unless we can trust to the human mind's having such a power of guessing right that before very many hypotheses shall have been tried, intelligent guessing may be expected to lead us to

* Cf. 1.122ff, 5.600ff.

the one which will support all tests, leaving the vast majority of possible hypotheses unexamined. Of course, it will be understood that in the testing process itself there need be no such assumption of mysterious guessing-powers. It is only in selecting the hypothesis to be tested that we are to be guided by that assumption.

531. If we subject the hypothesis, that the human mind has such a power in some degree, to inductive tests, we find that there are two classes of subjects in regard to which such an instinctive scent for the truth seems to be proved. One of these is in regard to the general modes of action [of] mechanical forces, including the doctrine of geometry; the other is in regard to the ways in which human beings and some quadrupeds think and feel. In fact, the two great branches of human science, physics and psychics, are but developments of that guessing-instinct under the corrective action of induction.*

532. In those subjects, we may, with great confidence, follow the rule that that one of all admissible hypotheses which seems the simplest to the human mind ought to be taken up for examination first. Perhaps we cannot do better than to extend this rule to all subjects where a very simple hypothesis is at all admissible.

This rule has another advantage, which is that the simplest hypotheses are those of which the consequences are most readily deduced and compared with observation; so that, if they are wrong, they can be eliminated at less expense than any others.†

533. This remark at once suggests another rule, namely, that if there be any hypothesis which we happen to be well provided with means for testing, or which, for any reason, promises not to detain us long, unless it be true, that hypothesis ought to be taken up early for examination. Sometimes, the very fact that a hypothesis is improbable recommends it for provisional acceptance on probation.

534. On the other hand, if one of the admissible hypotheses presents a marked probability of the nature of an objective fact, it may in the long run promote economy to give it an

* See 418, 491.

† Cf. 2.740.

early trial. By an objective probability I mean one which could be used to guarantee an insurance company or gamester against loss, because it expresses the real fact that among occurrences of a certain genus a certain proportion are of a certain species. Such is the probability of one/six that a die will turn up any particular face. Such a probability must be distinguished from a mere likelihood* which is nothing better than the expression of our preconceived ideas. The confusion between those two kinds of probability is one of the main sources of human errors, especially in abduction, in which yielding to judgments of likelihood is a fertile source of waste of time and energy.

535. In some departments of science, where experimentation is easy, the testing of hypotheses may be performed with some promptitude. In other departments, especially in ancient history, it will extend beyond a human life, so that for the individual the result of the abduction is all that he can hope to live to see. So long as the scientific hypothesis does not offer any particular dangers to the individual, he will do well to content himself with that hypothesis which the wise application of principles of economy recommends to undying scientific research. On the other hand, if there are such dangers, the individual may, as a scientific man, entertain one hypothesis for probation, while he allows probabilities greater weight in deciding upon what hypothesis he shall base his individual behaviour. Thus, in metaphysics, the maxim called Ockham's razor, to the effect that more elements must not be introduced into a hypothesis until it is absolutely proved that fewer are not sufficient, is a sound economic principle which ought to guide the scientific metaphysician. But centuries before it is absolutely proved that the simpler hypothesis is inadequate, it may have been made extremely probable that it is so, and the individual's behaviour may reasonably be based upon what the ultimate conclusion of science is likely to be.

536. In the department of ancient history, what is called "higher criticism"—that is to say, that particular color of non-textual criticism which has been dominant during the nineteenth century, especially in Germany—has placed, and though it has of late years retreated from many of its positions,

* See 2.101, 2.662f, 2.777.

still continues to place, great reliance upon likelihoods. To such a pitch is this carried that, although we can have no knowledge of ancient history independent of Greek (and Latin) authors, yet the critics do not hesitate utterly to reject narratives attested sometimes by as many as a dozen ancient authorities — all the testimony there is, at any rate — because the events narrated do not seem to persons living in modern Germany to be likely. I could write a whole book,* and not an unentertaining one, in illustration of this point. But scientific archaeology has, in our day, subjected those hypotheses to objective tests; and the uniform result has been to show that what seemed likelihoods to German professors were all but quite uniformly wrong and the ancient testimonies right.† Thus the maxim of exact logical analysis, that no regard at all, or very little indeed, ought to be paid to subjective likelihoods in abduction, has been fully confirmed by inductive tests.

§3. THE MEANING OF MIRACLES

537. Hume's argument against miracles is substantially based upon the assumption that we ought to judge of testimony by balancing the likelihood that the witnesses tell the truth against the likelihood that no such event as that to which they testify ever took place.‡ It is true that Hume gives a metaphysical definition of a miracle based upon the definition of Aquinas.§ But his argument in no way turns upon that. The definition he virtually *uses* is that a miracle is something the like of which has never been known to happen. He has completely mistaken the nature of the true logic of abduction.

538. I beg to say that I go no farther than that. I do not assent to the contention of many theologians that the miracles of Jesus can properly convince a modern man of the divinity of Jesus. On the contrary, all the evidence which can now be presented for them is quite insufficient, unless the general divinity of the Christian religion be assumed. The evidence

* See vol. 8.

† See 513.

‡ *Inquiry*, Section X.

§ *Summa Theol.*, I, qu. 110, art. 4, ad. 2.

which may have been overwhelming for eye witnesses and persons near them is of a very different and inferior character to that which may weigh with a modern Christian.

539. Now, laying aside the question of how one ought to think, let us ask what effect was, in fact, produced upon Hume's contemporaries by his argument against miracles; and also, what effect was produced by Hume's introducing a definition of a miracle which introduced the idea of a *Law of Nature*.* For it is a fact that Hume defined a miracle as a violation of a law of nature, and that the great bulk of his contemporaries were not sufficiently at home in philosophy to see that he was giving the definition a metaphysical turn that was quite uncalled for.

540. The fathers of the church had introduced no more metaphysics into their definitions of a miracle than had the simple folks who had witnessed miracles, or thought they had witnessed them. For both classes a miracle was nothing more than a great wonder.

541. The miracle remained nothing more than a great wonder, until the scholastic doctors, in their desire to give exactitude to theology, began to define it metaphysically. Aquinas said that a miracle was an interruption of the order of nature; and that remained the regular definition for the scholastics. When Hume took up the subject of miracles, he endeavoured to conform to the definition of the theologians, although for the purposes of his argument it was a matter of indifference how a miracle should be defined. All he needed was that it should be something the like of which was perfectly unexampled in experience. He was perfectly willing to adopt whatever definition the theologians preferred. But Hume was a literary man, and one of the characteristics of his philosophical style was that he was continually endeavouring to clothe philosophical ideas in fresh and modern phraseology. He probably referred either to Aquinas or to some theologian influenced by Aquinas; but he thought the definition would come home to his readers more if, instead of defining a miracle as an interruption of the order of nature, he defined it as a violation of a law of nature; for "law of nature" had become a familiar phrase. There was nothing in this

* *Inquiry*, X, I, 90.

modification of language which was particularly favorable to Hume's argument.

542. Aquinas had not spoken of a violation of a law of nature, because the phrase "law of nature" bore, in his day, no such meaning as Hume attached to it. The phrase itself is very old. It occurs in the early Greek poet Pindar,* and in Plato.† In Latin it is met with in the early poet Lucretius.‡ But until modern times, it had meant a rule of natural morality. For a scholastic, therefore, it would have been simple nonsense to say that a violation of a law of nature would be a miracle. That is why he spoke of the "order of nature" which meant for him substantially what we mean by a "law of nature." If there was any difference, it lay in this, that to the majority of scholastics, the order of nature was something absolutely real, having a being in or behind the very essence of nature; while for the majority of modern thinkers a law of nature is relative to the human understanding. The medieval "order of nature" would, therefore, have been more inviolable than the modern "law of nature," were it not for the fact that the marvellous appealed to the childish mind of the Middle Ages, while the scientific regularity appeals to the modern mind. But after men had become generally pretty thoroughly disgusted with scholasticism, Descartes came forward with a new philosophy which answered their new wants. Now it was a part of this philosophy, not, it is true, much insisted on by Descartes§ himself, but so much in the line of his ideas that his followers would be sure to insist upon it, as in fact they did, that nothing takes place in the world without the direct assistance of the Deity. There was no other force in causation, according to them, than that it is the will of God that events shall follow one another in certain definite ways. It was under the influence of this conception that Boyle,¶ a natural philosopher of strong theological tendencies, and at the same time of a decided physical turn of thought, began to speak of "laws of nature," very much in the modern sense, except that

* *Fragment*, 169 (151); see Plato's *Gorgias*, 484 B, 488 B; *Laws*, 690 B, 715 A.

† *Gorgias*, 483 E.

‡ See *De rerum natura*, I, 148.

§ See *Meditation* III.

¶ See *Works*, vol. 5, p. 52, London (1672).

with him, no doubt, there was an implication that they were divine decrees. The phrase had met with favor and, by Hume's time, had become familiar to all English ears. He adopted it, therefore, in his definition of a miracle, although it rather suggested the possibility of miracles than otherwise. Still, as close a reasoner as Hume was could easily see that it would not materially affect the force of his argument to admit that miracles do, from time to time, occur; for in regard to any special miracle it would still remain more likely that the miracle had not occurred and that the witnesses had not given exact testimony than that the witnesses had been exact and that the particular miracle in question had occurred. The truth is that, as soon as it is granted that it is proper to judge of testimony by the balance of likelihoods and unlikelihoods, Hume's reasoning about miracles has been substantially admitted.

543. In estimating the effect of Hume's argument upon his contemporaries it should be remembered that attacks upon the miracles of Jesus presented no novelty whatever at the time when Hume's celebrated essay was written. For all through the period of Hume's boyhood the whole island of Great Britain had resounded with the violent attacks continually renewed upon them by Thomas Woolston, whose books had had a popular sale that was quite unprecedented. Woolston was a thoroughly sincere Christian; but he maintained that the fathers of the church had unanimously held the gospel miracles to be parables and types of the greater spiritual miracles that the religion of Christ was destined to accomplish.* He offered no general argument against miracles, but simply took up the narrative of each one and undertook to show, first, that the circumstances were such as to render its literal happening incredible, and secondly, that even if it did happen it would not tend to prove the divinity of Jesus. As an example of his style of reasoning we may take the miracle of casting out the devils into the herd of swine. Woolston said that it could not have happened, because it had for centuries been against the law in Judæa to keep swine; so that no herd of swine could have been on the public road. He added that if it had happened, so far from evidencing the divinity

* See his *Discourses on the Miracles of Our Savior*, etc., London (1727-29).

of Jesus, it would simply have evinced a total disregard for the rights of property, for which any jury in England would have awarded damages. Woolston kept up a hot fire of such arguments all his life, and after his death his follower Annet* had taken up the cudgels.

544. This discussion had been made familiar to every man in England and Scotland; and it is therefore safe to say that by the time Hume wrote, whoever was to [be] persuaded that the miracles of Jesus were unliteral had already been persuaded. But I must say that I cannot but believe that Woolston had carried substantially the whole population with him on his main contention, which was that whatever views are taken of the miracles they cannot suffice by themselves, in modern days, to prove the Christian religion. I believe that those who adhered to the literal miracles did so because they were inclined to believe in the Christian religion, and that they had, but for rare exceptions, failed to be brought to believe in the Christian religion because of an antecedent conviction of the reality of the gospel miracles.

545. What Hume mainly did was to supply those who were disposed to reject the miracles with an expeditious way of disposing of the evidence at one blow. At the same time, he probably shook the belief of some who had been accustomed to regard legal evidence as a matter to be discussed by the method of balancing likelihoods and unlikelihoods — a method which had met considerable favour among lawyers.

546. Of course, formalism was rife among the men of that generation. There was in many minds such a worship of obstinacy that they would naturally look upon the immutability of a divine decree as an attribute of Deity, regard[less] of the circumstances of any particular case. The extreme irrationality of many rules of law fostered such sentiments. It may have been, therefore, that as soon as some men of that description were credibly informed that a miracle was a violation of a law of nature, or divine decree, they would be unable to conceive that such a Deity as they could worship, the personification of obstinacy, would ever consent to such a thing; and they may perhaps have read that argument into Hume, although it is one which Hume himself could only look

* See *A Collection of the Tracts of a Certain Free Inquirer*, etc., London (1739).

upon with contempt. I can, at any rate, imagine no other way in which Hume's definition of a miracle could have specially weakened faith in miracles.

§4. BUTLER'S ANALOGY

547. It was while Hume was engaged in writing his first treatise, and long before he touched upon miracles, that Bishop Butler's *Analogy of Reason with Nature* was published.* This work contains an interesting application of the then current notion that the order of nature is a law to the doctrine of miracles. Butler† remarks that if we could know what the laws of nature really are it would perhaps be seen that they positively require the occurrence of miracles. For if there are any "laws" of nature, they must be supposed to be supremely reasonable. Now the supreme reasonableness of a "law" will consist in its advancing a rational purpose in every particular case. Hence, if there is really a need of an apparently exceptional phenomenon, it will not be contrary to real analogies, but on the contrary required by them, that that apparently exceptional phenomenon should occur. On the surface of it, at any rate, this view creates no objection to Hume's real argument; but it clearly does show that to look upon the order of nature as being of the nature of a "law" is to adopt a view which is really favorable to miracles, rather than the reverse.

But when we come to penetrate the spirit of Butler's remark, we recognize that it has, hidden in the depths of it, an idea which has only to be developed to refute all such reasonings as that of Hume about miracles, and the similar but far more extravagant conclusions of the "higher critics" of ancient history, and which is in remarkable consonance with the higher teachings of modern science.

* 1733.

† *Analogy*, Part II, bk. IV (1736). Hume's *Treatise* was published in 1739-40.

CHAPTER 6

SCIENCE AND IMMORTALITY*

§1. PSYCHIC RESEARCH^E

548. What is the bearing of positively ascertained facts upon the doctrine of a future life? By the doctrine of a future life, I understand the proposition that after death we shall retain or recover our individual consciousness, feeling, volition, memory, and, in short (barring an unhappy contingency), all our mental powers unimpaired. The question is, laying aside all higher aspects of this doctrine, its sacredness and sentiment — concerning which a scientific man is not, as such, entitled to an opinion — and judging it in the same cold way in which a proposition in physics would have to be judged, what facts are there leading us to believe or to disbelieve it?

549. Under the head of direct positive evidence to the affirmative would be placed that of religious miracles, of spiritualistic marvels, and of ghosts, etc. I have little to say to all this. I take the modern Catholic miracles to be the best attested. Three members of the English Psychical Research Society have lately published a vast book of fourteen hundred pages, large octavo, under the title of *Phantasms of the Living*. This work gives some seven hundred cases of apparitions, etc. of a dying person to another person at a distance. The phenomenon of telepathy, or perception under conditions which forbid ordinary perception, though not fully established, is supported by some remarkable observations. But the authors of the book I am speaking of — Messrs. Gurney, Myers, and Podmore — think they have proved a kind of telepathy by which dying persons appear to others at great distances. Their most imposing arguments are based upon the doctrine of

* First published in a Symposium in the *Christian Register*, Boston, April 7, 1887. Reprinted from *Science and Immortality*, The Christian Register Symposium, Revised and Enlarged, edited by S. J. Barrows; Geo. H. Ellis, Boston (1887).

probabilities, and these I have examined with care. I am fully satisfied that these arguments are worthless, partly because of the uncertainty and error of the numerical data, and partly because the authors have been astonishingly careless in the admission of cases ruled out by the conditions of the argumentation.

550. But, granting all the ghost stories that ever were told, and the reality of all spiritual manifestation, what would they prove? These ghosts and spirits exhibit but a remnant of mind. Their stupidity is remarkable. They seem like the lower animals. If I believed in them, I should conclude that, while the soul was not always at once extinguished on the death of the body, yet it was reduced to a pitiable shade, a mere ghost, as we say, of its former self. Then these spirits and apparitions are so painfully solemn. I fancy that, were I suddenly to find myself liberated from all the trials and responsibilities of this life, my probation over, and my destiny put beyond marring or making, I should feel as I do when I find myself on an ocean steamer, and know that for ten days no business can turn up, and nothing can happen. I should regard the situation as a stupendous frolic, should be at the summit of gayety, and should only be too glad to leave the vale of tears behind. Instead of that, these starveling souls come mooning back to their former haunts, to cry over spilled milk.

551. Under the head of positive evidence apparently unfavorable to the doctrine, we may reckon ordinary observations of the dependence of healthy mind-action upon the state of the body. There are, also, those rare cases of double consciousness where personal identity is utterly destroyed or changed, even in this life. If a man or woman, who is one day one person, another day another, is to live hereafter, pray tell me which of the two persons that inhabit the one body is destined to survive?

552. There is certainly a large and formidable mass of facts, which, though not bearing directly upon the question of a future life, yet inclines us to a general conception of the universe which does not harmonize with that belief. We judge of the possibility of the unseen by its analogy with the seen. We smile at Aladdin's lamp or the elixir of life, because they

are extremely unlike all that has come under our observation. Those of us who have never met with spirits, or any fact at all analogous to immortality among the things that we indubitably know, must be excused if we smile at that doctrine. As far as we see, forms of beauty, of sentiment, and of intelligence are the most evanescent of phenomena.

“The flower that once has bloomed forever dies.”

Besides, scientific studies have taught us that human testimony, when not hedged about with elaborate checks, is a weak kind of evidence. In short, the utter unlikeness of an immortal soul to anything we cannot doubt, and the slightness of all the old arguments of its existence, appear to me to have tremendous weight.

§2. THE BREAKDOWN OF THE MECHANICAL PHILOSOPHY

553. On the other hand, the theory of another life is very likely to be strengthened, along with spiritualistic views generally, when the palpable falsity of that mechanical philosophy of the universe which dominates the modern world shall be recognized. It is sufficient to go out into the air and open one's eyes to see that the world is not governed altogether by mechanism, as Spencer, in accord with greater minds, would have us believe. The endless variety in the world has not been created by law. It is not of the nature of uniformity to originate variation, nor of law to beget circumstance. When we gaze upon the multifariousness of nature we are looking straight into the face of a living spontaneity.* A day's ramble in the country ought to bring that home to us.

554. Then there is the great fact of growth, of evolution. I know that Herbert Spencer endeavours to show that evolution is a consequence of the mechanical principle of the conservation of energy. But his chapter† on the subject is mathematically absurd, and convicts him of being a man who will talk pretentiously of what he knows nothing about. The principle of the conservation of energy may, as is well known, be

* Cf. 58ff.

† *First Principles*, bk. II, ch. 18.

stated in this form: whatever changes can be brought about by forces can equally happen in the reverse order (all the movements taking place with the same velocities, but in the reverse directions), under the government of the same forces. Now, the essential of growth is that it takes place in one determinate direction, which is *not* reversed. Boys grow into men, but not men into boys. It is thus an immediate corollary from the doctrine of the conservation of energy that growth is not the effect of force alone.

555. The world, then, is evidently not governed by blind law. Its leading characteristics are absolutely irreconcilable with that view. When scientific men first began to understand dynamics, and had applied it with great success to the explanation of some phenomena, they jumped to the anticipation that the universe could be explained in that way; and thus what was called the Mechanical Philosophy was set up. But a further study of the nature of force has shown that it has this conservative character, which absolutely refutes that mechanical notion of the universe. As well as I can read the signs of the times, the doom of necessitarian metaphysics is sealed. The world has done with it. It must now give place to more spiritualistic views, and it is very natural now to anticipate that a further study of nature may establish the reality of a future life.

556. For my part, I cannot admit the proposition of Kant — that there are certain impassable bounds to human knowledge; and, even if there are such bounds in regard to the infinite and absolute, the question of a future life, as distinct from the question of immortality, does not transcend them. The history of science affords illustrations enough of the folly of saying that this, that, or the other can never be found out. Auguste Comte said that it was clearly impossible for man ever to learn anything of the chemical constitution of the fixed stars,* but before his book had reached its readers the discovery which he announced as impossible had been made. Legendre said of a certain proposition in the theory of numbers that, while it appeared to be true, it was most likely beyond the powers of the human mind to prove it; yet the next writer on the subject gave six independent demonstrations of

* *Cours de philosophie positive*, 19^e leçon. vol. 2, p. 8, Paris (1835).

the theorem. I really cannot see why the dwellers upon earth should not, in some future day, find out for certain whether there is a future life or not. But at present I apprehend that there are not facts enough in our possession to warrant our building any practical conclusion upon them. If any one likes to believe in a future life, either out of affection for the venerable creed of Christendom or for his private consolation, he does well. But I do not think it would be wise to draw from that religious or sentimental proposition any practical deduction whatever — as, for instance, that human happiness and human rights are of little account, that all our thoughts ought to be turned away from the things of this world, etc. — unless such deduction has the independent sanction of good sense.

CHAPTER 7

LOGIC AND SPIRITUALISM*^P

557. Facts, new or newly published, rappings, table-turnings, with different predispositions opining differently, started controversy concerning Spiritualism. In course of time, other facts, planchette, public exhibitions, mind-reading, trances, apparitions, physical manifestations in great variety, many hundred well-attested strange experiences, attempts at scientific experimentation — contrariwise, important mediums and mind-readers detected rogues, new psychological laws explanatory of various illusions — all these facts doubtless had influence, one or other way, upon men's opinions. Meantime, a mighty flood, literature and talk, deluged the subject — observations highly judicious, delicious satire, ingenious speculations, a large part sadly rash, a very little too timorous. But doubted whether all this comment has changed one individual's mind.

558. In this impotence of argumentation, sole hope of contributing anything useful to the discussion lies in breathing into it spirit so candid, unsophisticated, direct, yielding, that the impartial mind, he who alone can get good from such reading, he who looks upon speculative opinions as so many objects of natural history, calculated to excite lively interest by curious relationships and affinities, more so perhaps being false than being true, but who lays them upon his dissection-table as things not calling for sympathy, as vivisection-subjects whose vehement logic-squirmings need excite no concern whatever — that this reader may be aided in picking to pieces, disentangling, studying, the intellectual component impulses urgent to the opinion in hand, in appreciating them, in considering their just limits of action, not so much himself to form definitive judgment *pro* or *con* (which mostly is not safe while controversy rages) as to assign it schematic place in the natural history of opinion.

* Exactly as written and corrected by Peirce. Intended for *The Forum*, c. 1905.

559. First, I state plainly what I dispute. Hypnotism I question not, nor double and triple personality. That these things yet remain imperfectly classified is admitted, too; and not alone these phenomena, but much in everyday life, in communication of ideas in ordinary conversation. Only vague, doubtful explanations are deliverable for phenomena resembling clairvoyance. Not altogether improbably, unrecognized avenues of sense may exist. Possibly *so* the blind avoid trees and walls. Phenomena in abundance await explanation from future science about every stock and stone; how much more about mind? But here, with parting salutation, I diverge from spiritualistic paths, for I think no mind with which man can communicate can act or feel otherwise than through its residential nerve matter, which in turn can act and react upon external bodies only according to recognized laws of mechanics. Not that telepathy is absurd or in its nature impossible, but, in the coarse form it has been imagined impracticable as voyage to planet Mars. Belief in telepathy ought to be ranked as variation of spiritualism.

560. I run up my colors and confess myself scientific specialist. Spiritualists do not take kindly to scientific men, and never forego opportunities of instancing scientific follies. Though eminent scientists be their allies, they would not have spiritualism judged by the scientific kind of intelligence, surely anticipating disfavor from such judgment. For scientific men, we may as well acknowledge it, are, as such, mere specialists. That stigma! We are blind to our own blindness; but the world seems to declare us simply incapable of rising from narrowness and specialism to take broad view of any facts whatsoever.

561. "Myopy" and "presbyopy": inability to focus objects too far away; corresponding inability for objects too near. I suppose we scientific specialists, technical sharps, connoisseurs, travelers, scholars, are myopic minds, seeing microscopically, but only things under our several noses. Presbyopic minds, with defective accommodation, would be able to see only what stands open to all men's apprehension: these are fogies, average board-members, men whom one believes to be very wise, but whom one perceives to be very ignorant.

562. Is there a corresponding contrast between objects

themselves? Some paintings are not easily made out because done in miniature, requiring narrow examination. Others, large and executed broadly, when looked at closely show only brush marks, the design quite invisible. So, some experiences are inapprehensible because minute and recondite. They are (a) scientific observations, only feasible with special instrumental aids, under special precautions, by virtue of special skill; they are (b) strange adventures, happenings dependent on rare chances fallen to few people, unrepeatable at pleasure. In contrast with these phenomena, remote from everyday life, others (let us hasten to acknowledge) are as hard or harder to see, simply because they surround us on every hand; we are immersed in them and have no background against which to view them. A person's heart stops beating; he perceives it; but let it keep on its regular course, and he knows not he has a heart. People do not hear how their own voices sound, nor feel their own manners. Writers are unaware of peculiar impressions produced by their own styles. What is the most obvious characteristic of the universe we live in puzzles one to answer otherwise than by rote.

563. Curious how little impression experience too familiar makes upon men's minds, how little attention is paid to it. With an oversecure, not to say ridiculous, contempt, I be-think me, are we despising everyday experience, we special-ists and half the world besides — except where its lessons are followed irreflectively. Recondite experiences, whether scientific or autobiographic, are cherished as very precious. They are rare; the means for acquiring them have been costly; they distinguish their possessor over other men; they are all that many a man has to show for life's labor. Have we professional men often been found *underrating* importance of special orders of facts we have spent our lives in acquiring and in learning how to acquire? Has it happened to any of us, I wonder, to detect smiles on circumspect faces at our contrary tendency? Or has it been generally remarked that persons who have gazed upon the midnight sun, or attended Nijni-Novgorod fair, or seen the effigies in Westminster Abbey, have set *less* store by these experiences than their untraveled interlocutors would seem inclined to do?

564. Let us ask ourselves whether not only scientific

specialists, not only professional men, not only all educated men, but whether the bulk of mankind do not place too much stress on particulars, and regard too little the universal. Two persons casually meeting, with wish to develop mild sympathy, call one another's attention to the fair weather or the foul weather — insignificant details. The deeper ground of common feeling, that it is day-time, nobody is ever asked to remark; still less the good cheer that earth contains fellow creatures, heaven a Father. Commonplaces these? Granted. But what are commonplaces but universal experiences?

Ask a thoughtful company the general question where lies the intellectual superiority of one set of experiences over another, and reply will be made with some concord; facts are important only, first, as they are massed and concentrated upon one or more positions, and, secondly, as these positions are themselves important.

Go on, however, to inquire of relative values of experiences familiar and recondite, and differences will emerge. Respectability will remark that worth of anything is equivalent of trouble requisite to supply it, familiar experiences, like air and water, commanding no price — answer veritably redolent of the frankincense and the myrrh of the temple of Solomon. Science will hold scientific experiences more capable of systematic marshaling to great ends than civilian facts. Young America will call familiar phenomena squeezed lemons, whatever they had to teach already learned, things to be left behind in pressing on to things new; and it will recall dazzling inventions sprung from recondite experiences, gunpowder, mariner's compass, steam engine, electric telegraph, India rubber, anæsthetics, sewing machine, telephone, electric light.

565. But all these voices will not drown those that decry and revile specialism, extolling and magnifying perfections of the all-pervading. These will be heard to say that those things are not most intellectually helpful which most dazzle imagination; that great facts of nature which familiar experiences embody are not of the number of those things which can have their juices sucked out of them and be cast aside; that (returning to the principle upon which alone the question can be properly answered) the very circumstance which renders facts familiar is their being grouped into uniformed hordes,

in consequence of which no collection of scientific observations can well be vast enough to withstand their concurrent testimony.

566. These protestants against worship of scientific specialties, deeper-thinking of the spiritualists included, will be averse from admitting that the discovery of phenomena of electricity, establishment of its laws, determination of its constants, and application to the uses of life, rank as the greatest triumph of modern knowledge. That distinction they will rather reserve for the evolution of the principle of conservation of energy, *résumé* of all that man has ever learned about force, great governing principle of all physics, whose history reaches from Archimedes to our day. That history shows that this great investigation has, from first to last, rested almost exclusively upon familiar experiences.

Its completion was involved in the discovery that heat, instead of being something ingenerable, indestructible, is but mechanical work transformed. Humanity wanted time to master that subtilty, energy being yet only letter in algebraic formula and even *vis viva* no commanding feature of ordinary conceptions of mechanics. Accordingly, the doctrine having been accepted, a vestige of mental confusion remained in disagreements as to nature of the evidence that had demonstrated it. Tyndall* and Clausius,† sound logicians, uphold Mayer's‡ proof drawn from facts to be reckoned as familiar; but Tait,§ patriotic Scot, finds adherents for attribution to more special considerations adduced by countrymen. Others, however, had found it out long before, Rumford, Sadi Carnot,¶ and, if I am rightly informed, Uriah Boyden.||

567. Be those doubts what they may, there can be none that previous steps used familiar experiences as almost their sole premisses. Archimedes proves property of lever, Stevinus

* See his *Heat Considered as a Mode of Motion*, Lecture V (1862).

† "Ueber einen Grundsatz der Mechanischen Wärmetheorie," *Annalen der Physik u. Chemie*, Bd. CXX, pp. 426-452 (1863).

‡ See "Remarks on the Mechanical Equivalent of Heat," *Philosophical Magazine*, Series IV, vol. 25, p. 493 (1863).

§ *Sketch of Thermodynamics*, §§ 30-39 (1868 and 1877).

¶ *Réflexions sur la puissance motrice du feu*, 1824.

|| An American inventor and scientist (1804-79) who does not seem to have published his theoretic results.

that of inclined plane, Huygens that of moments of inertia, by mathematical reasoning from propositions assumed as self-evident — dictates of common sense. Galileo, demonstrating mechanical parallelogram, merely asks imagination how a body would move upon a vessel itself moving, no outward experiment demanded. Newton, establishing the law of action and reaction, treats his facts as matters of course. Even Galileo arguing substantially first two laws of motion in teeth of supposed established facts, though keen observer, though experimenter, rests almost exclusively on familiar experience, and “*il lume naturale*,” adducing but few simple experiments, after all not needed.

568. Dr. Thomas Young,* name to conjure with among physicists, thought, in the first quarter of this century, scientific experimentation had gone far enough and should stop till facts already collected were digested. Every scientist will jeer. My individual notion, doubtless warped by specialism, is this. Reasoning is strictly experimentation. Euclid, having constructed a diagram according to prescription, draws an extra line, whereupon his mind's eye observes new relations not among those prescribed quite as surprising as new metals or new stars. Experimentation is strictly appeal to reason. Chemist sets up retort, introduces ingredients, lights fire, awaits result. Why so confident? Because he trusts that what happens once happens always; nature follows general laws, in other words, has a reason. Successful research — say Faraday's — is conversation with nature; the macrocosmic reason, the equally occult microcosmic law, must act together or alternately, till the mind is in tune with nature. This, the distinctively scientific procedure, linked experimentation and reasoning (suppose we say *indagation*), essentially involves special, new experience. A scientific man is simply one who has been trained to conduct observations of some special kind, with which his distinctive business begins and ends. Nevertheless, reasoning from familiar experience plays a great rôle in science: it lays the indispensable foundation, is needful in frequent later conjunctures. The part so built is the strongest of the structure, upholding the rest.

* “On the Theory of Light and Colours,” *Philosophical Transactions*, 1802, p. 12.

569. Such reasoning is sometimes elaborate, self-critical; but at its best it is simple, sleepy. The doctrine of Descartes,* that the mind consists solely of that which directly asserts itself in unitary consciousness, modern scientific psychologists altogether reject. Swarming facts positively leave no doubt that vivid consciousness, subject to attention and control, embraces at any one moment a mere scrap of our psychical activity. Without attempting accuracy of statement demanding long explanations, and irrelevant to present purposes, three propositions may be laid down. (1) The obscure part of the mind is the principal part. (2) It acts with far more unerring accuracy than the rest. (3) It is almost infinitely more delicate in its sensibilities. Man's fully-conscious inferences have no quantitative delicacy, except where they repose on arithmetic and measurement, which are mechanical processes; and they are almost as likely as not to be downright blunders. But unconscious or semi-conscious irreflective judgments of mother-wit, like instinctive inferences of brutes, answer questions of "how much" with curious accuracy; and are seldom totally mistaken.

570. Conclusions men reach they know not how are better than those fortified by unscientific logic. By logic *Aquinas*, if not *Calvin*, persuaded himself that one of the chief joys of the blest will be to peer over heaven's parapet and watch the damned writhing in torments and rage below:¹ by instinct, or half-conscious inference, a poor peasant girl will inwardly reject the doctrine, for all revered pastor may say. No moral sentiment more universally violent than reprobation of inter-marriage of near relatives. Assassin will shudder at thought of incest. But had a man to depend upon conscious reasoning

* *Meditation II. Principles*, Part I, 9.

¹ Thus in the *Scriptum in quartum librum sententiarum Magistri Petri Lombardi* (Distinctio 50, questio 3, articulus 4), he says: Dicendum . . . quod . . . ut beatitudo sanctorum eis magis complaceat et de ea uberiores gratias Deo agant, dantur eis ut poenam impiorum perfecte intueantur. In his 8th *Quodlibet*, question 7, article 16, he says: Dicendum quod videre miseriam damnatorum omnino erit sanctis ad gloriam, gaudebunt enim de justicia Dei et de sua evasione. And in another place: laetantur de justa punitione. "A horrible doctrine, I confess," says Calvin [*Institutes of the Christian Religion*, bk. III, chapter 23, section 7] of election to damnation; but logic forces him to it.

to instruct conscience in this matter, while he might be led to condemn the act, he would be unlikely to regard it with the extreme horror in which actually all share. Generation after generation has, in almost unconscious mode, taken measure of ordinary experiences about family relationships, has transmitted its impression to the next, partly by tradition, partly, one guesses, by congenital bequest, this next has made its observations and discussions, has modified in some insensible degree the sentiment it derived from its fathers, and so at last our strong feeling has been developed. That races tolerating occasional incest have died out and that *so* horror of it has been bred, there is scant room to believe.

571. This transmission from father to son of dictates of good judgment makes the growth of common sense. Based on large, ordinary experience, far more valuable reservoir of truth than the aggregate of man's special experiences (scientific and extraordinary), worked up in that part of the mind that functions the most delicately and unerringly, reconsidered and revised by countless generations, such conclusion, if unequivocal and pertaining to matter plainly within the competency of good sense, who shall dare to dispute?

572. Let not conscious reason look down upon it as inadequate to problems high, intellectual, intricate. From data of sensations proper to hundreds of nerve-terminals in the optic retina, combined with certain muscular sensations — premisses more tangled and confused than tongue can tell or brain can think — common sense has extricated the marvelously clear and beautiful conception, Space.* What simple theory, reducing to order what infinitely complicated facts! Can whole history of science show any discovery whatever half so practically important, half so intrinsically difficult, half so intellectually interesting? It is conceivable that future science should find some principles of geometry to be measurably erroneous. Such discovery would be the most remarkable ever made by science. Yet what insignificant detail compared with that which common sense has taught us of space!

573. Common sense corrects itself, improves its conclusions. The history of the science of dynamics is that of gradual correction by inference from familiar experience (essentially

* See e.g. 5.223.

an operation of good sense) of primitive conceptions of "force" and "matter." There, however, the reasoning was of the self-conscious kind. But we see social, political, religious common sense modifying itself insensibly in course of generations, ideas of rights of man acquiring new meaning, thaumaturgic elements of Christianity sinking, spiritual rising in religious consciousness.

574. Common sense improves; it does not, then, attain infallibility. Then, its decisions are subject to review. But in case there be evidence that such a conclusion is definitive, not a mere stage in a changing estimate; if it appears to have been formed under guidance of general experience and to be of the kind such experience can warrant; finally, if its substance is in harmony with individual good judgment from general experience, then the authority of common sense as to the practical truth of the conclusion (subject to minute modification) is so weighty that special experience can hardly attain sufficient strength to overthrow it.

575. How will this rule work in practice? Dr. Zöllner, eminent astronomer and mathematical physicist, man of true genius, keen and subtle, has Mr. Slade, celebrated medium, as visitor in his house.* One night he ties the ends of a string together, putting seal upon the knot. Next day, he hands this string to Slade, who thereupon before his eyes makes (or seems to make) a knot in the single string (in contradistinction, I mean, to the double string), and hands it back for examination. The ends of the string not being free, this was impossible according to common sense. But had space a fourth dimension, additional to its three of length, breadth, and thickness, there would be no such impossibility. Hence Dr. Zöllner concludes that space really has four dimensions. Now, it must be admitted that no experiences, familiar or otherwise, are absolutely inconsistent with space having four dimensions. For example, this refutation might be proposed: steam can be subjected to great pressure in a boiler; now if space were open in a fourth dimension, there would be ways round from inside to outside of the boiler, and why should not the steam escape? It might, however, be replied that the molecules hav-

* See Zöllner, *Transcendental Physics*, trans. by W. H. Harrison, London (1880).

ing no component velocities in that direction, and there being no component pressure in that direction, there would be no tendency to motion in that direction; indeed various other loop-holes in the argument are discoverable. Only suppose, then, that space really has fourth dimension, and suppose that one single muscle-cell of Slade's had somehow got displaced so as to project in that direction, and force is thus supplied in that direction which, in total absence of resistance in that direction, would suffice to carry Slade's fingers and with them the string round by that path so as to tie the knot; and here we have explanation, simple and beautiful, of the phenomenon; a gentlemanly explanation, too, not unnecessarily offensive to Mr. Slade's honour. Should it be urged that all experience is against space having fourth dimension, because on that hypothesis phenomena similar to that tying of knot ought to be more common, ready reply comes: If space has fourth dimension there is no determining *a priori* how often it would happen that something would project into it; experience seems to show it happens so rarely that Mr. Slade furnishes the first conclusive instance of it. Now, it is certainly true that no experience whatever can furnish the slightest reason for thinking that an event of any conceivable kind will *absolutely never* happen. Take a thousand people at random among the inhabitants of the United States, and upon inquiry it may probably be found that not one of them will ever have read a line of Martin Farquhar Tupper. It will be fair to conclude that not one in a thousand of all the people in the country ever read line of this poet; but not to conclude he has *no* readers in the country, since it might be not one in a thousand were readers of his works, while still those poems were devoured by sixty thousand people. Upon same principle, all accumulable experience will never furnish any smallest reason for thinking that no one, or no million for that matter, of all the bodies in the universe juts out into fourth dimension. Nay, presumption rather holds that this does somewhere occur, since every rule has exceptions; for how could an absolutely universal law ever come about? But the whole of our personal experience, itself an amazing flood, together with the experience of all history as embodied in common sense, compels us to hold such jutting to be so excessively infrequent that the

probability of its occurrence in any particular case, as in the person of Mr. Slade, is beyond all compare smaller than the probability of trick, even were we at a loss to conceive how trick could be.

576. Of course, popular belief has often fallen into gross errors. Primitive man peopled woods, streams, earth, air, clouds, stars, with spirits. If intercourse with these beings could be shown to have been believed customary, happening every day, it would be an inference of a kind legitimately to be drawn from familiar experience, and we should have to inquire seriously into its truth. But I fancy intercourse with spirits was never considered matter of course. Belief in it was not formed under guidance of experience, but was hot, extravagant fancy, classable with those superstitions that have inspired or terrified mankind — fountain of perpetual youth, philosopher's stone, fairies, ogres, ghosts, magic, personal devil, jinns sealed up by Solomon, archei, oracles of Apollo, Eleusinian mysteries, metempsychosis, and all other romances about substantial spirits.

577. Faith in these things is fading out; where people are enlightened mere traces of it remain. The essence of these rapidly-decadent beliefs is the doctrine that soul (such as we can know) is able to feel and act independently of its animal body. State the proposition in the abstract, and most men will subscribe to it. Find a practical case, and willingness to risk great interests upon the truth of the principle will commonly be deemed symptomatic of aberration of mind.

578. Common sense is coming to reject the doctrine, good sense does reject it. All ordinary phenomena of life, which crowd upon us every minute, together with such familiar matters as sleep, faintings, bodily illness, insanity, death, show as plainly, as conclusively, dependence of mind upon body, as familiar facts of lifeless things show first law of motion. That law which Galileo* substantially first told the world is that a moving body left to itself will move on with no diminution, no increase of speed, in one straight line forever. They say the first thing that made him think so was seeing a lamp hung by chain from roof of the beautiful cathedral at Pisa, just before the choir, swinging backward and forward, through a small

* *Dialogues Concerning Two New Sciences*, "Fourth Day" *ad init.* (1638).

arc, once in about four seconds, and continuing so to move all through high Mass, without any perceptible decrement of the amplitude of its oscillations. I can well believe this true. Performance of good judgment is a sluggish movement, a mental peristalsis, slow, obscure, that is favored by beautiful and peaceful surroundings, even by luxurious tedium, which, in most satisfying of cathedrals, ceremonies performed with an elegance in manner, a refinement in spirit, caught it might seem from the architecture, would well produce in mind of boy attending them too often. I remember myself giving that same lamp, as no doubt it was, a small impulse shortly before a function more than ordinarily prolonged — obsequies of prince of the church — and to have watched its grave, impressive, though soft, assertion of the first law of motion, all through service, wondering whether the obvious lesson of mortality which that corpse, whole scene, was bearing in upon me could be less true, less infallible than that.

579. Completely satisfactory discussion of the question of Spiritualism would involve satisfactory theory of connection of soul and body, which is not perhaps forthcoming.

580. The obsolete Cartesian dualism, that soul and body are two substances, distinct, independent, untenable as positing double absolute, rendering connection of soul and body absolutely inexplicable either on mechanical or on psychological principles, had a single element of philosophical strength, its recognition of real reaction between *ego* and *non-ego*. Development of this naturally leads to thinking that minds can communicate only through bodies — doctrine unfavorable to Spiritualism.

581. Philosophy tries to understand. In so doing, it is committed to the assumption that things are intelligible, that the process of nature and the process of reason are one. Its explanation must be derivation. Explanation, derivation, involve suggestion of a starting-point — starting-point in its own nature not requiring explanation nor admitting of derivation. Also, there is suggestion of goal or stopping-point, where the process of reason and nature is perfected. A principle of movement must be assumed to be universal. It cannot be supposed that things ever actually reached the stopping-point, for there movement would stop and the principle of

movement would not be universal; and similarly with the starting-point. Starting-point and stopping-point can only be ideal, like the two points where the hyperbola leaves one asymptote and where it joins the other.

582.* In regard to the principle of movement, three philosophies are possible.

1. Elliptic philosophy. Starting-point and stopping-point are not even ideal. Movement of nature recedes from no point, advances towards no point, has no definite tendency, but only flits from position to position.

2. Parabolic philosophy. Reason or nature develops itself according to one universal formula; but the point toward which that development tends is the very same nothingness from which it advances.

3. Hyperbolic philosophy. Reason marches from premisses to conclusion; nature has ideal end different from its origin.

583. The choice of elliptic philosophy, which refuses to acknowledge the ideal, supposes more interest in nature than in reason. The philosophy which sees nothing in nature but the washing of waves on a beach cannot consistently regard mind as primordial, must rather take mind to be a specialization of matter. Bent on outward studies, it will find the statement that nerve-matter feels, just as carmine is red, a convenient disposition of a troublesome question. Elliptic philosophy is irreconcilable with Spiritualism.

584. He who feels himself and his neighbors under the constraints of overwhelming power, from which they long to take refuge in annihilation — situation less common in this country and age than in other places and times — viewing this little life as rounded with a sleep, readily accepts the idea that the world, too, sprang out of the womb of nothingness to evolve its destiny, and into nothingness back to return. Such life as this philosophy recognizes — a fatal struggle, a mere death-throe — it should extend throughout nature. Soul should be a mere aspect of the body, not tied to it, therefore, but identical with it. Nothing can be more hostile to Spiritualism than this Parabolic philosophy.

585.† Hyperbolic philosophy has to assume for starting-

* Cf. 27, 1.362.

† Cf. 260ff.

point something *free*, as neither requiring explanation nor admitting derivation. The free is living; the immediately living is *feeling*. Feeling, then, is assumed as starting-point; but feeling uncoördinated, having its manifoldness implicit. For principle of progress or growth, something must be taken not in the starting-point, but which from infinitesimal beginning will strengthen itself continually. This can only be a principle of growth of principles, a tendency to generalization. Assume, then, that feeling tends to be associated with and assimilated to feeling, action under general formula or habit tending to replace the living freedom and inward intensity of feeling. This tendency to take habits will itself increase by habit. Habit tends to coördinate feelings, which are thus brought into the order of Time, into the order of Space. Feelings coördinated in a certain way, to a certain degree, constitute a person; on their being dissociated (as habits do sometimes get broken up), the personality disappears. Feelings over whose relations to their neighbors habit has acquired such an empire that we detect no trace of spontaneity in their actions, are known as dead matter. The hypothesis here sketched, whose consequences, traceable with precision to considerable detail in various directions, appear to accord with observation, to an extent of which I can here give no idea, affords a rational account of the connection of body and soul. This theory, so far as I have been able as yet to trace its consequences, gives little or no countenance to Spiritualism. Still, it is evidently less unfavorable than any other reasonable philosophy.

586. The myriad strange stories prove nothing. Tell me a marvel; I cannot explain it. Does that teach you or me anything? True, you offer explanation, the spiritualistic one; but that is in conflict with good sense, while we know so little of the mind, at present, that it is not surprising that many things are yet inexplicable. Taking these stories in the gross, the only profitable way, we can roughly compare the phenomena with the general facts at our command for their explanation. These facts are four. First, the fact that all men are liars. Secondly, the fact of deranged imagination, hypnotism, hysteria. Thirdly, the fact that we may receive and act upon indications of which we are quite unconscious, and which,

owing to the low sensibility of the conscious part of the mind, seem impossible. Fourthly, the fact that a certain number of coincidences will occur by chance. The result of such rough comparison is that, notwithstanding these four considerations, there are some stories truly surprising. If you have already admitted the general proposition of Spiritualism, you will naturally be inclined to use it to explain some of these stories. If, on the other hand, your judgment is that general experience is emphatically opposed to that proposition, these stories will assuredly not shake that judgment.

587. Meantime, those who are engaged in psychical research should receive every encouragement. They may have reached little or no result, so far; perhaps will not till they dismiss the phantom of telepathy from their minds. But scientific men, working in something like scientific ways, must ultimately reach scientific results. Psychology is destined to be the most important experimental research of the twentieth century; fifty years hence its wonders may be expected to occupy popular imagination as wonders of electricity do now.

APPENDIX A

REPLY TO THE NECESSITARIANS*

REJOINDER TO DR. CARUS

588. In *The Monist* for January, 1891, and in the number for April, 1892, I attacked the doctrine that every event is precisely determined by law.† Like everybody else, I admit that there is regularity: I go further; I maintain the existence of law as something *real and general*. But I hold there is no reason to think that there are general formulæ to which the phenomena of nature *always* conform, or to which they *precisely* conform. At the end of my second paper, the partisans of the doctrine of necessity were courteously challenged and besought to attempt to answer my arguments. This, so far as I can learn, Dr. Carus alone, in *The Monist* of July and October, 1892, has publicly vouchsafed to do. For this I owe him my particular thanks and a careful rejoinder.

589. I number the paragraphs of his papers consecutively. The following index shows the pages [of *The Monist*] on which those paragraphs commence, and the numbered sections of this rejoinder in which they are noticed.

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* *The Monist*, vol. 3, pp. 526-570 (1893).

† See bk I, chaps. 1 and 2.

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590. Dr. Carus' philosophy is hard to understand. Some phrases which he frequently uses lead the reader to imagine that he is listening to an old-fashioned Königsberg Kantian. What, then, is our surprise when we find (§ 14) that he sneers at the Kantian, Sir William Hamilton (whom he calls Mr. Hamilton) as having "no adequate conception of the *a priori*." In his *Ursache, Grund und Zweck* (1883), an admirably clear and systematic exposition of much of his thought, he takes a Schleiermacherian view of the *a priori*. He admits it to be founded in the universal conditions of cognition; but he thinks it is among the objective rather than the subjective conditions. This is an opinion to which Hamilton is also at times inclined. It is a weak conception, unless the whole distinction between

the inward and the outward world be reformed in the light of agapastic and synechistic ontology. For to deny that the *a priori* is subjective is to remove its essential character; and to make it both subjective and objective (otherwise than in the sense in which Kant himself makes it objective) is uncalled for, and is cut off by Ockham's razor. But when synechism has united the two worlds, this view gains new life.

Another thing which has astonished me is Dr. Carus's extravagant laudation (§17) of Venn's highly enlightened and remarkably bright-thinking, yet blundering little book, *The Logic of Chance*.¹ This is the way he speaks of it: "This admirable work, we will make bold to say, marks a new epoch in the study of logic." He adds that it "paves the way which Mr. Peirce has actually followed." But the question of the nature of probability had long before that publication engaged the attention of some of the most powerful intellects in England; and my opinion concerning it was fully made up before I saw the book.* I do not think I learned anything from that except a classification of the philosophies of probability. However, after all his eulogy, Dr. Carus only uses the book to quote from it Mill's rewording of Kant's definition of causation,† which he would better have quoted direct.

Let me say, not to Dr. Carus, but to the younger generation of readers, that if they imagine that Hamilton, because he is antiquated, is not worth reading, they are much mistaken. The Scotistic elements of his philosophy, and his method in the notes on Reid, are especially worthy of attention. As for Mill, though his philosophy was not profound, it is, at least in his *Examination of Hamilton*, admirably set forth. Whoever

¹ J. S. Mill had in the first edition of his *Logic* decisively taken an objective conception of chance and probability; but in his second edition he had become puzzled and had retracted [see bk. III, ch. 18], leaving that chapter, and with it his whole logic, a melancholy wreck, over which the qualified reader sighs, "And this once seemed intelligible!" Venn in the first edition of his book set forth the same objective conception with great clearness, and for that he was entitled to high praise, notwithstanding his manifest inadequacy to the problems treated. But in his second edition [see ch. 6] he too has fallen away from his first and correct view, and has adopted a theory which I shall some day show to be untenable. Venn's whole method in logic, as well as his system, is in my opinion of the weakest.

* See 3.14ff.

† *System of Logic*, bk. III, ch. 5, §5.

wishes to appeal to the American philosophical mind needs to be quite familiar with the writings of these two men.

Dr. Carus himself accepts all that I hold for erroneous in Kant's definition of causation as universal and necessary sequence.* Mill merely substitutes the exacter words *invariable* for "universal," and *unconditional* for "necessary."¹ In giving his form of the definition, Mill shows† why it is not applicable to the sequence of day and night, namely, that that is not necessary. Yet Dr. Carus writes (§ 18) of this very same sequence as if it came under Mill's definition.²

Again, why should he make it "the immortal merit of the great Scotchman" (§ 22), that is, of Hume, that he admitted the truth of Leibnitz's principle?

The famed puzzle of causation is peculiarly understood by Dr. Carus. The difficulties which the perusal of Hume suggested to the mind of Kant,³ were such as belonged to all categories, or general conceptions of the understanding. The pre-critical Kant inherited a very decided nominalism from Leibnitz and Wolf; and the puzzle for him was simply the usual difficulty that plagues nominalism when it finds itself confronted with a reality which has an element of generality. Necessity is, I need hardly say, but a particular variety of universality. But Dr. Carus (§ 24) passes over this, to dwell upon an entirely different objection to causation, namely, that it seems to be a creation out of nothing, and a miracle.

I find myself equally at cross-purposes with him, when in §§ 71-77, he speaks of the prevalent views of logicians concerning *comprehension*. This word, in logic, measures the amount of predicates or marks attached to a conception;‡ but

* See e.g. *Kritik der Reinen Vernunft*, A91, B124.

¹ Mill often did good service in substituting precise terms for ambiguous ones; as when in speaking of mathematical conclusions he prefers to say they are legitimate deductions rather than that they are necessary. [*System of Logic*, bk. II, ch. 5 §1.]

† In *A System of Logic*, bk. III, ch. 5, §5.

² In his *Ursache, Grund und Zweck*, Dr. Carus alludes to this passage [*Ursache, Grund und Zweck*, p. 37, Dresden (1883)]. But he prefers the treatment of the question by Reid, whom he calls Mill's opponent (*Gegner*).

³ It is of comparatively little consequence what Hume really meant. The main interest is in what Kant thought he meant.

‡ See 2.407ff.

Dr. Carus's criticisms seem to be based upon the idea that by comprehension is meant logical breadth, or the amount of subjects to which the conception is applicable.

I am simply gravelled by his remarks (§ 95) concerning sundry English words.

No more do I know what to make of his praise (§ 123) of the German translation of a French phrase used in the theory of functions, meaning *univocally determined*.

591. One habit which goes far to obscure Dr. Carus's meaning is that whenever he finds his opinion at variance with a familiar saying, instead of rejecting that formula, he retains it and changes the meaning. This is calculated to throw the whole discussion into confusion. Thus, nothing is more certain than that the so-called "law of identity," or A is A , was intended to express the fact that every term is predicable of itself.* But Dr. Carus, simply because he finds that "meaningless and useless" (§ 96), thinks himself authorized to confuse the terminology of logic by making this formula, $A = A$, under the same old name, mean that things to which the same name is applicable are for some purpose equivalent.

In like manner, he changes the meaning of the word *freedom* (§ 165), so that the distinction between those who maintain and those who oppose the freedom of the will may, in words, disappear. It seems scarcely defensible for a thoroughgoing necessitarian, such as he is, to fly the flag of Free Will.

He also changes the meaning of *spontaneity* so far that, according to him, "masses gravitate spontaneously" (§ 191), and so pretends that his doctrine does not suppress the spontaneity of nature!

592. There are other questions of terminology in which I am unable to agree with Dr. Carus. Thus, when I define† necessitarianism as "the theory that the will is subject to the general mechanical law of cause and effect," Dr. Carus (§ 139) wishes to delete "mechanical." But the result would be to define a doctrine to which the advocates of free will would generally subscribe, as readily as their opponents. In order properly to limit the definition, it is quite requisite to exclude "free causation." By "mechanical" causation, I mean a

* Cf. 2.315, 2.594, 3.182.

† In the *Century Dictionary* of 1889; see also 38.

causation entirely determinative, like that of dynamics, but not necessarily operating upon matter.

Dr. Carus mentions (§ 84) that there are several different ideas to which the term necessity is applied. It seems to me that what lies at the bottom of all of them is the experience of reaction against one's will. In the simplest form, this gives the sense of reality.* Dr. Carus himself admits (§ 46) that reality involves the idea of inevitable fate. Yet philosophical necessity is a special case of universality. But the universality, or better, the generality, of a pure form involves no necessity. It is only when the form is materialized that the distinction between necessity and freedom makes itself plain. These ideas are, therefore, as it seems to me, of a mixed nature. Dr. Carus (§§ 91-94) insists that by the necessary, he wishes to be understood to mean in all cases the *inevitable*. This is the idea of *fate*,† and is not the conception which determinists usually attach to the term necessity. Yet he does not appear to be quite consistent. At one time (§ 88), he carefully distinguishes necessity from fate. At another time (§ 163), every element of compulsion is to be excluded from the conception of necessity.

593. One important key to Dr. Carus's opinions is the recognition of the fact that, like many other philosophers, he is a nominalist tinctured with realistic opinions.

He says (§ 103) that "there is no need of discussing the truism that, properly speaking, there is no absolute sameness." Now, upon the nominalistic theory, there is not only no absolute or numerical identity, but there are not even any real agreements or likenesses between individuals; for likeness consists merely in the calling of several individuals by one name, or (in some systems) in their exciting one idea. On the other hand, upon the realistic theory, the fact that identity is a relation of reason does not in the least prevent it from being real. On that theory, it is real unless it is *false* that anything is itself. Thus, upon either theory, identity is just as real as similarity. But Dr. Carus, being a nominalist leaning toward realism, is inclined to make dynamical relations real, and second-intentional ones unreal. This opinion, I think, is a transitional one.

* See 1.322ff.

† See 4.547n, 5.339, 5.403.

The declaration (§ 198) that "natural laws are simply a description of nature as nature is," and that "the facts of nature express the character of nature," are nominalistic. But in another place (§§ 107-116) he says distinctly that uniformities are real.

He says (§ 70), "Mr. Peirce attempts to explain natural laws as if they were concrete and *single facts*." This is eminently nominalistic. The nominalist alone makes this sharp distinction between the abstract and the concrete,¹ which must not be confounded with Hegel's distinction for which the same words are used. The nominalist alone falls into the absurdity of talking of "single facts," or *individual generals*. Yet Dr. Carus says (§ 68) that natural laws describe the facts of nature *sub specie aeternitatis*. Now I understand Spinoza to be a realist. In § 117 he considers it "settled" "that there are samenesses." This is realistic. But in § 120, he holds "the whole business of science to be to systematize the samenesses of experience," which is nominalistic.

594. Dr. Carus seems to be in some doubt as to how far evolutionism ought to be carried. In §§ 48-51, he seems to side with my contention that it should be thoroughgoing. In § 116, he makes intellect an evolution from feeling. Yet he is sometimes (§ 125) "inclined" to say the world never was a chaos; he sometimes (§ 61) thinks it weak to suppose that real chance begets order; and he sometimes (§ 68) goes so far as to pronounce eternity to be the *conditio sine qua non* of natural law.

595. Every reader of *The Monist* knows that our good editor's great word is "formal law." The clearest statement he has ever made of this doctrine I find in the following two sentences (§ 127):

"The *a priori* systems of thought are . . . constructions raised out of the recognition of the formal, i.e. relational samenesses that appear in experience. All possibilities of a certain class of relations can be exhausted and formulated in theorems."²

¹ Along with the distinction, I would of course do away with this use of the words *abstract* and *concrete* to which no clear idea can be attached, as far as I can see.

² I cannot but disapprove of this use of the word "construction" to mean a studied theory, because the word is imperatively required in the theory of cognition to denote a mathematical diagram framed according to a general precept.

This is perspicuous. For example, of pairs, we can easily show that there are but two forms $A:A$ and $A:B$. This proposition — theorem if you will — exhausts the possibilities. If we make believe there is no danger of falling into error in mathematical reasoning — and one danger, though not, perhaps, a very serious one, *is* eliminated — then this proposition is absolutely certain. But I will say, at once, that such a proposition is not, in a proper sense, synthetic. It is a mere corollary from the definition of a pair. Moreover, its application to experience, or to possible experience, opens the door to probability, and shuts out absolute necessity and certainty, *in toto*.

Concerning points like this, Dr. Carus, in company with the general body of thinkers, is labouring under a great disadvantage from not understanding the logic of relatives. It is a subject I have been studying for a great many years, and I feel and know that I have an important report that I ought to make upon it.* This branch of logic is, however, so abstruse, that I have never been able to find the leisure to translate my conclusions into a form in which their significance would be manifest even to a powerful thinker whose thoughts had not long been turned in that direction. I shall succeed in doing so, whenever I can find myself in a situation where I need think of nothing else for months, and not before. That may not be for thirty years; but I believe it is the intention of providence that it should be. Meantime, I will testify, and the reader can take my testimony for what he thinks it is worth, that all deductive reasoning, except that kind which is so childishly simple that acute minds have doubted whether there was any reasoning there — I mean non-relative syllogism — requires an act of choice; because from a given premiss, several conclusions — in some cases an infinite number — can be drawn. Hence, Dr. Carus is altogether too hasty in his confidence (§§ 195, 196) that general thinking machines “are not impossibilities.” An act of original and arbitrary determination would be required; and it seems almost evident that no machine could perform such an act except within narrow limits, thought out beforehand and embodied in its construction.† Moreover, positive

* See Paper No. XVI of vol. 3.

† Cf. 2.56ff.

observation is called for in all inference, even the simplest — though in deduction it is only observation of an object of imagination. Moreover, a peculiar act which may properly be called *abstraction*¹ is usually required, consisting in seizing evanescent elements of thought and holding them before the mind as “substantive” objects, to borrow a phrase from William James. At the same time, the process I am describing, that is, relative deduction, is perfectly general and demonstrative, and depends upon the truth of the assumed premisses, and not, like inductive reasoning, upon the manner in which those premisses present themselves.

But the application of the logic of relatives shows that the propositions of arithmetic, which Dr. Carus usually adduces as examples of formal law (§ 15), are, in fact, only corollaries from definitions. They are certain only as applied to ideal constructions and, in such application, they are merely analytical.

The truth is our ideas about the distinction between analytical and synthetical judgments is much modified by the logic of relatives, and by the logic of probable inference. An analytical proposition is a definition or a proposition *deducible* from definitions; a synthetical proposition is a proposition not analytical.* Deduction, or analytical reasoning, is, as I have shown in my “Theory of Probable Reasoning,”† a reasoning in which the conclusion follows (necessarily, or probably) from the state of things expressed in the premisses, in contradistinction to scientific or synthetical, reasoning, which is a reasoning in which the conclusion follows probably and approximately from the premisses, owing to the conditions under which the latter have been observed, or otherwise ascertained. The two classes of reasoning present, besides, some other contrasts that need not be insisted upon in this place. They also present some significant resemblances. Deduction is really a matter of perception and of experimentation, just as induction and hypothetical inference are; only, the perception and experimentation are concerned with imaginary objects instead of with real ones. The operations of perception and of experimentation are sub-

¹ I apply this term because it is essentially like the passage from the concrete “virtuous” to the abstract “virtue,” or from the concrete “white” (adjective) to the abstract “whiteness,” or “white” (substantive). [Cf. 2.428.]

* Cf. 3.85ff.

† See 2.694ff.

ject to error, and therefore it is only in a Pickwickian sense that mathematical reasoning can be said to be perfectly certain. It is so only under the condition that no error creeps into it; yet, after all, it is susceptible of attaining a practical certainty. So, for that matter, is scientific reasoning; but not so readily. Again, mathematics brings to light results as truly occult¹ and unexpected as those of chemistry; only they are results dependent upon the action of reason in the depths of our own consciousness, instead of being dependent, like those of chemistry, upon the action of Cosmical Reason, or Law. Or, stating the matter under another aspect, analytical reasoning depends upon associations of similarity, synthetical reasoning upon associations of contiguity.* The logic of relatives, which justifies these assertions, shows accordingly that deductive reasoning is really quite different from what it was supposed by Kant to be; and this explains how it is that he and others have taken various mathematical propositions to be synthetical which in their ideal sense, as propositions of pure mathematics, are in truth only analytical.

Descending from things I can demonstrate to things of which various facts, in the light of those demonstrations, fully persuade me, I will say that in my opinion there are many synthetical propositions which, if not *a priori* in Dr. Carus's sense, are, at least, innate (notwithstanding his frequent denials of this, as in ¶ 15), though he is quite right in saying that their abstract and distinct formulation comes very late. (¶ 126.)† But turn the facts as I will, I cannot see that they afford the slightest reason for thinking that such propositions are ever absolutely universal, exact, or necessary in their truth. On the contrary, the principles of probable inference show this to be impossible.

Dr. Carus adduces the instance of a geometrical proposition, namely, "that two congruent regular tetrahedrons, when put together, will form a hexahedron." (¶ 25.) This, he says, seems to be "a very wonderful thing"; for why should not a

¹ I can never use this word without thinking of the explanation of it given by Petrus Peregrinus in his *Epistole de Magnete*. [See vol. 7.] He says that physical properties are occult in the sense that they are only brought out by experimentation, and are not to be deduced from admixtures of *hot* and *cold*, *moist* and *dry*.

* Cf. 1.383.

† See 5.504, 5.591.

larger tetrahedron be formed, just as two heaps of flour make a large heap of flour? Yet, he continues, the probability that the two tetrahedrons do always make a hexahedron is 1, "which means certainty." (§ 27.) But as it happens, the proposition, in the form stated, is quite erroneous. What is true is this. If two tetrahedra are so placed that one face of each is coincident with one face of the other, while all the other faces are inclined to one another, and if of the 8 faces, the 2 that are coincident are not counted, there remain to be counted $8 - 2 = 6$ faces. But there is nothing more wonderful about this than that $8 - 2 = 6$, which is an easy corollary from definitions. Very few propositions in mathematics that appear "marvellous" will hold water; and those few excite our astonishment only because the real complexity of the conditions are masked in an intuitional presentation of them.

Dr. Carus holds (§ 15) that formal knowledge is absolutely universal, exact, and necessary. In some cases, as where he says that, given the number of dimensions of space, the entire geometry could be deduced (§ 35), the boasted infallibility will prove on examination to be downright error. In all other cases, the propositions only relate to ideal constructions, and their applicability to the real world is at the best doubtful and, as I think, false; while in their ideal purity they are not synthetical.

Thus, my good friend and antagonist holds that the combination of oxygen and hydrogen to produce water is not "different in principle" from that of the tetrahedra to produce a hexahedron. (§ 26.) There is all the difference between the ideal and the real; which to my Scotistic mind is very important. But this is not the only passage in which he speaks as if form were the principle of individuation.

596. Dr. Carus's position is even weaker than that of Kant, who makes space, for example, a necessary form of thought (in a broad sense of that term). But Dr. Carus appears to consider space as an absolute reality. For he says (§ 119) that "every single point of space has its special and individual qualities." Here again form is made the principle of individuation; whence the queer phrase "individual qualities."

597. Dr. Carus argues that whatever is unequivocally determinate is necessary. (§ 124.) Were the determination

spoken of real dynamic determination, this would be a mere truism. But the expression used, *eindeutig bestimmt*, merely expresses a mathematical determination, and therefore no real necessity ensues. The equation

$$x^2 - 23x + 132\frac{1}{4} = 0$$

determines x to be either 11.477 or 11.523. In this sense, x has necessarily one value or the other. The equation

$$x^2 - 12x + 6 = 0$$

determines x to be either 11.477 or 0.523. Together, the two equations uniquely determine x to be 11.477. This shows how much that argument amounts to.

598. By "sameness," Dr. Carus means equivalence for a given purpose. (§§ 102, 106.) By the "idea of sameness," he means (§§ 77, 96) the principle that things having a common character are for some purpose equivalent. This, he says, "has a solid basis in the facts of experience." By a "world of sameness" (§ 113), he seems to mean one in which any two given concrete things are in some respect equivalent. He argues (§ 122) that a "world of sameness is a world in which necessity rules." I do not see this. It seems to me so bald a *non sequitur* that I cannot but suppose the thought escapes my apprehension. If there were anything in the argument, it would seem to be a marvellously expeditious way of settling the whole dispute; and therefore it would have been worth the trouble of stating, so as to bring it within the purview of minds like mine.

599. My candid opponent sometimes endorses emphatically the Leibnitzian principle. "Necessitarianism must be founded on something other than observation. Observation is *a posteriori*; it has reference to single facts, to particulars; yet the doctrine of necessity . . . is of universal application. The doctrine of necessity . . . is of an *a priori* nature." (§ 11.) "Millions of single experiences . . . cannot establish a solid belief in necessity." (§ 14.) "No amount of experience is sufficient to constitute causation by a mere synthesis of sequences." (§ 22.) "Millions of millions of cases" constitute "no proof" that a proposition "is always so." (§ 29.)

Nevertheless, he holds that the law of "the conservation of

matter and energy" so conclusively proves necessary causation that the obstinacy of Hume, himself, could not have withstood the argument. (§ 23.) One wonders, then, what is supposed to prove this "law of the conservation of matter and energy," if no amount of experience can prove it.

But the *a priori* itself can "be based on the firm ground of experience." (§ 14.) In that case, it is not prior to experience, after all! "The idea of necessity is based upon the conception of sameness, and . . . the existence of sameness is a fact of experience." (§ 87.) If absolute necessity can be irrefragably demonstrated from the fact that two things are alike, it is a pity Dr. Carus should not state this demonstration in a form that I, and men like me, can understand. That would be more to the purpose than merely saying it can be proved. Absolute chance is rejected as "involving a violation of laws well established by *positive evidence*." (§ 149.)

All these *denials* that absolute necessity can be established and absolute chance refuted by experiential evidence, mixed with as clear *assertions* of the same things, when taken together, have the appearance of an attempt, as the politicians say, to "straddle" the question.

600.* But the ingenious Doctor seeks to bolster up necessity by introducing the confused notion of "causation."

I do not know where the idea originated that a cause is an instantaneous state of things, perfectly determinative of every subsequent state. It seems to be at the bottom of Kant's discourse on the subject; yet it accords neither with the original conception of a cause, nor with the principles of mechanics. The original idea of an efficient cause is that of an agent, more or less like a man. It is prior to the effect, in the sense of having come into being before the latter; but it is not transformed into the effect. In this sense, it may happen that an event is a cause of a subsequent event; seldom, however, is it the principal cause. Far less are events the only causes. The modern mechanical conception, on the other hand, is that the relative positions of particles determine their accelerations at the instants when they occupy those positions. In other words, if the positions of all the particles are given at *two* instants (together with the law of force), then the positions at all other

* Cf. 67ff.

instants may be deduced.¹ This doctrine conflicts with Kant's second analogy of experience, as interpreted by him, in no less than four essential particulars. In the first place, far from involving any principle that could properly be termed generation, or *Erzeugung*, which is Kant's word for the sequence of effect from cause, the modern mechanical doctrine is a doctrine of persistence, and, as I have repeatedly explained, positively prohibits any real growth. In the second place, one state of things (i.e. one configuration of the system) is not sufficient to determine a second; it is two that determine a third. To whomsoever may think that this is an inconsiderable divergence of opinions, let me say, study the logic of relatives, and you will think so no longer. In the third place, the two determining configurations, according to mechanics, may be taken at almost any two instants, and the determined configuration be taken at any third instant we like. *There is no mechanical truth in saying that the past determines the future, rather than the future the past.* We habitually follow tradition in continuing to use that form of expression, but every mathematician knows that it is nothing but a form of expression. We continue, for convenience, to talk of mechanical phenomena as if they were regulated, in the same manner in which our intentions regulate our actions (which is essentially a determination of the future by the past), although we are quite aware that it is not really so. Remark how Kant reasons:*

"If it is a necessary law of our sensibility, and consequently a *formal condition* of all perceptions, that the preceding time determines the following (since I can only come to the following through the preceding), then is it also an indispensable *law of the empirical representation* of the time-series that the appearances of the preceding time determine every occurrence in the following."

What this leads to is a causality like that of mental phenomena, where it *is* the past which determines the future, and

¹ It follows as a corollary from this that if the positions of the particles at any one instant, together with the velocities at that instant, and the law of force, are given, the positions at all instants can be calculated. Of course, to give the positions and velocities at one instant is a special case of the giving of the positions at two instants. The two instants may be such that there will be more than one solution of the problem; but this is an insignificant detail.

* *Kritik der Reinen Vernunft*, A199, B244.

not (in the same sense) the reverse; but the doctrine of the conservation of energy consists precisely in the denial that anything like this occurs in the domain of physics. Had Kant studied the psychological phenomena more attentively and generalized them more broadly, he would have seen that in the mind causation is not absolute, but follows such a curve as is traced in my essay towards "The Law of Mind."* Does our judicious editor deem it ungracious to find fault with Kant for not doing so much more than he did, considering what that hero-like achievement was? We must seem to carp, as long as thinkers can hold that achievement for sufficient. In the fourth place, Kant's "Analogy" ignores that continuity which is the life blood of mathematical thought. He deals with those awkward chunks of phenomenon called "events." He represents one such "event" as determined by certain others, definitely, while the rest have nothing to do with it. It is impossible to cement such thought as this into hermetic continuity with the refined conceptions of modern dynamics. The statement that every instantaneous state of things determines precisely all subsequent states, and not at all any previous states, could, I rather think, be shown to involve a contradiction.

The notion which Dr. Carus holds of a cause seems to be that it is a state, embracing all the positions and velocities of all the masses at one instant, the effect being a similar state for any subsequent instant. (§§ 21, 24.) This breaks at once with common parlance, with dynamics, and with philosophical logic. In common parlance, we do not say that the position and upward velocity of a missile is the cause of its being at a subsequent instant lower down and moving with a greater downward velocity.¹ In dynamics, it is the fixed force, gravitation, or whatever else, together with those relative positions of the bodies that determine the intensity and direction of the forces, that is regarded as the cause. But these causes are not previous to, but simultaneous with, their effects, which are the instantaneous accelerations. Finally, logic opposes our calling one of two states which equally determine one another (as any

* See 139.

¹ It would seem to follow from his notion that in uniform motion each minute's motion is the cause of that of the next. Yet he says (§19) "there is no cause that is equal to its effect."

two states of a system do, if the velocities are taken to be included in these states) *the* determinator, or cause, simply because of the circumstance that it precedes the other in time — a circumstance that is upon the principles of dynamics plainly insignificant and irrelevant.

Everybody will make slips in the use of words that have been on his lips from before the time when he learned to think; but the practice which I endeavor to follow in regard to the word *cause* is to use it in the Aristotelian sense of an *efficient cause*, in all its crudeness. In short, I refuse to use it at all as a philosophical word. When my conception is of a dynamical character, I endeavour to employ the accepted terminology of dynamics;¹ and when my idea is a more general and logical one, I prefer to speak of the *explanation*.

601. Dr. Carus thinks the element of necessity in causation can be demonstrated by considering the process as a transformation. "It is a sequence of two states which belong together as an initial and final aspect of one and the same event." (§ 21. Compare §§ 20, 24.) He neglects to explain how he brings under this formula the inward causation of the will and character, as set forth by him in §§ 163-167.

It is unnecessary for me to reply, at length, to an argument so manifestly inconclusive. On the one hand, it conflicts with the principle that absolute necessity cannot be proved from experience; and, on the other hand, it leaves room for an imperfect necessity.

Professor Tait* has done an ill office to thought in countenancing the idea that the conservation of energy is of the same nature as the "conservation," or rather perduration, of matter. Dr. Carus says (§ 121) that

"The law of the conservation of matter and energy rests upon the experience (corroborated by experiments) that causation is transformation. It states that the total amount of matter and the total amount of energy remain constant. There is no creation out of nothing and no conversion of something into nothing."

¹ But, as I have elsewhere said, I should like to persuade mathematicians to speak of "positional energy" as *Kinetic potency*, the *vis viva* as *Kinetic energy*, and the total "energy" as the *Kinetic entelechy*.

* *Lectures on Some Recent Advances in Physical Science*, p. 17 (1876).

The historical part of this statement contains only a small grain of truth; but that I will not stop to criticize. The point I wish to make is that the law of the conservation of energy is here represented under a false aspect. The true substance of the law is that the accelerations, or rates of change, of the motions of the particles at any instant depend solely on their relative positions at those instants. The equation which expresses the law under this form is a differential equation of the second order; that is, it involves the rates of change of the rates of change of positions, together with the positions themselves. Now, because of the purely analytic proposition of the differential calculus that

$$D_t^2 s = \frac{1}{2} D_s (D_t s)^2,$$

the first integral of the differential equation of the second order, that is, the differential equation of the first order which expresses the same state of things, equates half the sum of the masses, each multiplied by the square of its velocity, to a function of the relative positions of the particles *plus* an arbitrary constant.¹ In order to fix our ideas, let us take a very simple example, that of a single particle accelerated towards an infinite plane, at a rate proportional to the *n*th power of its distance from the plane. In this case, if *s* be the distance, the second differential equation will be

$$D_t^2 s = -a s^n,$$

and the first integral of it will be

$$(D_t s)^2 = -\frac{2a}{n+1} s^{n+1} + C.$$

By the first law of motion, and the Pythagorean proposition, the part of the velocity-square depending on the horizontal component is also constant.

The arbitrary constant, *C*, plainly has its genesis in the fact that forces do not determine velocities, but only accelerations. Its value will be fixed as soon as the velocity at any instant is known. This quantity would exist, just the same, and be independent of the time, and would therefore be "conserved" whether the forces were "conservative," that is, simply posi-

¹ The differential equation being an ordinary, not a partial one, this is an absolute constant, determined by initial (or final, or any instantaneous) conditions.

tional, or not. Now, this constant is the energy; or rather, the energy is composed of this constant increased by another which is absolutely indeterminable, being merely supposed large enough to make the sum positive.

Thus, the law of energy does not prescribe that the total amount of energy shall remain constant; for this would be so in any case by virtue of the second law of motion; but what it prescribes is that the total energy diminished by the living force shall give a remainder which depends upon the relative positions of the particles and not upon the time or the velocities. It is also to be noticed that the energy has no particular magnitude, or quantity. Furthermore, in transformations of kinetic energy into positional energy, and the reverse, the different portions of energy do not retain their identity, any more than, in bookkeeping, the identity of the amounts of different items is preserved. In short, the conservation of energy (I do not mean the *law* of conservation) is a mere result of algebra. Very different is it with the "conservation" of matter. For, in the first place, the total mass is a perfectly definite quantity; and, in the second place, in all its transformations not only is the *total* amount constant, but all the different parts preserve their identity. To speak, therefore, of "the conservation of matter and energy" is to assimilate facts of essentially contrary natures; and to say that the law of the conservation of energy makes the total amount of energy constant is to attribute to this law a phenomenon really due to another law, and to overlook what this law really does determine, namely, *that the total energy less the kinetic energy gives a remainder which is exclusively positional.*

602. Dr. Carus does not make it clear what he means by *chance*. He does, indeed, say (§§145, 146):

"What is chance?"

"Chance is any event not especially intended, either not calculated, or, with a given and limited stock of knowledge, incalculable."

This defines what he means by a chance event, in the concrete; what he understands by probability we are left to conjecture. But from what he says in §147, I infer that he regards it as dependent upon the state of our ignorance, and therefore nothing real.

I am, therefore, much puzzled when I find him expressing a conviction (§§88, 156) that chance plays an important part in the real world. He explains very distinctly that “when we call a throw of the dice pure chance, we mean that the incidents which condition the turning up of these or those special faces of the dice have not been, or cannot be, calculated.” (§147.) This is the commonest, because the shallowest, philosophy of chance. Even Venn might teach him better than that. However, according to that view, when he writes of “the important part that chance plays in the world — not absolute chance . . . but that same chance of which the throw of the die is a typical instance” (§88), he can be understood to mean no more than that many things happen which we are not in condition to calculate or predict. This is not playing a part *in the world*, one would say — at least, not in the natural world; it is only playing a part in our ignorance.

Dr. Carus frequently uses phrases which make us suspect he penetrates deeper. Thus, he says, “We do not believe in absolute chance, but we believe in chance” (§144); and again, “Every man is the architect of his own fortune — but not entirely. There are sometimes coincidences determining the fates of men.” (§161.) But when we remark the consecution of §§137–162, we feel pretty sure he really sees no further. To do so would have been to perceive that indefinitely varied specificficalness *is* chance.

For a long time, I myself strove to make chance that diversity in the universe which laws leave room for, instead of a violation of law, or lawlessness. That was truly believing in chance that was not absolute chance. It was recognizing that chance does play a part in the real world, apart from what we may know or be ignorant of. But it was a transitional belief which I have passed through, while Dr. Carus seems not to have reached it.

As for absolute chance, Dr. Carus makes the momentous admission that it is “not unimaginable.” (§150.) If so, its negation, or absolute necessity, cannot be a formal principle.

603. But it is time for me to leave the consideration of Dr. Carus’s system and to take up his strictures upon mine. His philosophy is one eminently enlightened by modern ideas, which it synthetizes to an unusual extent. It is distinguished

for its freedom from the vice of one-sidedness, and displays every facet of the gem of philosophical inquiry, except the one on which it rests, the question of absolute law. Its prominent faults, which I feel sure must have struck every competent reader, are that it shows little trace of meditation upon the thoughts of the great idealists, and that there is a certain want of congruity between different elements of it. How strangely it sounds, for instance, to find an apriorian, and one who is dinging "formal laws" so perpetually into our ears, one who holds that "in order to weave the woof of the *a posteriori* elements into coherent cloth we want the warp of the *a priori*" (§15), to find this man declaring for a positivism "which accepts no doctrine, theory, or law, unless it be a formulation of facts," and proclaiming that "the whole business of science is to systematize the samenesses of experience, and to present them in convenient formulas." (§120.) Now there is just one way of bringing such warring elements into harmony, and curing the greatest defect of the system — and it is a way which would also bring the whole into far better concordance with natural science. It is to lop off the heads of all absolute propositions whose subject is not the Absolute, and reduce them to the level of probable and approximate statements.* Were that defalcation performed, Dr. Carus's philosophy would, in its general features, offer no violent opposition to my opinions. Moreover, the Doctor has at heart the conciliation of religion and science. I confess such serious concern makes me smile; for I think the atonement he desires is a thing which will come to pass of itself when time is ripe, and that our efforts to hasten it have just that slight effect that our efforts to hasten the ripening of apples on a tree may have. Besides, natural ripening is the best. Let science and religion each have stout faith in itself, and refuse to compromise with alien and secondary purposes, but push the development of its own thought on its own line; and then, when reconcilment comes — as come it surely will — it will have a positive value, and be an unmixed good. But since our accomplished editor thinks himself called upon to assist in this birth of time, let me ask him whether of all the conditions of such peace the first is not that religious thought should abandon that extravagant

* Cf. 1.135ff.

absoluteness of assertion which is proper to the state of intellectual infancy, but which it has so long been too timid to let go? This pragmatical and unneeded absoluteness it is which is most deeply contrary to the method, the results, and the whole spirit of science; and no error can be greater than to fancy that science, or scientific men, rest upon it or readily tolerate it.

604. Dr. Carus (§§56-64) condemns my method of investigation as contrary to that by which science has been advanced; and holds that a radically different, and thoroughly positivistic method is requisite — a method so intensely positivistic as to exclude all originality. I suppose he will not object to my forming an opinion concerning the methods of science. I was brought up in an atmosphere of scientific inquiry, and have all my life chiefly lived among scientific men. For the last thirty years, the study which has constantly been before my mind has been upon the nature, strength, and history of methods of scientific thought. I have no space here to argue the question. In its logical aspect, I have partly considered it in various publications;* and in its historical aspect I have long been engaged upon a treatise about it.† My critic says (§57) that I am “very positivistic in my logic of science.” This is a singular misapprehension. Few of the great scientific minds with whom I have come into personal contact, and from whom I endeavoured to learn, were disposed to condemn originality or the ideal part of the mind’s work in investigation; and those few, it was easy to see, really breathed an atmosphere of ideas which were so incessantly present that they were unconscious of them. Were I to name those of my teachers who were most positivistic in theory a smile would be excited. My own historical studies, which have been somewhat minutely critical, have, on the whole, confirmed the views of Whewell, the only man of philosophical power conjoined with scientific training who had made a comprehensive survey of the whole course of science, that progress in science depends upon the observation of the right facts by minds *furnished with appropriate ideas*.‡ Finally, my long investigation of the logical process of scientific reasoning led me many years ago to the

* See vol. 2, bk. III, B.

† See vol. 1, bk. I, ch. 2.

‡ *History of the Inductive Sciences*, p. 6, third edition, London (1837).

conclusion that science is nothing but a development of our natural instincts. So much for my *theory* of scientific logic. It is as totally opposed as anything can be to Dr. Carus's theory (§69, note; and *Ursache, Grund und Zweck*, p. 2) that originality is out of place in science.

But in my *practice* of scientific reasoning, Dr. Carus accuses me of being what he calls a "constructionist"; that is, a theorizer unguided by indications from observation or accepted facts. To a mind upon whom that celebrated and splendid chapter of Kant upon the architectonical method failed to make a deep impression I may appear so; but *travesty* is in truth hardly too strong a word to describe the account of my method by Dr. Carus.

Perhaps exaggeration is not without its value. If so, let me sum up the method Dr. Carus recommends. Eschew originality is its pious formula; do not think for yourself, nor countenance results obtained by original minds. Distrust them; they are not safe men. Leave originality to mathematicians and their breed, to poets, and to all those who seek the sad notoriety of having unsettled belief.¹ Flee all philosophies which smack of this aberrant nineteenth century.² This theory of Dr. Carus condemns itself; for it is highly original, and soars into the free ether untrammelled by historic facts.

Kepler comes very close to realizing my ideal of the scientific method; and he is one of the few thinkers who have taken their readers fully into their confidence as to what their method really has been.³ I should not feel justified in inflicting upon mine an autobiographical account of my own course of thought; but some things Dr. Carus's accusation forces me to mention. My method of attacking all problems has ever been to begin with an historical and rational inquiry into the special method adapted to the special problem. This is the essence of my architectonical proceeding upon which Dr. Carus has commented very severely. To look an inch before one's nose involves originality: therefore, it is wrong to have a conscious

¹ Dr. Carus calls attention to the connection between my doctrine of the fixation of opinion and his anti-originalism.

² Dr. Carus passes a sweeping judgment on post-Kantian philosophy as being original.

³ This was a remark of my father's.

method. But further, in regard to philosophy, not only the methods, but the elementary ideas which are to enter into those methods, should be subjected to careful preliminary examination. This, especially, Dr. Carus finds very unscientific. (§64, and elsewhere.) It is, undoubtedly, the most characteristic feature of my procedure. Certainly it was not a notion hastily or irreflectively caught up; but is the maturest fruit of a lifetime of reflection upon the methods of science, including those of philosophy; and if it shall be found that one contribution to thought on my part has proved of permanent service, that, I expect, will be the one. This method in nowise teaches that the method and materials for thought are not to be modified in the course of the study of the subject-matter. But instead of taking ideas at haphazard, or being satisfied with those that have been handed down from the good old times, as a mind keenly alive to the dangers of originality would have done, I have undertaken to make a systematic survey of human knowledge (a very slight sketch of which composed the substance of my paper on the "Architecture of Theories")* in order to find what ideas have, as a fact, proved most fruitful, and to observe the special utilities they have severally fulfilled. A subsidiary object of this survey was to note what the great obstacles are today in the way of the further advance of the different branches of science. In my "Architecture of Theories," I never professed to do more than make a slight sketch of a small portion of my preliminary studies, devoting thirteen lines to some hints as to the nature of the results.† In the four following papers I have given a selection of a few of these results. Among those which remain to be reported are some of much more immediate importance than any of those hitherto set forth. If anybody has been surprised to find my subsequent papers developing thoughts which they were unable to foresee from my first, it is only what I warned people from the outset that they would find to happen. Nor have the greatest of these surprises yet been reached.¹

* See 7ff.

† See 33.

¹ A person in the last *Monist* [G. M. McCrie, "The Issues of Synechism," vol. 3, pp. 380-401] breaks in upon my series of articles to foretell what the "issues of synechism" will be. Were he able to do so, it would certainly be the height of ill-manners thus to take the words out of my mouth.

The next series of facts reviewed was that of the history of philosophy. I waded right into this fearful slough of "originality," in order to gather what seemed to throw a light upon the subject. Finally, I reviewed the general facts of the universe.

I now found myself forced by a great many different indications to the conclusion that an evolutionary philosophy of some kind must be accepted — including among such philosophies systems like those of Aristotle and of Hegel. From this point the reasoning was more rapid. Evolution had been a prominent study for half a generation; and much light had been thrown upon the conditions for a fruitful evolutionary philosophy. The first question was, how far shall this evolution go back? What shall we suppose *not* to be a product of growth? I fancy it is this cautious reflectiveness of my procedure which especially displeases Dr. Carus. It is not positivistic: it is architectonic. But the answer to the question was not far to seek. If an evolutionary explanation is to be adopted, philosophy, logic, and the economy of research all dictate that in the first essay, at least, that style of explanation be carried as far back as explanation is called for. What elements of the universe require no explanation? This was a simple question, capable of being decided by logic with as much facility and certainty as a suitable problem is solved by differential calculus. Being, and the uniformity in which being consists, require to be explained. The only thing that does not require it is non-existent spontaneity. This was soon seen to mean absolute chance. The conclusion so reached was clinched by a careful reëxamination of the office of chance in science generally, and especially in the doctrines of evolution. Arrived at this point, the next question was, what is the principle by which the development is to proceed? It was a difficult inquiry, and involved researches from different points of view.

But I will not trouble the reader with further autobiographical details. I have given enough to show that my method has neither been in theory purely empirical, nor in practice mere brain-spinning; and that, in short, my friend Dr. Carus's account of it has been as incorrect as can be.

605. The learned doctor (§§6, 7, 8) pronounces me to be an imitator of David Hume, or, at least, classes my opinions

as closely allied to his. Yet be it known that never, during the thirty years in which I have been writing on philosophical questions, have I failed in my allegiance to realistic opinions and to certain Scotistic ideas; while all that Hume has to say is said at the instance and in the interest of the extremest nominalism. Moreover, instead of being a purely negative critic, like Hume, seeking to annul a fundamental conception generally admitted, I am a positive critic, pleading for the admission to a place in our scheme of the universe for an idea generally rejected. In the first paper of this series, in which I gave a preliminary sketch of such of my ideas as could be so presented, I carefully recorded my opposition to all philosophies which deny the reality of the Absolute, and asserted that "the one intelligible theory of the universe is that of objective idealism, that matter is effete mind."* This is as much as to say that I am a Schellingian, of some stripe; so that, on the whole, I do not think Dr. Carus has made a very happy hit in likening me to Hume, to whose whole method and style of philosophizing I have always been perhaps too intensely averse. Yet, notwithstanding my present disclaimer, I have little doubt apriorians will continue to describe me as belonging to the sceptical school. They have their wonderful ways of arriving at truth, without stooping to confront their conclusions with facts; and it is amusing to see how sincerely they are convinced that nobody can have science at heart, without denying all they uphold.¹

My opponent has a habit of throwing out surprising opinions without the least attempt to illuminate them with the effulgence of reason. Thus he says (§8): "If Kant's answer to Hume had been satisfactory, Mr. Peirce would probably not have renewed the attack." What attack? All that Hume

* See 25.

¹ As I am writing, I am shown a letter, in which the writer says: "Peirce with all his materialistic ideas, yet," etc. I never promulgated a materialistic idea in my life. The writer simply assumes that science is materialistic. As I am correcting the proofs, I notice that Mr. B. C. Burt, in his new *History of Modern Philosophy*, sets me down as sceptical, though doubtfully. There are a good many inaccuracies in the work. This was inevitable in a first edition. But the ingenious plan of the book admirably adapts it to the wants of just that class of students who cannot understand that no repertory of facts ever can be trusted implicitly.

attacked I defend, namely, law as a reality. How could a defense of that which I defend as essential to my position, cause me to surrender that position, namely, that real regularity is imperfect? In any sense in which Hume could have admitted the possibility of law, it must be precisely followed; since its existence could consist only in the conformity of facts unto it. But perhaps Dr. Carus means that if one question had been completely settled, I should probably have confined myself to talking about that, instead of broaching a new one.

606. Another misunderstanding of my position on the part of Dr. Carus (§§12, 13) is simply due to "boldly" having been twice printed where the reading should have been "baldly," in my paper on "The Doctrine of Necessity." (*The Monist*, vol. II, p. 336, lines 20 and 25 [63].) I wish printers would learn that I never use the word *bold*. I have so little of the quality, that I don't know what it means. As I read the "revise," as usual, it was presumably my fault that the *erratum* occurred. At any rate, had my meaning been clearly expressed, the proofreader would not have been misled by my defective chirography. What I was trying to say was, in substance, this: Absolute chance is a hypothesis; and, like every hypothesis, can only be defended as explaining certain phenomena.¹ Yet to suppose that an event is brought about by absolute chance is utterly illogical, since as a hypothesis it could only be admitted on the ground of its explaining observed facts; now from mere non-law nothing necessarily follows, and therefore nothing can be explained; for to explain a fact is to show that it is a necessary or, at least, a probable result from another fact, known or supposed. Why is not this a complete refutation of the theory of absolute chance? *Answer*: because the *existence* of absolute chance, as well as many of its characters, are not themselves absolute chances, or sporadic events, unsubject to general law. On the contrary, these things *are* general laws. Everybody is familiar with the fact that chance has laws, and that statistical results follow therefrom. Very well: I do not propose to explain anything as due to the action

¹ Its being hypothetical will not prevent its being established with a very high degree of certainty. Thus, all history is of the nature of hypothesis; since its facts cannot be directly observed, but are only supposed to be true to account for the characters of the monuments and other documents.

of chance, that is, as being lawless. I do not countenance the idea that Bible stories, for instance, show that nature's laws were violated; though they may help to show that nature's laws are not so mechanical as we are accustomed to think. But I only propose to explain the regularities of nature as consequences of the only uniformity, or general fact, there was in the chaos, namely, the general absence of any determinate law.¹ In fact, after the first step is taken, I only use *chance* to give room for the development of law by means of the law of habits.

607. In ¶28, I read: "Mr. Peirce does not object to necessity in certain cases; he objects to necessity being a universal feature of the world." This is correctly stated, and so it is in ¶203. I object to necessity being universal, as well as to its ever being exact. In short, I object to absolute universality, absolute exactitude, absolute necessity, being attributed to any proposition that does not deal with the A and the Ω , in the which I do not include any object of ordinary knowledge. But it is careless to write (¶193) that I "describe the domain of mind as the absence of law." Is not one of my papers entitled "The Law of Mind"? It is true that I make the law of mind essentially different in its mode of action from the law of mechanics, inasmuch as it requires its own violation; but it is law, not chance uncontrolled. That it is not "an undetermined and indeterminable sporting" should have been obvious from my expressly stating that its ultimate result must be the entire elimination of chance from the universe. That directly negatives the adjective "indeterminable," and hence also the adjective "undetermined." Still more unwarranted is the statement (¶205) that I deny "that there are samenesses in this world." If the slightest excuse for such an accusation can be found in all my writings I shall be mightily surprised.

608. Dr. Carus fully admits (¶9) the justice of my first reply to the argument that necessity is postulated in all scientific reasoning, which reply is that to postulate necessity does not make it true. As this reply, if correct, is complete, Dr. Carus was bound after that admission to drop the postulate-

¹ Somebody may notice that I here admit a proposition as absolutely true. Undoubtedly; because it relates to the Absolute.

argument in favor of necessity.¹ But he takes no notice, at all, of my four-page argument to show that scientific reasoning does *not* postulate absolute universality, exactitude, or necessity (*The Monist*, vol. II, pp. 324–327 [39–43]); but calmly asserts, four or five times over (§§5, 11, 16, 62, 79), without one scintilla of argumentation, that that postulate *is* made, and uses this as an argument in favor of necessity.

609. He also fully admits (§§11, 14, 22) the justice of my argument that the absoluteness of universality, exactitude, and necessity, cannot be proved, nor rendered probable, by arguments from observation. That argument consisted in assuming that all arguments from observation are probable arguments, and in showing that probable inferences are always affected with probable errors.

Had I deemed it requisite, I might easily have fortified that argument by a more profound analysis of scientific reasoning. Such an analysis I had formerly given in my "Theory of Probable Inference" [vol. 2, bk. III, ch. 8] (in *Studies in Logic*, Boston, Little and Brown).

But, notwithstanding his admissions, Dr. Carus sets up his *ipse dixit* against my argumentation. "We deny most positively," says the editorial Elohim, "that the calculus of probabilities is applicable to the order of the world, as to whether it may or may not be universal." (§§27, 31.)

To support this, he cites (§§31–34) four passages from articles written by me sixteen years ago. I hope my mind has not been stationary during all these years; yet there is little in those old articles which I now think positively erroneous, and nothing in the passages cited. My present views had, at that time, already begun to urge themselves on my mind; but they were not ripe for public avowal. In the first of the passages cited, I express the opinion, which I first uttered in my earlier lectures before the Lowell Institute, in 1866, afterwards in the *Popular Science Monthly* in 1877* [1878], in still fuller elaboration in my "Theory of Probable Inference" in 1882,† and maintain now as strongly as ever, that no definite probabil-

¹ Indeed, to admit that reply is all but to admit the non-absolute grade of necessity.

* See 2.683f.

† See 2.745f.

ity can be assigned to any general arrangement of nature. To speak of an *antecedent* probability would imply that there was a statistical science of different universes; and a *deduced* probability requires an antecedent probability for one of its data.¹ This consideration only goes to fortify my present position, that we cannot conclude from observed facts with any degree of probability, and therefore *a fortiori* not with certainty, that any proposition is absolutely universal, exact, or necessary. In the absence of any weight of probability in favor of any particular exact statement, the formal presumption is altogether against any one out of innumerable possible statements of that kind.

The second passage cited is one in which I argue that the universe is not a chaos, or chance-medley. Now Dr. Carus admits (§28) that I do not today maintain that it is a chance-medley.

The third passage cited is this: "A contradiction is involved in the very idea of a chance-world." This is in entire harmony with my present position that "a chaos . . . being without connection or regularity would properly be without existence." ("Architecture of Theories," *The Monist*, vol. I, p. 176 [33].)

The fourth passage is to the effect that "the interest which the uniformities of nature have for an animal measures his place in the scale of intelligence." This I still believe.

So much for my supposed contradictions. If I am not mistaken, our amiable editor, whose admirable editorship springs so largely out of his amiability, in copying out these passages was really not half so much intent on showing me to be wrong at present, as on showing me to have been right formerly. However hard he hits, he contrives to honey his sockdolagers, and sincerely cares more to make the reader admire his antagonist when he is right than to condemn him when he is wrong. There is a touch of art in this that proclaims the born editor, and which I can hardly hope to imitate.

Though Dr. Carus admits over and over again that necessity cannot be based on observation, he often slips back to the idea that it can be so based. He says (§30) that "form is a quality of this world, not of some samples of it, but throughout, so

¹ I rightly go somewhat further in my *Theory of Probable Inference*; but that has no bearing on the present discussion.

far as we know of existence in even the most superficial way." But does he not see that all we *do* know, and all we *shall* tomorrow, or at any date know, is nothing but a sample of our possible experience — nay, is but a sample of what we are in the future to have already experienced? I have characterized inductive inference as reasoning from samples; but the most usual way of sampling a class is by examining *all* the instances of it that have come under our observation, or which we can at once collect.

610. Dr. Carus (§§44, 46) holds that from my social theory of reality, namely, that the real is the idea in which the community ultimately settles down, the existence of something inevitable is to be inferred. I confess I never anticipated that anybody would urge that. I thought just the reverse might be objected, namely, that all absoluteness was removed from reality by that theory; and it was many years ago that, in my "Theory of Probable Inference,"* I admitted the obvious justice, as it seemed to me, of that objection. We cannot be quite sure that the community ever will settle down to an unalterable conclusion upon any given question. Even if they do so for the most part, we have no reason to think the unanimity will be quite complete, nor can we rationally presume any overwhelming *consensus* of opinion will be reached upon every question. All that we are entitled to assume is in the form of a *hope* that such conclusion may be substantially reached concerning the particular questions with which our inquiries are busied.

Such, at least, are the results to which the consideration of the doctrine of probability brings my mind irresistibly. So that the social theory of reality, far from being incompatible with tychism, inevitably leads up to that form of philosophy. Socialistic, or as I prefer to term it, agapastic ontology seems to me likely to find favour with many minds at an early day, because it is a natural path by which the nominalist may be led into the realistic ways of thought, ways toward which many facts and inward forces impel him. It is well, therefore, to call attention to the circumstances that the realism to which it leads is a doctrine which declares general truths to be real — independent of the opinions of any particular collection of

* See 2.749.

minds — but not to be destined, in a strictly universal, exact, and sure acceptance, to be so settled, and established. Now to assert that general truths are objectively real, but to deny that they are strictly universal, exact, and certain, is to embrace the doctrine of absolute chance. Thus it is that the agapastic ontologist who endeavours to escape tychism will find himself “led into” that “inextricable confusion” which Dr. Carus (§4) has taken a contract to show that I am led into.

611. Conservatism is wholesome and necessary; the most convinced radical must admit the wisdom of it, in the abstract; and a conservative will be in no haste to espouse the doctrine of absolute chance. I, myself, pondered over it for long years before doing so. But I am persuaded, at length, that mankind will before very long take up with it; and I do not believe philosophers will be found tagging on to the tail of the general procession.

My little dialogue between the tychist and the necessitarian (*The Monist*, vol. II, pp. 331–333 [53–57]) seems to have represented pretty fairly the views of the latter; for Dr. Carus, in §§151–155, does little more than reiterate them, without much, if at all, reinforcing them. His §§158–160 merely work out, in a form perhaps not quite clear, what is manifest from the elementary principles of dynamics, and was considered in my dialogue.

His arguments in this connection, apart from those already noticed, are that absolute chance is something which if it existed would require explanation, that the manifold specific-ness of nature is explained by law without any aid from chance, and that absolute chance if it existed, in the sense in which it is supposed to exist in my chaos, could not possibly breed law as supposed by me. To the consideration of these arguments I proceed to apply myself.

612. One of the architectonic — and, therefore, I suppose, by Dr. Carus considered as highly reprehensible — features of my theory, is that, instead of saying off-hand what elements strike me as requiring explanation and what as not doing so, which seems to be his way, I have devoted a long time to the study of the whole logical doctrine of explanation, and of the history of explanations, and have based upon the general

principles so ascertained my conclusions as to what things do and what do not require to be explained.

Dr. Carus (§67) defines *explanation* as a description of a special process of nature in such a way that the process is recognized as a transformation. This I cannot quite grant. First, I cannot admit that "special processes of nature" are the only things to be explained. For instance, if I were to meet a gentleman who seemed to conform scrupulously to all the usages of good society, except that he wore to an evening party an emerald satin vest, that would be a fact calling for explanation, although it would not be a "special process of nature." Second, I cannot admit that an explanation is a description of the fact explained. It is true that in the setting forth of some explanations, it is convenient to restate the fact explained, so as to set it under another aspect; but, even in these cases, the statement of *other* facts is essential. In all cases, it is *other facts*, usually hypothetical, which constitute the explanation; and the process of explaining is a process by which from those other facts the fact to be explained is shown to follow as a consequence, by virtue of a general principle, or otherwise. Thus, a "special process of nature" calling for explanation is the circumstance that the planet Mars, while moving in a general way from west to east among the fixed stars, yet retrogrades a part of the time, so as to describe loops in the heavens. The explanation is that Mars revolves in one approximate circle and we in another. Again, it has been stated that a warm spring in Europe is usually followed by a cool autumn, and the explanation has been offered that so many more icebergs than usual are liberated during a warm spring, that they subsequently lower sensibly the temperature of Europe. I care little whether the fact and the explanation are correct or no. The case illustrates, at any rate, my point that an explanation is a special fact, supposed or known, from which the fact to be explained follows as a consequence. Third, I cannot admit that every description which recognizes the fact described as a transformation is an explanation; far less that "it is complete and exhaustive." (§67.) A magician transforms a watch into a dove. Recognize it as a transformation and the trick is explained, is it? This is delightfully facile. Describe the change from a caterpillar to a butterfly as a

transformation, and does that explain it? Fourth, I cannot admit that every explanation recognizes the fact explained as a transformation. The explanation of the loops in the motion of Mars is not of that nature. But I willingly recognize in Dr. Carus's definition an attempt — more or less successful — to formulate one of the great offices of scientific inquiry, that of bridging over the gap between the familiar and the unfamiliar.

Explanation, however, properly speaking, is the replacement of a complex predicate, or one which seems improbable or extraordinary, by a simple predicate from which the complex predicate follows on known principles.* In like manner, a *reason*, in one sense, is the replacement of a multiple subject of an observational proposition by a general subject, which by the very conditions of the special experience is predicable of the multiple subject.¹ Such a reason may be called an explanation in a loose sense.

Accordingly, that which alone requires an explanation is a coincidence.

Hence, I say that a uniformity, or law, is *par excellence*, the thing that requires explanation. And Dr. Carus (§51) admits that this "is perfectly true."

But I cannot imagine anything further from the truth than his statement (§66) that "the only thing in the world of which we cannot and need not give account is the existence of facts itself." I should say, on the contrary, that the existence of facts is the only thing of which we need give account. Forms may indulge in whatever eccentricities they please in the world of dreams, without responsibility; but when they attempt that kind of thing in the world of real existence, they must expect to have their conduct inquired into. But should Dr. Carus reply that I mistake his meaning, that it is only "being in general" (§66) that he holds unaccountable, I reply that this is simply expressing scepticism as to the possibility and need of philosophy. In a certain sense, my theory of reality, namely that reality is the dynamical reaction of certain forms upon the

* Cf. 2.690, 2.716.

¹ Dr. Carus, in his *Ursache, Grund und Zweck*, well says that *reasons* are discovered by induction, in the strict sense. It is often admitted that *causes* can only be inferred by hypothetical reasoning.

mind of the community, is a proposed explanation of being in general; and be it remarked that the mind of the community, itself, is the thing the nature of whose being this explanation first of all puts upon an idealistic footing.

Chance, according to me, or irregularity — that is, the absence of any coincidence — calls for no explanation. If *law* calls for a particular explanation, as Dr. Carus admits it does, surely the mere absence of law calls for no further explanation than is afforded by the mere absence of any particular circumstance necessitating the result. An explanation is the conception of a fact as a necessary result, thereby accounting for the coincidence it presents. It would be highly absurd to say that the absence of any definite character must be accounted for, as if it were a peculiar phenomenon, simply because the imperfection of language leads us so to talk of it. Quite unfounded, therefore, is Dr. Carus's opinion that "chance needs exactly as much explanation as anything else" (§53) — an opinion which, so far as I can see, rests on no defensible principle.

Equally hasty is his oft-repeated objection (§§55, 58, 61) that my absolute chance is something ultimate and inexplicable. I go back to a chaos so irregular that in strictness the word existence is not applicable to its merely germinal state of being; and here I reach a region in which the objection to ultimate causes loses its force. But I do not stop there. Even this nothingness, though it antecedes the infinitely distant absolute beginning of time, is traced back to a nothingness more rudimentary still, in which there is no variety, but only an indefinite specificability, which is nothing but a tendency to the diversification of the nothing, while leaving it as nothing as it was before.* What objectionable ultimacy is here? The objection to an ultimate consists in its raising a barrier across the path of inquiry, in its specifying a phenomenon at which questions must stop, contrary to the postulate, or hope, of logic. But what question to which any meaning can be attached am I forbidding by my absolute chance? If what is demanded is a theological backing, or rational antecedent, to the chaos, that my theory fully supplies. The chaos is a state of intensest feeling, although, memory and habit being totally absent, it is sheer nothing still. Feeling has existence only so

* See 214ff.

far as it is welded into feeling. Now the welding of this feeling to the great whole of feeling is accomplished only by the reflection of a later date. In itself, therefore, it is nothing; but in its relation to the end it is everything.

More unreasonable yet is Dr. Carus's pretension that the manifold specificicalness, which is what I mean by chance, is capable of explanation (§§142, 143) by his own philosophic method. He may explain one particularity by another, of course; but to explain specificicalness itself would be to show that a specific predicate is a necessary consequence of a generic one, or that a whole is without ambiguity a part of its part. Remark, reader, at this point, that chance, whether it be absolute or not, is not the mere creature of our ignorance. It is that diversity and variety of things and events which law does not prevent. Such is that real chance upon which the kinetical theory of gases, and the doctrines of political economy, depend. To say that it is not absolute is to say that it — this diversity, this specificicalness — can be explained as a consequence of law. But this, as we have seen, is logically absurd.

Dr. Carus admits that absolute chance is "not unimaginable." (§150.) Chance itself pours in at every avenue of sense: it is of all things the most obtrusive. That it is absolute is the most manifest of all intellectual perceptions. That it is a being, living and conscious, is what all the dullness that belongs to ratiocination's self can scarce muster hardihood to deny.

Almost as unthinking is the objection (§61) that absolute chance could never beget order. I have noticed elsewhere the historic obliviscence of this objection.* Must I once again repeat that the tendency to take habits, being itself a habit, has *eo ipso* a tendency to grow; so that only a slightest germ is needed? A realist, such as I am, can find no difficulty in the production of that first infinitesimal germ of habit-taking by chance, provided he thinks chance could act at all. This seems, at first blush, to be explaining something as a chance-result. But exact analysis will show it is not so.

In like manner, when the eminent thinker who does me the honor to notice my speculation objects that I do not, after all, escape making law absolute, since the tendency to take habits which I propose to make universal is itself a law, I confess I

* See 297.

can find only words without ideas in the objection. Law is a word found convenient, I grant, in describing that tendency; but is there no difference between a law the essence of which is to be inviolable (which is the nominalistic conception of mechanical law, whose being, they say, lies in its action) and that mental law the violation of which is so included in its essence that unless it were violated it would cease to exist? In my essay "The Law of Mind" I have so described that law. [See 148.] In so describing it, I make it a law, but not an absolute law; and thus I clearly escape the contradiction attributed to me.*

613. In my attack on "The Doctrine of Necessity" I offered four positive arguments for believing in real chance. They were as follows:

1. The general prevalence of growth, which seems to be opposed to the conservation of energy.

2. The variety of the universe, which is chance, and is manifestly inexplicable.

3. Law, which requires to be explained, and like everything which is to be explained must be explained by something else, that is, by non-law or real chance.

4. Feeling, for which room cannot be found if the conservation of energy is maintained.

In a brief conversation I had with him, my friend remarked (and if it was an inconsiderate concession, I certainly do not wish to hold him to it) that, while the theory of tyichism had some attractive features, its weakness consisted in the absence of any positive reasons in its favor. I infer from this that I did not properly state the above four arguments. I therefore desire once more to call attention to them, especially in their relations to one another.

Mathematicians are familiar with the theorem that if a system of particles is subject only to positional forces, it is such that if at any instant the velocities were all suddenly reversed, without being altered in quantity, the whole previous history of the system would be repeated in inverse succession. Hence,

* Dr. Carus says of this: "Mr. Peirce's escape is like the disappearance of a medium from a room without doors. He must have got out through the fourth dimension. The argument is so subtle that I cannot see it." (*The Monist*, vol. 3, p. 599.)

when physicists find themselves confronted with a phenomenon which takes place only in one order of succession and never in the reverse order — of which no better illustration could be found than the phenomena of growth, for nobody ever heard of an animal growing back into an egg — they always take refuge in the laws of probability as preventive of the velocities ever getting so reversed. To understand my argument number 1, it is necessary to make this method of escape from apparent violations of the law of energy quite familiar to oneself. For example, according to the law of energy, it seems to follow (and by the aid of the accepted theory of light it does follow) that if a prism, or a grating, disperses white light into a spectrum, then the colors of the spectrum falling upon the prism or grating at the same angles, and in the same proportions, will be recombined into white light; and everybody knows that this does in fact happen. Nevertheless, the usual and prevalent effect of prisms and gratings is to produce colored spectra. Why? Evidently, because, by the principles of probability, it will rarely happen that colored lights converging from different directions will fall at just the right angles and in just the right proportions to be recombined into white light. So, when physicists meet with the phenomena of frictional and viscous resistance to a body in motion, although, according to their doctrine, if the molecules were to move with the same velocities in opposite directions the moving body would be accelerated, yet they say that the laws of probability, applied to the trillions of molecules concerned, render this practically certain not to occur. I do no more, then, than follow the usual method of the physicists, in calling in chance to explain the apparent violation of the law of energy which is presented by the phenomena of growth: only instead of chance, as they understand it, I call in absolute chance. For many months I endeavoured to satisfy the data of the case with ordinary *quasi* chance; but it would not do. I believe that in a broad view of the universe a simulation of a given elementary mode of action can hardly be explained except by supposing the genuine mode of action somewhere has place. If it is improbable that colored lights should fall together in just such a way as to give a white ray, is it not an equally extraordinary thing that they should all be generated in such a way as to

produce a white ray? If it is incredible that trillions of molecules in a fluid should strike a solid body moving through it so as to accelerate it, is it not marvellous that trillions of trillions of molecules all alike should ever have got so segregated as to create a state of things in which they should be practically certain to retard the body? It is far from easy to understand how mere positional forces could ever have brought about those vast congregations of similar atoms which we suppose to exist in every mass of gas, and by which we account for the apparent violations of the law of energy in the phenomena of the viscosity of the gas. There is no difficulty in seeing how sulphuric acid acting on marble may produce an aggregation of molecules of carbonic anhydride, because there are similar aggregations in the acid and in the marble; but how were such aggregations brought about in the first place? I will not go so far as to say that such a result is manifestly impossible with positional forces alone; but I do say that we cannot help suspecting that the simulated violation of the law of energy has a real violation of the same law as its ultimate explanation. Now, growth *appears* to violate the law of energy. To explain it, we must, at least, suppose a simulated, or *quasi*, chance, such as Darwin calls in to produce his fortuitous variations from strict heredity. It may be there is no real violation of the law, and no real chance; but even if there be nothing of the sort in the immediate phenomenon can the conditions upon which the phenomenon depends have been brought about except by real chance? It is conceivable, again, that the law of the conservation of forces is not strictly accurate, and that, nevertheless, there is no absolute chance. But I think so much has been done to put the law of the conservation of forces upon the level of the other mechanical laws that when one is led to entertain a serious doubt of the exactitude of that, one will be inclined to question the others.

Besides, few psychologists will deny the very intimate connection which seems to subsist between the law, or *quasi*-law, of growth and the law of habit, which is the principal, if not (as I hold it to be) the sole, law of mental action. Now, this law of habit seems to be quite radically different in its general form from mechanical law, inasmuch as it would at once cease to operate if it were rigidly obeyed: since in that case all habits

would at once become so fixed as to give room for no further formation of habits. In this point of view, then, growth seems to indicate a positive violation of law.

Let us now consider argument number 3: and remark how it fortifies number 1. Physical laws that appear to be radically different yet present some striking analogies. Electrical force appears to be polar. Its polarity is explained away by Franklin's one-fluid theory, but in that view the force is a repulsion. Now, gravitation is an attraction, and is, therefore, essentially different from electricity. Yet both vary inversely as the square of their distance. Radiation likewise follows the same formula. In this last case, the formula, in one aspect of it, follows from the conservation of energy. In another aspect of it, it results from the principle of probability, and does not hold good, in a certain sense, when the light is concentrated by a lens free from spherical aberration. But neither the conservation of energy nor the principle of probability seems to afford any possible explanation of the application of this theory to gravitation nor to electricity. How, then, are such analogies to be explained? The law of the conservation of energy and that of the perduratum of matter present so striking an analogy that it has blinded some powerful intellects to their radically different nature. The law of action and reaction, again, has often been stated as the law of the conservation of momentum. Yet it is not only an independent law, but is even of a contrary nature, inasmuch as it is only the algebraical sum of opposite momenta that is "conserved."¹ How is this striking analogy between three fundamental laws to be explained? Consider the still more obvious analogy between space and time. Newton* argues that the laws of mechanics prove space and time to be absolute entities. Leibnitz,† on the other hand, takes them as laws of nature. Either view calls for an explanation of the analogy between them, which no such reflection as the impossibility of motion without that analogy can supply. Kant's‡ theory seems to hint at the possibility of an explana-

¹ The conservation of a vortex, which consists of the preservation of a certain character of motion by the same particles, though derived from the coöperation of other laws, is, in form, quite different.

* *Principia*, I, 9ff.

† 3^{me} Lettre à Clarke, 4. Gerhardt, vol. 7, p. 363, Berlin (1890).

‡ See *Kritik der Reinen Vernunft*, A33, B50.

tion from both being derived from the nature of the same mind. Any three orthogonal directions¹ in space are exactly alike, yet are dynamically independent.

These things call for explanation; yet no explanation of them can be given, if the laws are fundamentally original and absolute.

Moreover, law itself calls for explanation. But how is it to be explained if it is as fundamentally original and absolute as it is commonly supposed to be? Yet if it is not so absolute, there is such a phenomenon as absolute chance.

Thus, the chance which growth calls for is now seen to be absolute, not *quasi* chance.

Now consider argument number 2. The variety of the universe so far as it consists of unlikenesses between things calls for no explanation. But so far as it is a general character it ought to be explained. The manifold diversity or specificness, in general, which we see whenever and wherever we open our eyes, constitutes its liveliness, or vivacity. The perception of it is a direct, though darkling, perception of God.* Further explanation in that direction is uncalled for. But the question is whether this manifold specificness was put into the universe at the outset, whether God created the universe in the infinitely distant past and has left it to its own machinery ever since, or whether there is an incessant influx of specificness. Some of us are evolutionists; that is, we are so impressed with the pervasiveness of growth, whose course seems only here and there to be interrupted, that it seems to us that the universe as a whole, so far as anything can possibly be conceived or logically opined of the whole, should be conceived as growing. But others say, though parts of the universe simulate growth at intervals, yet there really is no growth on the whole — no passage from a simpler to a more complex state of things, no increasing diversity.

Now, my argument is that, according to the principles of logic, we never have a right to conclude that anything is absolutely inexplicable or unaccountable. For such a conclusion goes beyond what can be directly observed, and we have no

¹ In speaking of directions, we assume the Euclidean hypothesis that the angles of a triangle are equal to two right angles.

* Cf. 553.

right to conclude what goes beyond what we observe, except so far as it explains or accounts for what we observe. But it is no explanation or account of a fact to pronounce it inexplicable or unaccountable, or to pronounce any other fact so. Now, to say no process of diversification takes place in nature leaves the infinite diversity of nature unaccounted for; while to say the diversity is the result of a general tendency to diversification is a perfectly logical probable inference. Suppose there be a general tendency to diversification; what would be the consequence? Evidently, a high degree of diversity. But this is just what we find in nature. It does not answer the purpose to say there is diversity because God made it so, for we cannot tell what God would do, nor penetrate his counsels. We see what He *does* do, and nothing more. For the same reason one cannot logically infer the existence of God; one can only know Him by direct perception.

It is to be noted that a general tendency to diversification does not explain diversity in its specific characters; nor is this called for. Neither can such a tendency explain any specific fact. Any attempt to make use of the principle in that manner would be utterly illogical. But it can be used to explain universal facts, just as *quasi* chance is used to explain statistical facts. Now, the diversity of nature is a universal fact.

To explain diversity is to go behind the chaos, to the original undiversified nothing. Diversificacity was the first germ.

Argument number 4 was, upon its negative side, sufficiently well presented in my "Doctrine of Necessity Examined." Mechanical causation, if absolute, leaves nothing for consciousness to do in the world of matter; and if the world of mind is merely a transcript of that of matter, there is nothing for consciousness to do even in the mental realm. The account of matters would be better if it could be left out of account. But the positive part of the argument, showing what can be done to reinstate consciousness as a factor of the universe when once tychism is admitted is reinforced in the later papers. This ought to commend itself to Dr. Carus, who shows himself fully alive to the importance of that part of the task of science which consists in bridging gaps. But consciousness, for the reason just stated, is not to be so reinstated without tychism; nor can the work be accomplished by assigning to the mind an occult

power, as in two theories to be considered in the section following this. As might be anticipated (and a presumption of this kind is rarely falsified in metaphysics), to bridge the gap synchism is required. Supposing matter to be but mind under the slavery of inveterate habit, the law of mind still applies to it. According to that law, consciousness subsides as habit becomes established, and is excited again at the breaking up of habit. But the highest quality of mind involves a great readiness to take habits, and a great readiness to lose them; and this implies a degree of feeling neither very intense nor very feeble.

I have noticed above (594) Dr. Carus's dubious attitude toward the first argument. I considered in the last section his attempted reply to the second. To the third argument, he replies (§65) that law ought to be accounted for by the principle of sufficient reason. But, of course, that principle cannot recommend itself to me, a realist; for it is nothing but the lame attempt of a nominalist to wriggle out of his difficulties. Reasons explain nothing, except upon some theistic hypothesis which may be pardoned to the yearning heart of man, but which must appear doubtful in the eyes of philosophy, since it comes to this, that Tom, Dick, and Harry are competent to pry into the counsels of the Most High, and can invite in their cousins and sweethearts and sweethearts' cousins to look over the original designs of the Ancient of Days.

614. My fourth argument it is which seems to have made most impression upon Dr. Carus's mind (§85), and his reply is rather elaborate.

While embracing unequivocally the necessitarian dogma, equally for mind and for matter (§193), Dr. Carus wishes utterly to repudiate materialism and the mechanical philosophy (§133). To facilitate his thus walking the slack-rope, he makes (§168) a division of events into "(1) mechanical, (2) physical, (3) chemical, (4) physiological, and (5) psychical events." The first three (§§169-171) are merely distinguished by the magnitude of the moving masses, so that, for philosophical purposes, they do not differ at all. As for physiological events, though he devotes a paragraph (§172) to their definition, he utterly fails to distinguish them from the mechanical (including the physical and chemical) on the one hand, or from the psychical on the other. Dr. Carus seems to think

(¶176) that by this division he has separated himself entirely from the materialists; but this is an illusion, for nobody denies the existence of feelings.

The truth is, he distinctly enrolls himself in the mechanical army when he asserts that mental laws are of the same necessitarian character as mechanical laws (¶193). The only question that remains as to his position is whether he is a materialist or not. He instances (¶185) the case of a general receiving a written dispatch and being stimulated into great activity by its perusal, and causing great motions to be made and missiles to be sped in consequence. Now, the dilemma is this. Will Dr. Carus, on the one hand, say that the motion of those missiles was determined by mechanical laws alone, in which case, it would only be necessary to state all the positions and velocities of particles concerned, a hundred years before, to determine just how those bullets would move and, consequently, whether the guns were to be fired or not, and this would constitute him a materialist, or will he say that the laws of motion do not suffice to determine motions of matter, in which case, since they formally certainly do so suffice, they must be *violated*, and he will be giving to mind a direct dynamical power which is open to every objection that can be urged against tychism?

Now admire the decision with which he cuts the Gordian knot!

“THERE ARE NO PURELY MECHANICAL PHENOMENA.” (¶175.)

That is,

“*The laws of motion ARE applicable to and will explain all motions.*” (¶177.)

But hold!

“The mechanical philosopher . . . feels warranted in the hope that . . . the actions of man . . . can be explained by the laws of motion. . . . We may anticipate that this conclusion will prove ERRONEOUS. *And so it is.*” (¶176.)

At the same time,

“NO OBJECTION CAN BE MADE to the possibility of explaining the delicate motions in the nervous substance of the brain by the laws of molar or molecular mechanics.” (¶178.)

Yet,

“*The simplest* psychical reflexes, including those *physi-*

ological reflexes which we must suppose to have originated by conscious adaptation, . . . CANNOT *be explained from mechanical or physical laws alone.*" (§186.)

However,

"*We do NOT say that there are motions . . . in the brain . . . which form exceptions to the laws of mechanics.*" (§187.)

Nevertheless,

"The brain-atoms are possessed of the same spontaneity as the atoms of a gravitating stone. Yet there is present an additional feature; there are present states of awareness. . . . Neither states of awareness nor their meanings can be weighed on any scales, be they ever so delicate, nor are they determinable in footpounds." (§192.)

Clearness is the first merit of a philosopher; and what §192 comes to is crystal-clear. Dr. Carus wants to have the three laws of motion always obeyed; but he wishes the forces between the molecules to be varied according to the momentary states of awareness. All right: he is entitled to suppose whatever he likes, so long as the supposition is self-consistent, as this supposition is. It conflicts with the law of energy, it is true; for that law is that the forces depend on the situations of the particles alone, and not on the time. It is liable to give rise to perpetual motion. It was intended, no doubt, to be an improvement on my molecular theory of protoplasm,* earlier in the same number. It escapes materialism. It supposes a direct dynamical action between mind and matter, such as has not been supposed by any eminent philosopher that I know of for centuries. I am sorry to say that it shows a dangerous leaning toward originality. The argument for thus rejecting the law of the conservation of energy I leave to others to be weighed. It seems to suppose a much larger falsification of that law than my doctrine; but it is a pretty clever attempt to escape my conclusions. It rejects what has to be rejected, the law of the conservation of energy; and is far more intelligent than the theory of those (like Oliver and Lodge)† who wish to give to mind a power of deflecting atoms, which would satisfy the conservation of energy while violating the law of

* See 239-263.

† Sir Oliver Lodge. See his "Force and determinism," *Nature*, vol. 43, p. 491; Vol. 44, pp. 198, 272; (1890-91).

action and reaction. If it can have due consideration, I doubt not it will accelerate the acceptance of my views. Meantime, I do not see where that "inextricable confusion" into which I was to be led is to come in. (§4.)

615. Little more requires to be noticed in Dr. Carus's articles. He admits (§2) that indeterminism is the more natural belief, which is no slight argument in its favor.

616. The remarks upon the theological bearings of the theories, if they are found somewhat wide of the mark, are explained by the haste of the editor to show just what all the affiliations of my views were, before I had had time to explain what those views are. The remarks to which I refer will be found in §§3, 36, 81, 82, 83, 128, 203, 204. They are worth putting together.

617. The doctrine of symbolism, to which Dr. Carus has recourse, seems to be similar to that of my essay "Some Consequences of Four Incapacities" (*Journal of Speculative Philosophy*, vol. II).* (§§180, 183, 199.) On this head, I can only approve of his ideas.

618. It is true that I wrote many definitions for one of the "encyclopedic lexicons." But they were necessarily rather vaguely expressed, in order to include the popular use of terms, and in some cases were modified by proofreaders or editors; and, for reasons not needful here to explain, they are hardly such as I should give in a Philosophical Dictionary proper.

* See vol. 5, bk. II, no. II.

APPENDIX B

NOMINALISM *versus* REALISM*

[We print below some strictures upon the position assumed in our last number with reference to M. Janet's version of Hegel's doctrine of the "Becoming." We hope that these acute statements which have been written, for the most part, in the form of queries, will receive a careful reading, especially by those who have differed from our own views hitherto expressed. They seem to us the most profound and commendable statement of the anti-speculative standpoint as related to the Science of Pure Thought (*Prima Philosophia*), that we have seen. But for this very reason we are fain to believe that the defects of the formalism relied upon are all the more visible. We have endeavoured to answer these queries with the same spirit of candour that animates their author.—*Editor.*]

Mr. Editor of the Journal of Speculative Philosophy:

619. I should like to make some inquiries in regard to your meaning in the paragraph beginning "Being is the pure Simple," vol. I, p. 255.

I will begin by stating how much of it I already understand, as I believe. I understand that "Being" and "Nothing," as used by you, are two abstract, and not two general terms. That Being is the abstraction belonging in common and exclusively to the objects of the concrete term, whose extension is unlimited or all-embracing, and whose comprehension is null. I understand that you use Nothing, also, as an abstract term = nothingness; for otherwise to say that Being is Nothing is like saying that humanity is non-man, and does not imply at all that Being is in any opposition with itself, since it would only say "Das Sein ist nicht Seiendes," not "Sein ist nicht Sein." By Nothing, then, I understand the abstract term corresponding to a (possible) concrete term, which is the logical

* A letter in *The Journal of Speculative Philosophy*, vol. 2, pp. 57-61 (1868) which, to judge from internal evidence, was written by Peirce.

contradictory of the concrete term corresponding to "Being." And since the logical contradictory of any term has no extension in common with that term, the *concrete* nothing is the term which has no extension. I understand, that, when you say "Being has no content," and "Being is wholly undetermined," you mean, simply, that its corresponding concrete has no logical comprehension, or, at least, that what you mean follows from this, and this, conversely, from what you mean.

I come now to what I do not understand, and I have some questions to ask, which I have endeavoured so to state that all can see that the Hegelian is bound to answer them, for they simply ask what you mean, whether this or that; they simply ask you to be explicit upon points upon which you have used ambiguous expressions. They are not put forward as arguments, however, but only as inquiries.

620. Abstract terms, according to the doctrine of modern times, are only a device for expressing in another way the meaning of concrete terms. To say that whiteness inheres in an object is the same as to say that an object is white. To say that whiteness is a color is the same as to say that the white is colored, and that this is implied in the very meanings of the words.

But, you will undoubtedly admit that there is a difference between a hundred dollars in my pocket *Being or not Being*, and so in any other particular case. You, therefore, admit that there is nothing which is, which is also not. Therefore, it follows that *what is*, and *what is not*, are mutually exclusive and not coëxtensive.

Since, then, you nevertheless say that the corresponding abstractions, Being and Nothingness, are absolutely the same (although you at the same time hold that it is not so, at all), it is plain that you find some other meaning in abstract terms than that which other logicians find. I would, therefore, ask what you mean by an abstraction, and how you propose to find out what is true of abstractions.*

621. You say, in effect,

Being has no determination;

Ergo, It is nothing.

Now, it certainly appears that the contrary conclusion follows

* Comments of the editor of the *Journal* follow here.

from this premiss, namely: that it is not nothingness. I suppose that you have suppressed one of your premisses, and that you mean to argue thus:

Indetermination in respect to any character is the negation of that character;

Being is indeterminate in respect to every character;

Ergo, Being is negative of every character.

In short, you seem to imply that to abstract from a character is to deny it. Is this the manner in which your argument is to be completed, or how else?

622. This suggests another question. You say that nothing has no determination. It is plain that it would not follow from this that Being is nothing, but only that Nothing is being, or rather that Any non-being is a being, thus reducing non-being (*nicht-seiende*) to an absurdity. This would be nothing new (for Albertus Magnus quotes Avicenna to this effect) and in my opinion would be perfectly true. *Non-ens*, or "the not being," is a self-contradictory expression. Still, though I thus see no monstrous consequences of saying that nothing has no determination, I see no proof at all that it is so. It might be said, indeed, that the things which are not have no characters in common, and that therefore *what is not* has no logical comprehension and Being — not no determination. I would ask, then, have you proved that nothing has no determination? Do not suppose that I am endeavouring to drive you into contradiction; for I understand Hegelians profess to be self-contradictory. I only wish to ascertain whether they have an equal disregard for those logical maxims which relate to ambiguities.

623. You say, in effect,

Difference is determination,

Being has no determination;

Ergo, Being has no difference from nothing;

Ergo, Being is nothing.

It is incontestable that difference from anything is determination in respect to being or not being that thing. A monkey, in differing from a man, is determined (negatively) in respect to humanity. Difference, then, in any respect, is determination in that respect. This, I take it, is what you mean. Now let us parallel the above argument:

Difference in any respect is determination in that respect;
 Animality, in general, is not determined in respect to
 humanity;

Ergo, Animality, in general, has no difference from humanity;

Ergo, Animality, in general, is humanity.

This is plainly sophistical. For to say that an abstraction, in general, is undetermined, has two different senses; one resulting from a strict analysis of the language, and the other reposing upon the ordinary use of language. Strictly, to say that an abstraction is undetermined would mean that it may be this or may be that abstraction; that is, that the abstract word by which it is expressed may have any one of a variety of meanings. What is ordinarily meant by the phrase, however, is that the object of the corresponding concrete term is undetermined, so that neither of a certain pair of mutually contradictory predicates are *universally* true of that concrete. Now, it is true to say that animality is undetermined in respect to humanity, or that being is not determined at all, only in the latter of these senses, to wit: that not every animal is a man, and not every animal is not a man, and (in the other case) that there is no predicate which can be truly affirmed or denied of all beings. For in the other sense we should imply that the abstractions themselves were vague, and that being, for example, has no precise meaning. In the only true sense, therefore, the premiss is, in the one case, that "Animal, simply, is undetermined," and, in the other, that "*Ens (seiende)* is undetermined"; and what follows is, in the one case, that "not every animal differs from a man," and, in the other, that "not every being differs from any nothing." This latter amounts merely to saying that there is nothing from which every being differs, or that a nothing is an absurdity. These correct conclusions do not in the least imply that animality is humanity, or that being is nothingness. To reach the latter conclusions, it would be necessary (in the first place) to use the premisses in the other and false sense; but even then all that would be legitimately inferable would be that "humanity, *in some sense*, is animality," and that "being, *in some sense*, is nothing." Only by a second fallacy could it be concluded that animality, in the sense intended, is humanity, or that being, in the sense intended, is humanity, or that being, in the sense intended, is

nothing. Now, I would inquire whether you inadvertently fell into these ambiguities, or, if not, wherein the force of your argumentation lies?

624. Finally, I would inquire whether, in your opinion, the maxims of (ordinary) logic relating to contradictions lack even a *prima facie* presumption in their favor? Whether the burden of proof is or is not upon the Hegelians to show that the assumption of their falsity is a more tenable position than the assumption of their truth? For in the present state of the question, it seems to me more probable that subtle fallacies lurk in the Hegelian reasoning than that such fallacies lurk in all other reasoning whatsoever.

APPENDIX C

WHAT IS MEANT BY "DETERMINED"?*

To the Editor of the Journal of Speculative Philosophy:

625. Your remarks upon my inquiries concerning Being and Nothing are very kind and courteous. Considered as replies, they are less satisfactory than they might have been had I succeeded better in making my difficulties understood.

I suspect that there must be some misunderstanding between us of the meaning of the various terms cognate with "determined." Perhaps, therefore, I shall do well to state more fully than I did before, the manner in which I understand Hegel (in common with all other logicians) to use them. Possibly, the original signification of *bestimmt* was "settled by vote"; or it may have been "pitched to a key." Thus its origin was quite different from that of "determined"; yet I believe that as philosophical terms their equivalence is exact. In general, they mean "fixed to be *this* (or *thus*), in contradistinction to being this, that, or the other (or in some way or other)." When it is a concept or term, such as is expressed by a concrete noun or adjective which is said to be more determinate than another, the sense sometimes is that the logical extension of the former concept or term is a part and only a part of that of the latter; but more usually the sense is that the logical comprehension of the latter is a part and only a part of that of the former.

626. In my former letter (623) I sufficiently expressed my own understanding of "determined" as applied to a concept or term such as is expressed by an abstract noun. *Determinate* is also used either in express application or with implicit reference to a second intention or term of second denomination. In such an acceptation, we may speak either of a singular as indeterminate, or of a conception of Being, in general, as determinate. Every singular is in one sense perfectly deter-

* A letter continuing the discussion begun in Appendix B. From *The Journal of Speculative Philosophy*, vol. 2, pp. 190-191 (1868).

minate, since there is no pair of contradictory characters of which it does not possess one. Yet if the extension of the term be limited, not by additions to its comprehension, but *by a reflection upon the term itself* — namely, that it shall denote but one — it is called an indeterminate singular. In this sense, “some one horse” is an indeterminate individual, while “Dexter” is a determinate individual. In a somewhat similar way, every universal conception of Being is quite indeterminate in the sense of not signifying any particular character. Yet, if the reflection is explicitly made (*gesetzt*) that every thing to which it applies has its particular characters, it is called by Hegel *determinate being*. Hegel teaches that the whole series of categories or universal conceptions can be *evolved* from one — that is, from *Seyn* — by a certain process, the effect of which is to make actually thought that which was virtually latent in the thought. So that this reflection which constitutes *Daseyn* lies implicitly even in *Seyn*, and it is by *explicitly* evolving it from *Seyn* that *Daseyn* is evolved from *Seyn*. (Hegel’s *Werke*, Bd. 3, S. 107.) The term “What is” has reference to pure *Seyn* only; the term “What is somehow” has reference to *Daseyn*.

This is my understanding of the term “determinate.” It must differ from yours, or you would not say that animality, *in general*, is determined in respect to humanity: so when you say that were animality and humanity, in general, undetermined with respect to each other they would be identical, I take the example of “highness of pitch in general” and “loudness of sound in general,” and I conclude again that we are taking the word “determine” in different senses. May I ask you to reperuse my fourth question? (623.)

627. You have apparently understood me as applying the term “abstract” to any concept the result of abstraction. But, as I intimated (620), I adopt that acceptation in which “whiteness” is said to be abstract and “white” concrete. For this use of the terms, I refer to the following authorities: Andrews and Stoddard’s *Latin Grammar*, §26, 5; Scotus, *Super Prædicamenta*, qu. 8; Durandus à Sancto Porciano, *In Sentent.*, lib. 1, dist. 34, qu. 1; Ockham, *Summa Logices*, pars 1, cap. 5; Chauvin, *Lexicon Rationale*, sub. V. *Abstractum*; Mill, *Logic*, bk. 1, cap. 2, §4; Trendelenburg, *Elementa Logices*

Arist., 6th ed., p. 117, note; Uberweg, *Logik*, §51 (where Wolff, also, is cited); Hoppe, *Logik*, §§256, 257. This misapprehension affects the relevancy of most of your remarks.

628. I think that I have not, as you suppose, greatly mistaken the sense in which Hegelians use the term Pure Being. At least, my definition seems to be in accord with the explanations of almost all, if not all, the commentators and expositors of Hegel. I would submit respectfully, that your own remarks upon p. 117 of vol. 1, of this Journal contradict, almost in terms, what you say (vol. II, p. 57) in reply to me.

629. Once or twice you use such expressions as "We do not profess to speak for Hegelians," "Hegelians may understand this as they please," etc. Have I been wrong, then, in supposing that the passage to which my queries related was a professed defense of Hegelian doctrine?

630. I am sorry to learn that I have done you injustice in saying that you profess to be self-contradictory. Yet I do not see in what sense you object to the remark. To say that a *man* is self-contradictory is, of course, but a way of saying that what he believes is self-contradictory. You believe that "finite things contradict themselves"; that is, as I understand it, that contradictions exist. Therefore, what you believe in appears to be self-contradictory. Nor can I see how a person "escapes self-contradiction by not attempting to set up non-contradiction as the first principle of things"; that is, by not professing to be otherwise than self-contradictory.

I do not see that you notice query 3.

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