TEXT PRODUCTION

Toward a Science of Composition

by Robert de Beaugrande

volume XI

in the series

ADVANCES IN DISCOURSE PROCESSES

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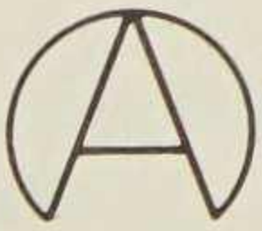
TEXT PRODUCTION

Toward a Science of Composition

Robert de Beaugrande

University of Florida

Volume XI in the Series
ADVANCES IN DISCOURSE PROCESSES
Roy O. Freedle, Editor



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This is dedicated to

EDWARD P. J. CORBETT

whose patience and enthusiasm encouraged me
to study and write about composition;

and to

MINA SHAUGHNESSY

who mapped out the terrain
for future explorers.

Preface to the Series

Roy O. Freedle
Series Editor

This series of volumes provides a forum for the cross-fertilization of ideas from a diverse number of disciplines, all of which share a common interest in discourse—be it prose comprehension and recall, dialogue analysis, text grammar construction, computer simulation of natural language, cross-cultural comparisons of communicative competence, or other related topics. The problems posed by multisentence contexts and the methods required to investigate them, while not always unique to discourse, are still sufficiently distinct as to benefit from the organized mode of scientific interaction made possible by this series.

Scholars working in the discourse area from the perspective of sociolinguistics, psycholinguistics, ethnomethodology and the sociology of language, educational psychology (e.g., teacher-student interaction), the philosophy of language, computational linguistics, and related subareas are invited to submit manuscripts of monograph or book length to the series editor. Edited collections of original papers resulting from conferences will also be considered.

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Vol. XII. Coherence in Spoken and Written Discourse. Deborah Tannen (Ed.), 1984.

Vol. XIII. The Development of Oral and Written Language in Social Contexts. Anthony D. Pellegrini & Thomas D. Yawkey (Eds.), 1984.

INTRODUCTORY NOTE

To my own satisfaction at least, writing this book has proved several points I try to make in it: that clear writing is very hard, especially if the content is new or complicated; that a text is never totally finished; and that writing, more than any other human action, forces you to take stock of what you think or know and how it all fits together. Also, I deliberately (though without warning) made some passages illustrate the argument I happen to be advancing at the moment about writing and usage. But the main evidence rests in the approximately 500 samples I took mostly from everyday discourse, especially that of my students.

Where appropriate, I refer to the background set forth in *Text, Discourse, and Process,* and *Introduction to Text Linguistics,* rather than rehearsing it all here. Still, this book is sufficiently self-contained for its own purposes, and much of it is new in comparison to those volumes. References are relatively extensive, because the topic itself has so many aspects. The original researchers might not always agree with the use I made of their work when trying to fit it all into one big picture. I hope that any criticism I have aired will be construed in a spirit of scientific progress that profits most if we periodically re-examine our habitual assumptions.

Some special tactics were applied to keep a project of this scope under control and to make it as readable as possible. Major terms are introduced in block capitals and explained in plain language according to the best consensus I could derive. If, as I contend, our terms constrain the way we view and explore the field, we should make them as transparent as possible. I have tried to unify the terms I found in previous research as far as was feasible. I translated all quotes from foreign languages into English.

A detailed index was also provided for cross-reference. This organization

compelled me to number the paragraphs as a means for keeping track of main ideas and reducing the need for restatement. Paragraphs can be subordinated to others by adding a decimal place, e.g., I.2.8 is detailed in I.2.8.1, I.2.8.2, and so on. A series of cross-references to one chapter and section omits obvious repetitions, e.g. I.1.1, 8, rather than I.1.1, I.1.8. A cross-reference with a chapter number and a small raised number, e.g. I[1], indicates a footnote to that chapter. Sample texts are numbered in parenthesis for compact citation. Different versions of the same text are lettered as well, e.g. (2a), (2b), etc.

My greatest debt is to my undergraduate students who have endured close scrutiny under a bewildering range of conditions. They supplied the inspiration and impetus for the whole project, and provided the evidence that made it possible, exciting, and rewarding—Jeff Anker, Terry Barrett, Tim Brennan, Rick Cagno, Mike Casella, Cynthia Catalan, Julie Chabot, Tony Covington, Robby Dingfelder, Penelope Douglas, Kathy Duncan, My-Hanh Duong, Cindy Factor, Elizabeth Farrior, Stacey Gange, Steve Gee, Sybil Grayson, Dan Halprin, Mike Heilman, Sherwyn Isom, Nancy Jacobson, John Michael Jones, Frank Latini, Barbara Laurence, Lisa Levinson, Dale Lee, Gail Leidig, Alberto Loret de Mola, Del Kelley, Steve Margolin, David McElroy, Robert McNair, Amy and Lynn McFall, Yvette Miley, Cheryl Mock, Robert Morrison, Cynthia Moore, Anna Nomberg, Cindy Oakley, Laurie Orrel, Yong Suk Pak, George Pankey, Sandra Ploegert, Richard Procyk, Connie Rambo, Ronnie Rothfield, Joel Safirstein, Amy Shaff, Juan Soto, Carolyn Stopher, Brian Taylor, Calvin Wagner, Marc Weinberg, Mike Weiss, Stacy Wenzel, Bob West, and others I may have forgotten. I hope they learned from me at least a small proportion of the amount I learned from them. I am also indebted to my graduate students who carried out tests and techniques, and collected surveys and samples: Robin Baldwin, Bruce Bartholomew, Lindsey Davis, Tom Davies, Roger Drury, Thomas Glass, Charles Hall, Richard Hersh, Gerald Langford, Darlene Logan, Scott Lowe, Michael McCoy, Genevieve Miller, Susan Murray, Marjean Olson, John Pieters, Zofia Solczak Roberts, Nathan Robinson, Stephen Robitaille, Neil Sebacher, Barbara Stephenson, Joe Straub, Patty Street, Jane Harper Yarbrough, and especially the tireless Patsy Lynn. Elementary and secondary teachers of Gainesville also contributed: Carolyn Cook, Reba Dean, Gail Kanipe, Mamie Kelsey, Mary Morgan, and Mary Sharp. My colleagues Dick Brantley, Ron Carpenter, Andy Gordon, Brandy Kershner, Marie Nelson (our most fluent writer), Mel New, and Jim Twitchell, and our secretary Kate Kent Ellis (of saintly kindness) joined my freshmen in allowing me to film their writing. I am grateful for support and release time (and for their patience about all the memos I didn't read, and all the departmental business I forgot) to the heads of the English Department, Ward Hellstrom, Ira Clark, and Mel New, to the director of the Linguistics Program, Chauncey Chu, and to

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RdB
May 1982

0

Plan of the Book

0.1 A general outline of this book may help to indicate how the materials are arranged and presented. Chapter I is devoted to the overall context in which research on text production and composition takes place. The notion of a "scientific mentality" is explored (I.1). The trend away from philosophical, ideological, and political speculation marked the transition between early science and modern science (I.1.2). But the side-products of the new mentality included overemphasizing quantitative aspects, statistics, and well-structuredness (I.1.2-3). Scientists tended to focus on static, orderly artifacts, and to discount the dynamic processes whereby artifacts are produced and used in human life (I.1.3). In fact, the scientists themselves were supplying the contexts they claimed to be abstracting away; hence, many possible issues were misinterpreted or overlooked (I.1.3-4). The credentials of science must be re-established by an explicit concern for contexts: historical (I.1.5), philosophical (I.1.6), and psychological (I.1.7). The most vital issue for research is the human processes of discovering and knowing anything, including scientific facts (I.1.8). Progress demands a self-critical awareness of how theories and models are constructed and how they influence what we find and believe (I.1.9-11). Though we can't escape our mental models of the world, we can apply any model to more and more domains to see how much it will account for (I.1.12). The best framework is a general theory of communication and cognition to subsume specific concerns, such as literacy and literacy education (I.1.12-15).

0.2 The "literacy crisis" should be defined in terms of public attitudes and their social and psychological consequences (I.2.1-7). Schools still presuppose literate capacities they aren't equipped to provide, so that failure is commonplace for learners of certain backgrounds (I.2.6-7). Judging some-

one's literacy is a complex action (I.2.8-9). Hence, many people suffer language anxieties, and many authorities make no rational attempt to justify their views (I.2.10-12). Education is hampered by the credo that all domains, including literacy, are made of "right and wrong" choices (I.2.13). English classes waste time on odd, poorly justified "rules" and "errors" that inhibit the learning of more essential strategies (I.2.14-17). Composition teachers are caught between diverse, intolerant public attitudes and the need to teach students to write with confidence and self-reliance (I.2.18). To counterbalance public attitudes, we need comprehensive research on social and psychological aspects of usage and error (I.2.19-22). We need to dispel common myths implying that literacy education is pointless or hopeless (I.2.23-24).

0.3 The pressure for testing and evaluating performance has greatly distorted education and its participants' view of their own roles (I.3.1-5). Many tests are poor indicators of valuable learning, and inhibit creativity and progress (I.3.4-11). The composition teachers' dilemma is intensified by having to set a grade on a product, whereas the processes of production are the more vital consideration (I.3.12-20). Whether the grade reflects mechanics, errors, or content organization, standards must be made fair and explicit (I.3.14-22). The grade should reflect what the learner achieved, within his or her preconditions and skills, during the course in question (I.3.21-24). Specific, easy steps for revision offer the best means for writers to control the outcome (I.3.25-26). Students will work hard without coercion if the tasks are well-defined and relevant, the success chances are good, and instruction is tailored to the learner (I.3.27-29).

0.4 The foundation of useful research is to view texts and discourses as dynamic events (I.4). Instead of just classifying items, we need to find out how items are chosen and used in real contexts (I.4.1-6). Processes must be orderly because people understand each other quite well most of the time (I.4.8). The text is thus not defined merely by its format and word-meanings, but its functions in human interaction (I.4.9-12). Obviously, this outlook brings important changes in research procedures (I.4.13-17). Some implications can already be foreseen: categories are something not given, but constituted when language is used; operations may fail, or may alter their own conditions; and so on.

0.5 Effective research should take stock of its scientific precursors and of their merits and limitations (Chapter II). Structuralism enabled more precise and systematic methods, but discounted the processes that build and use structures (II.1). Behaviorism took a new look at real actions and their relation to habits and emotions, but disregarded the cognitive predispositions and developments that make human actions meaningful and relevant (II.2). Mentalism turned to implicit, abstract knowledge that imposes order on artifacts and actions, but failed to establish a workable access to empirical evidence (II.3). Thus, all three precursors made valuable contributions,

but none of them provided the larger picture we need to understand language and literacy.

0.6 Research is most likely to be productive if we carefully design and discuss the theoretical models we accept and apply (III.1). Many experiments have involved text production as part of a task, but few attempts were made to define a comprehensive model of its mental processes (III.1.2-5). Specific causalities are hard to determine in a highly complex activity (III.1.6). Hence, we should not uncritically rely on old models such as "encoding" (III.1.7), but should explore the criteria for designing models to represent the detailed aspects and distinctions entailed in text production (III.1.8-30). Also, we need criteria to evaluate competing models (III.1.31).

0.7 Since texts are processed on several levels of awareness (sounds/letters, words, phrases, concepts, ideas, and goals), we need a model that relates these levels to phases of human processing (III.2). These phases are probably not distinct in time nor fixed in their order, but act as functional units for their respective parts of the task, assuming dominance as fits the occasion (III.2.5). A text producer must: plan how to reach goals (III.2.6-13); select, combine, and develop ideas and concepts (III.2.14-24); express this content in words (III.2.25-27); put words into phrases (III.2.28-30); and execute the sounds and letters of the surface text itself (III.2.31). This whole model can be supported by showing that its phases, though they normally interact, can reveal distinct identities under certain conditions (III.2.32-40).

0.8 Like any mental operation, text processing is influenced by the organization and limitation of human resources (III.3). These resources are assigned according to the demands made on memory, attention, action, and so on (III.3.2-3); if the mind is too heavily loaded, several counter-measures can be adopted (III.3.4.1-10). Memory should be defined along the dimensions that relate knowledge to performance during text processing (III.3.5-19). Knowledge of words and concepts must be searched out of memory and used for the text (III.3.10-13). These operations are sensitive to such factors as contexts, ideologies, belief systems, values, and prior experience (III.3.14-19). In order to write well, students need topics that tap their knowledge and experience; and teachers should be aware of their own prior assumptions in these matters (III.3.20-31). The discovery and arrangement of content ("invention" in rhetoric) is subject to obstacles, such as contamination during the recovery and use of stored knowledge (III.3.32-41). Writing cannot be divorced from thinking; and writers who think things out clearly spare their audience of having to do it for them (III.3.42).

0.9 The linearity of texts seems so obvious that little research has pursued its foundations (Chapter IV). The trend was to take it for granted that sentences are in sequential order, waiting to be dissected, analyzed, and described. But the ability to put words in a series must be part of more general human abilities to do anything in a series (IV.1.1-4). Words are produced or received in temporal succession, but the processes involved also

have a complex spatial dimension (IV.1.6-12). Seven linear principles appear necessary for any action involving a linear modality (IV.2). Core elements must be distinguished from their adjuncts (IV.2.6-13). Pauses must be allowed at various points (IV.2.14-34). Provisions must be made for looking back or ahead in the text (IV.2.35-52). Some elements will place a heavier load on the mind than others (IV.2.53-64). Ambiguities must be kept under control (IV.2.65-68). And finally, lists must be allowed in order to enumerate comparable things (IV.2.69-74). These seven principles provide a new means to account for the arrangement of texts. Punctuation is one important example (IV.3).

0.10 Moving from speech to writing is enormously complex (Chapter V). Spelling offers an intricate means to represent not only speech sounds, but diverse facets of grammar, etymology, and analogy (V.1.1-9). Research is now under way on spelling with respect to word types (V.1.11-12), errors (V.1.14-18), dictation (V.1.19), segmentation (V.1.20), proofreading (V.1.22), learning (V.1.24-27), and so on. Research on reading, perception, and learning in general is often relevant (V.1.30-33). Spellers must maintain words in working memory and execute the letters in the proper order (V.1.34-39). All this research is vital in view of the frequency and consequences of spelling errors in everyday writing (V.1.40-49).

0.11 People who have learned a language have a grammar embodied in the things they do with words (V.2). Composition textbooks typically rely on explanations that are either too vague or too technical for naive learners to work with (V.2.3-6). To remedy this state of affairs, we need to discover how well learners control grammatical categories and formats in actual use, without respect to explicit definitions (V.2.7-15). Apparently, this use defines the grammar far better than any abstract theory, at least for the majority of people (V.2.16-17). Then, we can teach notions like the "sentence" by tapping people's knowledge of speech in explicit, easy steps (V.2.18-29). The same approach has proven forceful in defining and resolving sentence problems, such as the fragment (V.2.32-37), the splice (V.2.38-43), and the run-on (V.2.44).

0.12 The distinction between speaking and writing has finally become a theme of important research (V.3). The texts involved, and the conditions of their use, are distinctive in many ways (V.3.2). Most people learn speaking first, whereas writing is usually a concern of schooling (V.3.3-4). Thus, a learner at any age can be guided by comparing his or her samples of speaking vs. writing (V.3.5-9). Certain speaking habits encourage disadvantageous writing tendencies (V.3.10-37), such as: fillers (V.3.11-14), hedges (V.3.15-17), slang vocabulary (V.3.18-19), restarts (V.3.20-21), shifts within a construction (V.3.22-26), indeterminacies (V.3.27-29), items out of order (V.3.30-31), and redundancies of various types (V.3.32-37). Proper training can provide simple steps for students to recognize and revise any conspicuous effects of such tendencies (V.3.39-41).

0.13 Stylistics shows that "style" means many things to many people (V.1.1-8). Since style results from choice, the educational dilemma of conformity vs. creativity is very acute (VI.1.9-16). We need to examine how style relates to types of texts (or "modes of discourse"), such as scientific and technical exposition (V.1.17-24). Obscure style is a common affliction because it is easy to write and serves personal goals, such as casting oneself as an authority or institution (VI.1.25-28). Instruction should, as usual, begin from the learners' current skills and views respecting style, and experimenting from there (V.1.29-34).

0.14 The stages of a text or discourse are not fixed, yet they do follow an orderly plan (VI.2). The beginning, middle, and end are defined in part by degrees of generality, and in part by the motives of the writer or speaker and of the audience (VI.2.1-11,22). Conversation includes an opening and closing, and in between, a statement of the reason for the discourse; topic flow is fairly free, as long as the situational background makes sense of things (VI.2.3-5). Written texts are typically for a more remote, general audience, and therefore must adhere to a clear and coherent flow of topics (VI.2.6), e.g., in the personal essay (VI.2.7-8), the scientific text (VI.2.9-10), and the technical report (VI.2.11). Paragraphing follows topic flow and marks common transitions (VI.2.12-24), such as cause vs. effect (VI.2.19), earlier vs. later (VI.2.20), whole vs. part (VI.2.21), general vs. specific (VI.2.22-23), problem vs. solution, and thesis vs. supporting evidence (VI.2.24). The stages of text and discourse can be taught with steps that sort, arrange, consolidate, or develop materials (VI.2.27-37).

0.15 Real advances in either theory or practice demand that both sides work together constantly (Chapter VI). Administrators need real expertise in order to make wise decisions (VI.3.1-2). Teachers need workable, theoretically well-founded advice on classroom approaches (VI.3.5-6). Diagnostics should place learners on a meaningful scale for future work (VI.3.8-11). Support activities such as pre-writing, free writing, outlining, journal-keeping, and peer tutoring should be explained in a broad theory (VI.3.12). Grading should be fair, realistic, and helpful (VI.3.13-14). Teachers' opinions should be supported by substantive research (VI.3.16). Correction and revision should be so clearly explained that student writers can do them themselves (VI.3.17). To carry out such projects, our future work should select its priorities with care (VI.3.19-28). It should be versatile, realistic, personal, interdisciplinary, and self-critical (VI.3.19-25). It should work for better textbooks and learning materials, and for more enlightened public attitudes (VI.3.26-27). It should identify the true "basics" of learning, and demand the respect that befits an enterprise as elaborate and vital as human literacy (VI.3.28).

0.16 By my own reasoning (VI.3), theory and practice are two means to the same end, and intertwined in every way. I have spent an additional year working to make all sections of the book readable, despite the relative new-

ness and technicality of some issues. Readers whose concern is essentially with practice may wish to focus on some sections of this volume more than on others: literacy (I.2); testing and grading (I.3); behavioral pedagogy (II.2.26-32); sentence-combining (II.3.17-47); the relationship of text production and processing to the conditions of composition classes (III.2.12-13, 19, 23-24; III.3.4, 16-31, 38-41); the significance of hesitancies and pauses in writing (IV.2.23-34; IV.3.11); the causes for problems and errors (II.3.46; III.3.32-41; IV.2.36, 47-48, 66, 68, 71-74; IV.3.34-35; V.1.14-18, 32-33, 40-49; V.2.30-45; V.3.10-37; VI.1.25-28); the motives for revision (II.3.47; IV.2.49-50, 71; V.3.40); the reasons for rating stylistic options (IV.2.55-64; IV.3.13, 15, 18, 28, 31, 36, 38, 45; V.2.32-33, 39, 43-44; VI.1.12-24; VI.3.25); the accounts of punctuation (IV.3) and paragraphing (VI.2.12-25); and the design of textbooks (V.2.2-6; VI.3.26), teaching modules (V.2.20-29; V.3.6, 40; VI.2.26-32; VI.3), and diagnostics (V.3.6; VI.3.7-11) The theoretical issues, such as definition of terms and concepts, model design, natural vs. experimental writing, and so on, are concentrated in I.4, II.1, II.2.1-25, III.1, III.2.32-39, III.3.1-16, IV.1, and V.1.6-39, and would be more relevant to the active researcher. However, the theoretical sections provide the rationale for the practical ones. I doubt the book works very well if one reads only the practical sections, or only the theoretical ones.

0.17 I have sometimes heard myself described as unduly critical of previous work on language and the mind. Like anyone else, I am influenced by the context of my own experiences and beliefs. Years of time and millions of dollars have been misspent on research whose irrelevance for human concerns was apparently considered a mark of scientific distinction. Educational programs built on the best intentions have remained unable to help people in need because the theoretical foundations were vague or outmoded. Young people, in whom our hope resides for a better world, have been systematically denied access to literacy, and thereby to discovery and organization of their own thoughts and motives. Disadvantaged people have been excluded from many benefits of life by discrimination against their language, while schools continue to stigmatize and perpetuate, rather than alleviate, the literacy problems of everyday life. Whoever has seen all this and unceasingly pondered it may, I hope, be forgiven for feeling strongly about the necessity to re-examine our basic assumptions, and to seek new directions wherever they may lead.

I

The Context of Communication

1. A "SCIENCE" OF COMPOSITION?

1.1 A "science" of composition may seem an unusual notion. Science is widely considered a specialized enterprise for making statements about stable entities and quantities. Webster's well-known dictionary (1963: 771) defines "science" as "knowledge covering general truths or the operation of general laws," and a sub-definition is: "one of the natural sciences"—the latter "dealing with objectively measurable phenomena" (1963: 653). These definitions embody the common belief that any domain hoping to be considered a legitimate "science" should emulate the natural sciences and their conceptions: laws, measurements, generality, and objectivity.

1.2 Early science was rooted in the speculations and ideologies of philosophy, theology, and politics. Facts were established by *assertion* (cf. I.2.8.4), and accepted as an act of faith in the person or institution making the claim. Modern science strove toward a method where facts are established by *empirical discovery* and accepted as a conclusion drawn from evidence. However, these strivings have had some problematic side-effects. Scientists became skeptical about the responsibility of science to serve the interests of society at all. Research focused on direct manipulation of small-scale objects in the laboratory and discounted their contexts in everyday life. Statements were mainly *quantitative,* rather than *qualitative,* because numbers allow neutral comparisons and generalizations more easily than characteristics do (cf. II.2.2). Individual objects were levelled into a *statistical norm:* the highest truth was equated with whatever happens most often. In principle, however, the norm may be a theoretical construct not embodied in any one real object.

1.3 In this ambience, the human sciences looked for domains that seemed *well-structured.* If necessary, domains were simplified and broken

down via *reduction* and *fragmentation*. Static objects were stressed at the expense of dynamic events. Hence, scientists preferred to study *artifacts* rather than the *processes* whereby those artifacts are produced and used within human activities; and to treat orderly *special cases* as *general cases* or as *metaphors* for the latter. Contexts and processes—especially those involving human creativity—were widely believed to lack the orderly structure and uniformity required for valid scientific inquiry. In actual practice, the investigators themselves informally supplied these contexts and processes. Methods worked best when the artifacts could readily be fit into uniform contexts (cf. I.1.7). For example, linguistics analyzed the formal structure of words and sentences much better than that of meanings and purposes (cf. II.1; II.3).

1.4 After a time, research of this kind must reach a point of diminishing returns, because a major part of the inquiry is hidden from view and thus hard to control. As long as scientists supply contexts without acknowledgement, the treatment of facts and evidence contains a concealed intermediate step that may endanger the consistency and reliability of the findings. The ideological and personal biases modern science strives to exclude might creep in at this very point. Such was the fate of the three scientific trends surveyed in Chapter II: structuralism, behaviorism, and mentalism. By discounting or fragmenting ordinary human processing, they failed to get any general picture of communication and cognition. This impasse can be resolved only if we agree that scientific principles are not compromised by seeking structures in processes, not just in artifacts. We can be more certain of what we know if we explore how we come to know it (I.1.8; III.1.32).

1.5 Accordingly, the status of science has recently been re-examined along three dimensions: historical, philosophical, and psychological. *Historical* studies (e.g. Kuhn, 1970a) remind us how, in the past, ardently accepted facts collapsed despite the methodologies and institutions that favored them. Conversely, many facts we now take for granted once encountered protracted opposition from high-ranking scientists. The borderline between a "new discovery" and a "scientific mistake" is precariously negotiated.[1] Science must be carefully maneuvered between the tendencies to *explore* and to *ignore*. If we bear in mind that any set of facts is in principle open to more than one explanation, and that no truth can be final, we will be more willing to consider new or competing approaches.

1.6 *Philosophical* studies lead to a similar conclusion via a different route. A fundamental principle is currently in debate: *the verification and*

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[1] The tension between disseminating new theories or discoveries vs. averting scientific aberrations pervades all facets of institutional leverage: the refereeing of journal articles and books, the granting of academic promotion and tenure, and so on. However, the scientific enterprise tends by nature to value creativity (cf. C. Taylor & Barron [Eds.], 1975).

falsification of theories (cf. Hanson, 1958; Feyerabend, 1970a; Lakatos, 1970; Popper, 1970, 1972; Stegmüller, 1976). The uncertainty of the dividing line between *evidence* and the *interpretation of evidence* has been recognized. Prevailing theory creates the categories in which scientists perceive and think, and thus decides what counts as evidence; a wholly impartial judgement is epistemologically not feasible. Contrary evidence that cannot be conceptualized within customary approaches tends to go unnoticed. Scholars who advance these considerations (e.g. Feyerabend, 1970b; Kuhn, 1970a, 1970b) have been attacked by defenders of the traditional status of science for portraying scientific communities as "irrational" (cf. Stegmuller, 1976), i.e., as insensitive to contradictions and inconsistencies.[2] But a semblance of irrationality is a natural by-product of the scientific enterprise. As theories and explanations change or evolve, inconsistent or contradictory sets of facts sometimes persist side by side. Indeed, science deliberately fosters such a state of affairs by seeking out problems and anomalies. Scientists understandably maintain their allegiances at least until a new corpus of contrary evidence becomes relatively large and secure. The real dispute is how this evidence weighs against prior institutional or personal commitments, e.g. one's investment in the older theory.

1.7 *Psychological* studies endow the message of the historical and philosophical ones with a new urgency. Researchers concur that "in every domain of human experience perception, comprehension, and interpretation involve an interaction of input with existing knowledge" (Anderson, 1977: 417). Everything humans can discover or know, except perhaps the experiences of very young children (cf. Piaget, 1976), makes sense only via the *mediation* of our prior *model of the world.*[3] What is true of humans at large is perforce true of scientists: there can be no absolute objectivity because there can be no totally unmediated access to an object. People agree about an object (and consider it objectively real) when they attain *consistent and comparable processing results* from encountering or using the object. Processing is therefore not chaotic; its profoundly ordered structuring helps to build the order of the world.

1.8 The most pressing issue for science now is *understanding understanding* (cf. Rumelhart, 1981). Until we obtain a viable model of what it means to understand something, the credentials of science itself have no

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[2] To the advocates of one theory, those of another naturally appear irrational, because coherence is being derived from two different frameworks. Creativity always entails a momentary disturbance of thought patterns, but is not irrational because it engenders a new order (cf. I.1.3; I.2.23.7; I.3.7, 10). Compare Note 1.

[3] For example, a vision program for a computer must incorporate knowledge about physical objects (dimension, location, displacement, edges, shadows, etc.) (cf. Winston [Ed.], 1975). Otherwise, the world looks like a jumble of lines and intensities capable of staggering numbers of interpretations.

ultimate recourse.[4] All essential constructs of science—discovery, objectivity, measurement, generalization, proof, etc.—are human processing acts we need to expound and explore (Neisser, 1982). The procedures of science should be analyzed in their interaction with commonsense reasoning (cf. Garfinkel, 1960; Cicourel, 1964; Jennings & Jennings, 1974). We can come closer to reality by examining the procedures whereby we constitute reality (I.1.3).

1.9. We will have to grant Tulving's (1979: 29ff) admission that "all current ideas, interpretations, and theories are wrong, in the sense that sooner or later they will be modified or rejected." Such a tenet need not damage our initiative and self-image. It might, on the contrary, incite us to contemplate unmapped terrains of discovery. And the imperative to question our answers (and even our questions) keeps us from falling into rigid habits of thinking.[5] Tulving (1979: 29ff) himself draws some noteworthy consequences (cf. VI.3.19-28):

1.9.1 It is unwise to expend too much effort on affirming accepted theories. Experiments should be designed not simply to shore up such theories, but also to show how they are still incomplete or inadequate.

1.9.2 An account for the findings of a single experiment or type of experiment is not too valuable. We need models that include the larger context in which any activity is performed. Such models "will bring out relationships between experiments or sets of data that we would not otherwise have perceived" (Estes, 1975a: 271).

1.9.3 Formalization should not be undertaken too early. Unwieldy constructs borrowed from mathematics and logic are out of place in domains where the basic concepts are still highly approximative. Such constructs give a false sense of security of having explained what has in fact only been rewritten in a formal language.

1.9.4 Scientists should be more willing to reject accepted theories that no longer lead to new or enlightening findings. The exertions of repeatedly patching up faltering theories could be better invested in the search for new ones.

1.10 The human sciences have both as their own foundation and as their object of inquiry the procedures of MODEL-BUILDING (cf. Beaugrande, 1980a, 1981a, 1981b). A MODEL can be defined as a theoretical

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[4] Neisser (1982: 44) observes that psychoanalysis and behaviorism imply a self-contradiction because they would exempt themselves from human nature. "If all ideas are wish-fulfillment, then psychoanalytic ideas just express the wishes of the psychoanalyst. If every belief just results from conditioning, so does the behaviorist's belief that this is the case." Cognitive psychology, in contrast, is concerned with "how knowledge is possible," and thus can deal with itself as one domain of human nature, rather than claiming to be a miraculous exception to its own scheme of things.

[5] The strong impetus of cognitive science (cf. I.4.12) is due to the novel outlooks enabled by seeking new approaches from a wider perspective.

construct intended to represent the nature and workings of some object or object domain. As long as the domain is relatively unfamiliar, the model remains highly APPROXIMATIVE, i.e., contains provisional assumptions for which there is sparse evidence. Further experience and reflection can TUNE the model, i.e. bring it into steadily more reliable correspondence with the domain and provide more consistent, effectual orientation. A society or culture is defined both by its major models and by its customary procedures for building and tuning them. At one extreme, the model becomes totally internalized and invisible, seeming to be reality itself; at the other, people become aware of models inside models (build models of themselves building models, and so on indefinitely), in an infinite regress.[6] Either way, models are pervasive and powerful determiners of how the world is viewed.

1.11 A science will progress the most swiftly by being aware of its own model-building. Science has special demands for orientation: not only to experience a domain, but also to *describe* and *explain* it. A scientific community typically seeks high degrees of completeness, consistency, and exactness, whence the familiar conceptual apparatus—definitions, classifications, measurements, regularities, and the rest. There is no way to *conclusively verify* a model, because all possible evidence can never be assembled (cf. Popper, 1972); at most, the model can be *falsified* if it contradicts a significant body of evidence (cf. Lakatos, 1970). However, the standard methods of observing, experimenting, predicting, etc., are never completely free of the prior model that determines which answers are sought for which questions. The real danger is that constant application of a model can internalize and reinforce it to the point where it is considered identical with the domain itself. At that point, the model severely limits and obscures the negotiation of the threshold at which accruing contradictions overturn an established theory (cf. I.1.5).

1.12 The priorities proposed in 1.9.2 suggest a way out of this basic predicament. The model can be DIVERSIFIED by applying it to a steadily wider domain or set of domains (III.1.31.1). Each step of diversification reexamines the accountability of the model. Of course, the model still influences discovery procedures and leads scientists to incorporate their prior assumptions into their treatment of evidence. But these effects are structurally and functionally altered by each step of diversification. The model must account not for just one concern, but for a growing intersection of

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[6] "Infinite regress" is the philosophical and psychological consequence of the search for ultimate causality and definition. In everyday life, people set a threshold where they stop pursuing the causes or definitions of one artifact or operation in another, and accept things as given. In science, the hope lingers on that physiology and neurology might be the final cause of cognition and communication (cf. II.2.3ff). But since the causalities are discoverable only in terms of a complex process model, the latter cannot be strictly *derived* from physiological events and observations.

concerns. The probability steadily rises that an inadequately designed model will lose its plausibility. Diversification should be based on ANTECEDENCE: the procedure of progressively specifying a general theory to create sub-theories for several domains. Research in any one of these domains can then be related to the others via an explicit shared conceptual framework. For example, a theory of communication and cognition is properly antecedent to a theory of text production, and the latter in turn antecedent to a theory of writing. In contrast, EXTRAPOLATION entails borrowing notions, methods, accounts, etc., from a "source" domain and transferring them to a "goal" domain without any such overarching framework. Normally, extrapolation occurs because the concepts and procedures of the source domain are better defined and operationalized than those of the goal domain. On occasion, the unexploredness of the goal domain can preclude a critical evaluation of whether the transfer is theoretically justifiable, and not just convenient. There may be no more than a *metaphoric* similarity between the domains, so that the well-defined source domain says very little about the precise nature of the goal domain (cf. I.1.3; II.2.15, 24; II.3.9; III.2.1).

1.13 The context for a "science of composition" should therefore be established through antecedence. As a sub-domain in a theory of text production (including speaking), composition is necessarily subject to the general conditions of cognition and communication. Texts are produced through complex operations that are guided by available processing resources, such as memory, attention, motor control, feedback, and motivation. These conditions in turn affect the *practical applications* through which theory and research on text production fulfills its responsibility to society (cf. VI.3). By exploring situations where text production is a relevant human action, we can better support the skills of communication in general and of literacy in particular. As a social institution, literacy promotes complex model-building, both collective (social, historical, scientific, technological, etc.) and individual (introspective, immediate, etc.). Scientists and writers alike use approximations and tests to steadily narrow down the disparity between intention vs. action, knowledge vs. expression. Thus, understanding the origin and production of discourse can bring new foundations not only for language instruction, but also for a general epistemology of discovering and communicating knowledge.

1.14 The importance of establishing antecedence relationships among adjacent disciplines is now widely recognized. The fragmentation of theory and research so common in the past (I.1.3) is yielding to unification and interdisciplinarity. Still, the legacy of previous research can serve us in the larger enterprises of the future. Chapter II surveys three scientific precursors that approached language or language activities via some degree of extrapolation. *Structuralism* was based on the notion of analyzing objects into minimal components, as practised in the natural sciences (II.1). *Behav-*

iorism rested upon the notion of conditioning, as established in animal testing (II.2). *Mentalism* centered on the notion of axiomatic systems, as conceived in formal logic (II.3). In each case, the application of these notions to human language was sometimes contestable, reductive, or misleading. However, many of the issues raised remain valid for any theory of language or communication, provided we find a unifying mode of stating and pursuing them.

1.15 Though composition itself is not a science, it constitutes a rich domain for scientific inquiry into human processing. This volume is intended to outline a provisional research program such a science might profitably pursue. In so early a state, approximations and limitations cannot be avoided (cf. I.4.17; VI.3.25). For the time being, qualitative discovery seems more vital than quantitative (cf. I.1.2; I.1.9.3; I.4.17; VI.3.22). We need to clarify the terrain before exact measurements and formalizations are likely to become decisive. We also need to determine how the detailed factors of text processing can be classified and described in relation to the whole. Finally, we should not forget that the conviction carried by a theory or a model ultimately depends on what Ulric Neisser (1976: 7f) calls its ECOLOGICAL VALIDITY (III.1.31.8): cognition and communication as they "occur in the ordinary environment and in the context of natural purposeful activity."

2. LITERACY: CRITIQUE OF A CRISIS

2.1 In spite of educational training in schools and professions, only a small portion of human abilities and resources are tapped in everyday life. Traditionally, the learners themselves, rather than the educational approaches, have been blamed for limitations and failures. The learners, it was argued, were inherently incapable of better performance, due to factors like "genetic endowment" and "intelligence quotient" (I.3.2). Quite conceivably, however, a fundamentally different educational approach could greatly reduce the ratio of failure schools now accept as normal and necessary (cf. Combs, 1979; Marks, 1982). Barring cases of actual brain damage, *every child could acquire from schooling a sufficient level of knowledge and skill to understand and control his or her natural life* (cf. Bruner, 1966). All we have proven so far is that current schooling does not attain this result.

2.2 The so-called "literacy crisis" may thus be a result of educational policy, not just a barrier to the latter's projects. On the one hand, the crisis is *illusory,* resulting less from a decline in skills than from a profound change in the fabric of society and its cultural expectations. Educational opportunities have been extended for the first time to disadvantaged social groups who contribute a non-traditional population of learners (Roueche & Kirk, 1973; Cross, 1974). These students don't share the hidden preconditions built into curricular domains such as literacy. Formerly, English teachers

"assumed a cultural trust, a vast body of unspoken but shared routines and information, which freed them from the need to explain what they were up to" (Shaughnessy, 1976: 153). Now that students are no longer attuned to the older goals and methods, teachers readily misconstrue the emergence of diverse backgrounds and dialects as a sudden decline in student potential.

2.3 On the other hand, the crisis is *genuine* to the extent that current patterns of social activity in America include literate concerns less prominently than before. By temporarily isolating a person from the group, reading and writing may engender anxieties (cf. I.2.10). Participation in mass media, despite a widespread lack of intellectual challenge, seems to promise social integration and divert attention from one's own problems. Reading and writing are essentially active and creative, whereas mass media encourage passive, reactive attitudes. The latter experiences could leave one's processing capacities underdeveloped, so that literate activities would demand an uncomfortable strain. For example, the camera perspective and sound track of filmic media pre-empt the tasks of deciding what is noteworthy or significant in the totality of a scene or event. The visual and acoustic impact of a film can overpower its conceptual organization.[7] Carolyn Stopher, one of my students at the University of Florida, interviewed her dorm-mates immediately after a TV news show. They could report vivid sights and sounds, but couldn't give any coherent account of whole events and their significance.

2.4 In another, less publicized, sense, the literacy crisis is genuine because a literacy deficit is a serious obstacle to personal and social advancement. Few people can dispense with literate skills and still have equal opportunities for a successful career in schooling and in later life. A literacy failure is not just a low grade on somebody's curve, a numerical abstraction to be shrugged off by teacher and pupil alike. It is a grave personal tragedy to be combatted with every resource available to our social institutions of development and advancement. The denial of literacy is a denial of freedom.[8]

2.5 Just as I do not believe educational failure is either normal or necessary (I.2.1), I cannot take the failure statistics of literacy education as proof that the skills involved are simply too hard for the contemporary learner (cf. I.2.23.1). Appropriately designed methods can provide a workable level of literacy to many children now denied that privilege. The key is to understand, expound, and train the requisite skills, instead of just assuming that

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[7] Marshall McLuhan (personal communication) suggested that media impact may alter cognition so radically that literacy is no longer feasible. But his argument, based on the dominance of brain hemispheres (cf. II.2.3ff), failed to consider the adaptability of cognition to new conditions.

[8] Historical evidence for this denial is the fact that teaching slaves to read or write was punishable by law in the American South before the Civil War.

they are obvious to everybody with the right social background (cf. I.2.2). Failure should be limited to cases where the learner actively opposes the educational process and refuses to participate. I suspect that such a defiant stance is likely only when learners emphatically doubt that a method can lead to success. If a task is explicit and realistic, learners will exert themselves far more intensely than if it is vague and elusive (I.3.27). The latter description often applies to the task of writing as posed in schools and colleges (I.2.17).

2.6 Non-traditional learners frequently suffer severe neglect of their literacy skills throughout their schooling. If prevailing methods *presuppose* a literate background, rather than being effectually able to *instill* it, then non-literate students are hardly likely to make much headway. Lacking an exact notion of the human processes that constitute literacy skills, educators are badly equipped to observe a child's progress and diagnose or relieve ongoing obstacles. Somewhere during the developmental process, a learner may adopt a non-strategic language model that blocks further evolution (III.1.8), and may emerge barely literate after twelve years of public schooling. To prevent such an impasse, a science of composition must define those processes and skills clearly enough to provide a more generally applicable approach (VI.3).

2.7 Sociologically, literacy is a key factor in a whole complex of personal attitudes about human status and values. People are hastily judged by any evidence they present for their literate abilities. Many social and professional opportunities are routinely made difficult or unavailable to people who elicit negative judgements. A particular dialect can mean that a child is expected to fail in school; or that an adult will not be trusted to perform properly on a responsible job. Otherwise enlightened citizens, even educators, misconstrue variations in literacy as marks of low intelligence and ability (I.2.17, 20).[9] A survey my student Gerald Langford conducted among rural Florida English teachers showed how they are led by the frequency of dialect-related errors in punctuation, spelling, or sentence grammar to predict that Black children will be low achievers.

2.8 The first step is to analyze the factors that influence literacy judgements. Figure 1 offers a provisional classification of the parameters along which a person might be rated.

2.8.1 Usage: Standard vs. non-standard. The most popular evidence for literacy ratings comes from variations in grammar, vocabulary, spelling, and punctuation. Simple errors, e.g. misspellings, are classed together with well-known markers of non-prestigious dialects, e.g. unusual noun plurals or verb tenses. Self-proclaimed language authorities, with no credentials in

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[9] Tom Wolfe (1969a: 117) remarked of a young woman: "But underneath all the 'gits' and 'gonnas' she turned out to be probably the brightest girl around there"—as if dialect should normally accompany low intelligence.

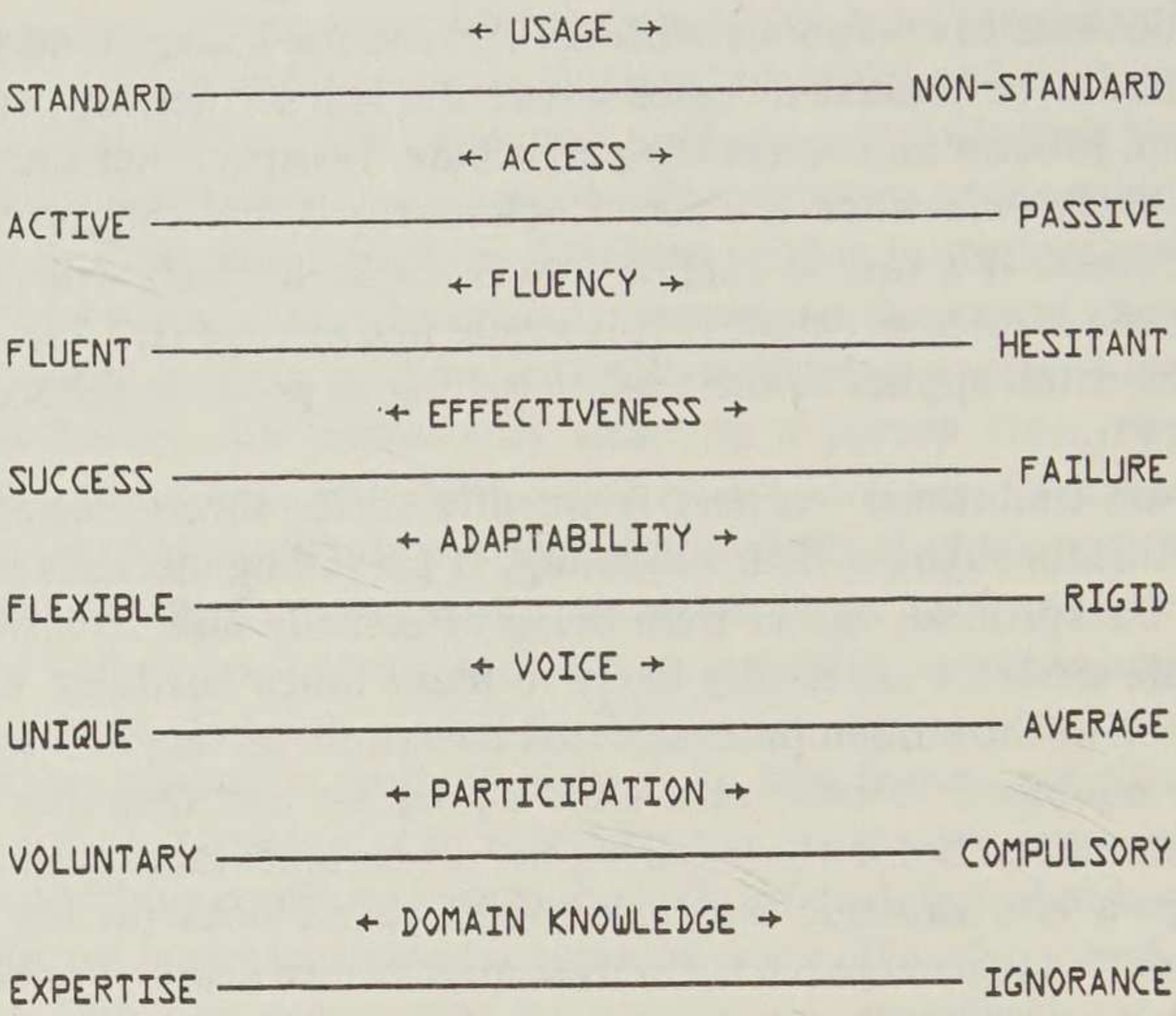


Figure 1. Parameters of literacy

serious research, assert the "correctness" of their own usage and aggressively denounce anyone who disagrees (cf. I.2.11).

2.8.2 Access: active vs. passive. "Access" decides the correlation between one's skills or knowledge and one's actual performance (cf. I.3.4, 22, 25; II.2.10; III.1.19; III.3.2.2; IV.1.12, IV.2 48; V.1.14f, 36, 40, 48; V.2.16; V.3.3, 22ff). Active skills are applied on one's own initiative; passive skills require activation from outside and thus, depending on conditions, may not be manifested in performance. The psychology of memory has shown that active *recall* can handle much less than passive *recognition* (III.3.5.4). Converting passive to active access is a pressing but poorly explored issue in developmental education, e.g. how to bring words from passive to active vocabulary.

2.8.3 Fluency: Fluent vs. hesitant. "Fluency" can denote the rate at which a task is carried out and the smoothness of transitions between successive steps (cf. II.2.5, 28f; II.3.21, 38; IV.2.14, 29, 32, 34; VI.3.12). In spoken text production, fluency depends somewhat on *articulateness,* i.e. ease of producing spoken sounds; but deeper factors like fluent planning and ideation also contribute (cf. III.2.6ff; IV.2.14-34). Fluency supports *efficiency:* the processing of the current text with the least amount of effort (I.4.10). Fluency may be crucial for personal goals: Wodak (1980) observed that Viennese courtroom judges, keenly sensitive to the literacy of defendants, believe a fluent report of an incident far more readily than a hesitant one.

2.8.4 Effectiveness: Success vs. failure. "Effectiveness" can designate the extent to which a text contributes to one's chances of obtaining a discourse goal (I.4.10). One contributor to effective text production is *assertiveness,* i.e. presenting one's materials as true, authoritative, and safe from challenge (cf. I.1.2; I.2.12, 16.3; VI.1.1; VI.3.25). Another is *audience sensitivity:* awareness of how text receivers will react (cf. III.1.5; III.2.13; IV.2.19.15ff; VI.1.17; VI.2.1; VI.3.12).

2.8.5 Adaptability: Flexible vs. rigid. "Adaptability" is the extent to which text production is tailored to the specific setting and audience. Audiences notice particular style markers (VI.1.4) and respond negatively if the style seems too plain (commonplace, intimate, slangy, etc.) or too elaborated (rare, remote, elevated, etc.) for the occasion. Many items of usage are neutral enough to escape notice, e.g., Quirk, Greenbaum, Leech, and Svartvik's (1972: 24) example, 'The student's work is now much better and seems likely to go on improving'.[10]

2.8.6 Voice: Unique vs. average. "Voice" can denote the extent to which text production reveals the peculiar individuality of the producer, as opposed to the habits of the whole language community (cf. I.2.16.6; I.4.8; II.2.28; II.3.44; III.3.10; VI.1.7, 9; VI.3.13). Though each text is normally unique in itself, there are differences of degree and markedness. A text producer with a distinctive voice typically requires from audiences a perceptibly high processing effort by frequently overturning common expectations.

2.8.7 Participation: Voluntary vs. compulsory. Participation in literate activities may depend entirely on free choice, e.g. reading a novel for entertainment or writing poetry to express oneself. Or, people may be forced to participate against their will, e.g. in some school settings. In between is the range where literate activities are instrumental for some further goal, as in many professions. In some societies, free participation is more prestigious than instrumental. For example, a government official who reads and writes a large number of letters may not be judged as literate as a literary book club president who actually addresses a lesser volume of written materials.

2.8.8 Domain knowledge: Expertise vs. ignorance. Simply knowing more about the knowledge domain used as a text topic creates the impression of being more literate. There will be easier access, larger and more precise active vocabulary, and often more assertiveness and fluency. Ignorance of the domain, on the other hand, creates the opposite impression.

2.9 The eight parameters outlined here, though doubtless not complete, should suggest the diversity and complexity of judging literacy. Many of the skills entailed are not just concerns of language, nor are they open to conscious control during text production. Access hinges on capacities for or-

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[10] I place all linguistic samples in single quotes.

ganizing and searching memory, which are hard processes to direct (cf. III.2.24; III.3.10ff; IV.2.11, 27). Fluency depends in part upon individual or biological rhythms of the organism (cf. IV.1.4; IV.2.19.7). Effectiveness is influenced by social beliefs about what goals are desirable (cf. III.2.7). Adaptability is determined by one's background of experience and practice. Participation may be sporadic or accidental. Knowledge or ignorance of a domain is an accident of one's training. Thus, literacy judgements have a complex origin utterly belied by the hasty, superficial ways they are often formed.

2.10 This complexity has two important consequences. The first is that many people suffer from *language anxiety* because they feel they are being judged by complicated, unexplained standards. Within a very limited range, anxiety is productive in heightening attention and effort; after that, it heavily drains the resources that should properly go to the task itself (Murray, 1971). Anxiety makes the situation appear "difficult, challenging, and threatening"; "the individual sees himself as ineffective, or inadequate, in handling the task," and "focuses on undesirable consequences" (Sarason, 1980: 6). Hence, anxiety interferes with performance and brings about the negative results the person fears and expects. Anxious attitudes toward literacy commonly impede learning and lead students to predict and accept failure as the natural outcome.[11]

2.11 The second consequence is that "authorities on usage" disdain unbiased empirical discovery and rational argument in favor of bald assertions about "correctness." Discussions of writing (e.g. handbooks on style and composition) freely mix general strategies, such as removing ambiguities and needless wordage, with the authors' personal and social biases. Strunk and White (1979) weaken their reasonable advocacy of precision, clarity, and brevity (e.g., "keep related words together," "omit needless words") with a flurry of fussy distinctions (e.g., 'compare to' vs. 'compare with', 'due to' vs. 'owing to', 'shall' vs. 'will', 'while' vs. 'although') and petty dislikes (e.g., 'anticipate', 'contact', 'currently', 'hopefully'). Whatever the authors don't care for is stigmatized as "incorrect/wrong," "awkward," "loose," "silly," "absurd," or "annoying"; writers who don't agree are called "indiscriminate" and "illiterate" promulgators of "vulgarisms" and "abominations" (1979: 42-63). Similarly, other "authorities"—Richard Grant White, Jacques Barzun, Wilson Follett—denounce anyone who rejects staid prejudices and advocates language tolerance as a deranged anarchist scheming to bring doomsday upon us all (cf. survey in Finegan, 1980).

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[11] Daly's (1977) work on "apprehension" would be more helpful if it took account of the large, important literature on anxiety (cf. Sarason [Ed.], 1980). Daly's "apprehension" appears to be a sub-type, namely anxiety before the act, as indicated in the person's own judgement.

The real goal of these polemics (aside from grabbing attention)[12] is to intimidate any counter-forces of language change or dialect proliferation that might endanger cultural elitism. The metaphors for adopting new usage are revealingly political ("sabotage," "guerilla war"), legalistic ("infractions of rules"), social ("slumming," "folksy"), moralist ("loose," "perverse," "corruptions," "sins"), and racist ("crossbreeding parts of speech") (Follett, 1962: 74ff; Strunk & White, 1979: 45, 47, 52, 77, 81f). If public opinion agrees with the authority, it is praised as "logic," "common sense," or "established," "modern," and "preferred usage"; if not, it is damned as the "popularity" that will make language "as chaotic as a ball game with no foul lines" (Strunk & White, 1979: 44, 52, 57); or "a confusion of unchanneled, incalculable willawaws" (Follett, 1962: 75). The elitist undercurrent is usually concealed—after all, one must "not inject opinion into a piece of writing" (Strunk & White, 1979: 80)—but breaks forth when the general audience is abandoned as the final adjudicator. After decrying usage that makes readers "impatient or confused" and "wastes their time," Strunk and White (1979: 78, 81, 85) abruptly decree:

> The writer [. . .] must sympathize with the reader's plight [. . .] but never seek to know his [sic] [13] wants. The whole duty of a writer is to please and satisfy himself, and the true writer always plays to an audience of one.

Yet most bad prose comes precisely from writers who rank their own mannerisms and convenience over the readers' (cf. III.3.16; VI.1.25ff).

2.12 Such popular handbooks have had a wide impact.[14] Their mode of dictating usage sets a bad precedent for society and the schools: accepting the welcome evidence from usage and public standards, and ignoring or vilifying the unwelcome. Correct usage is determined by decree and assertiveness. The average learner is rendered anxious and insecure by authoritarian attitudes, yet has no rational grounds for making decisions, because the promulgation of personal biases prevents a clear, workable consensus. Learning cannot be *cumulative* if every teacher legislates a new set of "correct" options (VI.3.2). Students must adapt to each new rule-set until they doubt the validity and rationality of any language judgements. Beyond spelling, punctuation, and grammar, superstition holds that *every* language choice is either "right" or "wrong," though the standards of rightness may

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[12] Edwin Newman's (1973) book simply uses literacy problems as a pretext to parade the travels and prominent acquaintances of its own author. Many of his anecdotes have little bearing on usage.

[13] Mr. White is adamant that sexist language has ceased to be so, thanks to long use; he condemns as "boring," "silly," "nonsensical," and "diffuse" both 'he or she' and 'they' as pronouns for indefinite persons; for him, anyway, the "writer" is "a man" (Strunk & White, 1979; 60f, 84).

[14] The back-cover blurb on Strunk and White claims an awesome sale of two million copies.

never be clearly explained. To appear less vulnerable, many people react as defensively and violently as the "authorities" when their usage is questioned. Some composition students take all criticism of their writing as degrading and offensive, and desperately fight against change (cf. I.3.12, 15, 19).

2.13 This state of affairs is part of a pervasive educational attitude we can call the *right/wrong dichotomy.* Politicians and philosophers have traditionally advertized their views as the "truth" whose acceptance was more a matter of moral rectitude than of dispassionately weighing the evidence (I.1.2). Dissenters are given the same vigorous flailing as the advocates of language tolerance and change (I.2.11). Science tends in the same direction to the extent that it ignores its own contexts (cf. I.1.2; I.2.23.9.; VI.3.21). Education has accordingly been set up as a relentless recitation of "right answers," rather than as a forum for acquiring powerful, self-reliant strategies to devise, assess, and de-bug answers (Papert, 1980). If necessary, educational domains are fragmented, reduced, or distorted to maintain the dichotomy of right vs. wrong, and the simple, mechanical grading it enables. "Facts" are learned like mad, but not integrated into a meaningful framework (I.3.6). Literature, a domain that thrives on freedom of thought and expression (VI.1.7f), is studied as a endless drill on quotations, plots, or authors' biographies. Composition, a domain for finding one's own voice and taking stock of one's knowledge (I.2.8.8; I.2.23.5), is disfigured as a self-conscious exercise in adhering to "rules"; monitoring the surface text becomes more important than delivering a purposeful message.

2.14 A survey of several hundred freshman writers at my university turned up a veritable class menagerie of "rules" from previous English teachers (cf. VI.1.12, 15). Some of the reported rules forbid the use of major options, such as opinions, adverbs, contractions, first and second person, the passive, the verb 'to be', quotations at the end of a paragraph, and questions in an argumentative essay. Other rules outlaw more specific options. No sentence can begin with 'there', 'it', 'this', 'and', 'but', 'so', 'because', or any conjunction or preposition.[15] No sentence can end with 'it', 'is', 'to', or a preposition. The blacklist of individual expressions included the transition words 'however', 'too', 'in addition', 'furthermore', 'like', and 'because'; plus hedges and qualifiers, such as 'perhaps', 'in my opinion', 'hopefully', 'anyway', 'a lot', 'a little', 'very', and 'really'. Still other "rules" prescribed numbers. A paragraph must have at least three sentences, and not more than five (cf. VI.1.15). No sentence may contain more than 30 words, and no paragraph more than 150 words. A high-school teacher in Indiana decreed that every research paper must have exactly 23

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[15] Like split infinitives, clause-final prepositions were outlawed because Latin, traditionally the language whose grammar served for other languages, doesn't have them (cf. Postman & Weingartner, 1966: 47).

pages, because that number was the average he had received in previous years.

2.15 The *origins* of these rules are complex and diverse. Some rules reflect a helpless search for order and uniformity in a seeming chaos of choices and varieties. Some combat presumed markers of verbosity, obscurity, and pretense. Some are taken uncritically from old handbooks like Strunk and White (e.g. no opinions) (I.2.11).[16] Some are violent reactions banning language items that happen to get misused or overused—a response as simplistic and disastrous as the Biblical admonition to tear out an eye that offends you (Matthew 18:9; Mark 9:47). Some discriminate against conversational speech, or against particular dialects (I.2.7f; I.2.23.4). Some simply make grading easier by sorting out the right from the wrong (I.3.14; VI.1.15). Since these motivations are such a mixture of good intent, convenience, helplessness, and misinformation, the rules themselves are not likely to be consistently or rationally defended. Like the "authorities" on usage, teachers have the institutional leverage to legislate rules and to stigmatize people who deviate. Putting all injunctions in the same category of "good usage" creates a facade of unity and respectability to ward off challenges against any particular rule.

2.16 The *disadvantages* of the rules must therefore be made clear. Objections can be raised on the grounds that the "rules" are:

2.16.1 Incomplete. The rules add up to an oddly tattered patchwork whose gaps are greater than its fabric. For example, conjunctions are evaluated for some positions, but not for others.

2.16.2 Inaccurate. The rules misrepresent what is demonstrably true of skilled writing, e.g. the dimensions of the paragraph. My students from Miami were unable to discover in essay collections a single example that followed the formula their high school teachers had stringently required (I.2.14; VI.1.15).

2.16.3 Authoritarian. Lacking a basis in observable usage, many rules merely embody personal biases. Bald assertiveness is considered just as respectable a basis for rules as serious research (cf. I.2.11ff; VI.3.25).

2.16.4 Inconsistent. Some rules seem valid only for a single textbook or teacher: moving to a new class may mean unlearning them and learning a new set, lest the old ones lead to "errors" (I.2.12). Textbook authors may set down a rule and then ignore it in their own writing (even on the same page) (cf. VI.1.22). Learners conclude that the rules are arbitrary, and the compulsion to obey them unfairly distributed.

2.16.5 Restrictive. The rule declares one option to be the only one, or misjudges a special case to be the general one. Motivations for individual

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[16] Probably, 'there is', 'hopefully', 'however', 'very', and 'in my opinion' also got blacklisted at the instigation of Strunk and White (1979: 18, 48f, 63, 80).

contexts don't come into view. The decision-making capacities for self-reliant use of varied writing options cannot be learned (I.2.12; cf. Youdelman, 1978).

2.16.6 Negative. The rules are mostly cast as "don'ts," telling writers only what *not* to do. Such advice does not help writers decide what should be done, and evokes strong inhibitions. In consequence, students fear experimentation and creativity as traps leading to "errors." No attempts are made to develop a personal voice (cf. I.2.8.6).

2.16.7 Unworkable. Many rules are defined so vaguely that only a proficient writer could apply them. An example cited by Robert Gorrell (1965: 141) is "never include more than one thought in a sentence"; naive students have no criteria to identify thoughts or determine their borderlines. Sometimes, two rules collide and leave the writer no way out, such as simultaneous proscription of both first person and passive (cf. VI.1.22; Harris, 1979).

2.16.8 Discriminatory. Many rules stigmatize specific features of minority dialects (cf. I.2.7; I.2.23.4). Justifications, if provided at all, usually conceal this striving behind some argument about logic or clarity. For instance, double negatives, a prominent feature of Black English (Scott, 1979), are attacked on the empirically false premise that they produce not an emphatic negative, but a positive (cf. IV.2.55).

2.17 The *effects* of the rules can be considered next. First, accurate, comprehensive surveys of current usage (e.g. Quirk et al., 1972) are overlooked, and the regional, social, and personal variations they reveal are discounted. Second, by misrepresenting actual usage and undermining the credibility of composition programs, the rules impede learning more than they support it. Untrained writers misunderstand any advice as a strict rule (Rose, 1981). They get caught between conflicting rules (Harris, 1979). They invest great ingenuity and intelligence in the struggle to follow or devise arcane rules, and make errors that are ironically construed as signs of inability and unintelligence. (Shaughnessy, 1977; Bartholomae, 1980). And they may strain to follow rules until they get "writer's block" (Rose, 1980). In such situations, trying out new skills seems too risky and frustrating to be worthwhile (I.2.23.3; I.3.8, 22). The red marks on papers "are not attuned to the approximate 'rightness' of what the student has written, but rather to the absolute wrongness of the composition"; they "make no attempt to tell the student to what extent his writing begins to approximate acceptable English and rhetorical effectiveness" (Zoellner, 1969: 280). Writing loses all purpose, enjoyment, or personality, and turns into a tedious, mystifying ritual, game, or tightrope act. The tremendous concentration on minor "errors" obscures the students' ability to implement major strategies. Eventually, students give up on literacy, like passengers abandoning a ship that sinks while the captain sedately dusts lint off a shiny brass deck railing.

2.18 In many ways, literacy educators and composition teachers are caught in an acute dilemma (cf. I.3.13; III.3.30; IV.3.45; V.1.40; V.2.3, 31;

VI.1.9, 13; VI.3.2). They must teach effective, self-reliant writing in a society that expects them to embody and enact its diverse, inconsistent, and irrational language attitudes. Teachers may indeed be forced by parents or schoolboards to uphold odd standards of usage. Teachers who adopt an enlightened, tolerant stance on usage risk being denounced as irresponsible, dangerous saboteurs trampling on all standards (I.2.11)—intense diatribes seek to conceal indefensible, inaccurate views. Similar biases live on in textbooks, because publishers don't want to offend those who decide what schools will buy, whether or not any expertise on language or writing influences the selection (VI.3.26).

2.19 The solution to the dilemma will not be easy: extensive research to situate rules and errors in their proper social and psychological contexts (cf. I.3.8, 14). From a *social* perspective, we might probe public attitudes, self-images, writers' anticipations of success or failure, prestige of dialects, and the literacy judgements discussed in I.2.8. In their attempts to prevent language change and to uphold cultural supremacy, authorities on usage pick out far more "rules" and "errors" than are socially relevant, and may even disregard them in their own texts (cf. I.2.16.4). Socially relevant, on the other hand, are usages that elicit judgements about a writer: obvious mistakes in spelling, punctuation, and grammar; unwittingly bizarre word choices; unintentional humor; ineptly pretentious verbiage; and so on. Students should learn about social consequences of usage, but not in composition courses that act as "laboratory sessions on linguistic and social conformity" (Larson, 1972: 635), or "maneuver students to internalize failure" (Kampf & Lauter, 1973: 23). Teachers should help students appreciate social pressures, but should not be arbitrary, unthinking enforcers of those pressures (V.2.31; VI.1.9, 13ff; VI.3.25). Teachers need to clarify public attitudes and work to make them more tolerant (Gere & Smith, 1979; VI.1.27).

2.20 From a *psychological* perspective, we must explore the processes of producing and receiving texts to determine what advice would genuinely improve written communication. Procedurally, a RULE is a regularity to be observed unless the writer has a good motivation not to; and an ERROR is an occurrence which consumes processing resources unnecessarily by an unmotivated departure from such a regularity. The system of text production is so complicated and extensive that it is naturally prone to limitations and dysfunctions, such as processing overload (III.1.17). Errors are a normal side-product, not proof of low ability or intelligence. Writers merely need proper "debugging" techniques: methods for expecting errors and reacting strategically. Learning improves best by monitoring one's own performance and applying the feedback (cf. III.3.2.2). Teacher-performed correction is not only unreasonably time-consuming, but also discourages students from learning to find and remedy errors on their own (VI.3.17).

2.21 Research on rules and errors can be productive within the larger framework of an antecedent theory of communication and cognition

(I.1.12f). The standards of good writing can only be stated and defended in terms of the actions and interactions of writers and readers. Students need active, positive advice, not inhibiting proscriptions. If we shift our emphasis from the written artifact over to processing actions, we will come to understand the motives for our advice and evaluations (cf. VI.3). We can also clarify basic questions such as the order in which course materials are presented and tasks are carried out. For example, demanding a complete, well-written essay at the outset of a course violates the principles of learning psychology by taking "the most difficult part of the problem first" (Kintsch, 1977: 402). Success is more likely if students begin from their current abilities and edit their successive approximations into a finished product, stage by stage (cf. III.1.26; V.3.40). Non-traditional students have a particular need for manageable sub-tasks (Roueche & Kirk, 1973: 68).

2.22 Such research is all the more pressing at a time when both society and the schools are re-appraising their notions about literacy education. The "back-to-the-basics" movement, a signal of disenchantment with recent methods, can hardly help out unless we identify the truly basic skills: model-building, problem-solving, search, hypothesis-testing, resource distribution, and so forth (cf. Beaugrande, 1980a: 278f; VI.3.28). Rote memorization, repetitive practice, and authoritarian discipline are not "basic," but simply ineffectual and alienating. Learning requires a cognitive reorganization of knowledge or skills to attain a more strategic design (cf. III.1.28). Mere repetition is as likely as not to reinforce a non-strategic tactic and block off further learning altogether.

2.23 The disappointing results of composition classes are occasionally explained by recourse to popular myths about educational potential (compare Combs, 1979). These myths are still strong enough that it is worthwhile to analyze the fallacies involved. For the sake of discussion, I will render each myth as a statement:

2.23.1 "College students today are less intelligent and capable (or lazier) than in the past." This myth is propagated in courses where traditional methods no longer work. Students who flunk composition often do well in such fields as computer science and chemistry whose complexity has greatly increased over the past. The problem is not lower potential, but a new diversity in background, expectations, and aspirations (I.2.2). For example, non-traditional students raise stronger demands that coursework be clearly relevant to a future career (Cross, 1974: 87). Early schooling (with its fixation on odd rules and mysterious errors) has led students to suppose that the effort expended on writing will not pay off, so that exertions are futile (cf. I.2.17).

2.23.2 "College-age students have already completed their language acquisition before arriving in college, and major changes are no longer possible." This myth was inspired by certain views on developmental learning. Schmidt (1975: 257) reports the view that "most of motor learning occurs in

children and that adult learning is merely a recombination of old habits." Ausubel (1967: 307) reports the view that certain developments are possible only during "critical periods" and, if missed, must lead to "retardation." Such claims reflect an unduly narrow and literal interpretation of findings on physiology, neurology, and maturation. Normal development is misunderstood not as the average (what most organisms do), but as the limits of the possible (the only thing that all organisms can do). Failure of an educational program is blamed on the hard-wiring of the human brain (cf. I.3.2; II.2.3ff). The best refutation is that many people do continue to learn language throughout their lifetime, and that developmental programs such as Mina Shaughnessy's do bring about major changes in student performance.

2.23.3 Still, cognitive and motor organization becomes steadily more complex throughout childhood, adolescence, and maturity, and thus harder to reorganize on any large scale, especially automatic actions (III.1.21). If some stage within this progressive organization should be mismanaged, or avoided as dangerous risk (I.2.16.6, 17; I.3.8, 22), the later stages that presuppose it would be set up and learned in entrenched non-strategic modes (II.3.31). Repetitive practice would only make students fall further and further behind, and perhaps be barely literate at the end of high school (I.2.6). Properly designed training could preclude such a cycle by explicitly addressing the cognitive and motor reorganization as it progresses.

2.23.4 Another source of this myth may be the attempts of some schools to stamp out student dialects. Dennis Baron (1975: 176) depicts the strange ideology of that crusade: "Those who would eradicate non-standard speech and writing operate under the delusion of a white man's burden of absolute cultural supremacy. 'Proper' usage is seen as the outward sign of deep-structural grace, while non-standard usage is regarded as evidence of physical and moral decay." Though few teachers hold such extreme views today, some still misunderstand dialect features as indicators of mental limitations (I.2.7). Bereiter and Engelmann (1966: 39), not finding in the speech of Black children the categories of middle-class White English, argued that the children suffered from "a total lack of ability to use language as a device for acquiring and processing information." Linguistic forms were used as evidence. "The speech of the severely deprived children seems to consist not of distinct words, as does the speech of middle-class children of the same age, but rather of whole phrases or sentences that function like giant words. That is to say, these 'giant words' cannot be taken apart by the child and recombined [. . .] the child's pronunciation arises from his inability to deal with sentences as *sequences of meaningful parts"* (Bereiter & Engelmann, 1966: 34ff). If this view were accurate, then all speakers of Aymara, an Amerindian language centered in Peru and Bolivia, should also process no information. Aymara creates utterances as single long words, e.g. 'Aruskipasipxañanakasakipunirakïspawa', meaning, 'I know it is desirable and necessary that all of us, including you also, keep communicat-

ing'.[17] Bereiter and Engelmann's good intentions and sincerely helpful remediation programs were hampered by naively assuming the categories and differentiations of their own language and dialect to be necessary prerequisites of communication and cognition. The alternatives, e.g. using intonation and non-verbal signals instead of grammar, were not properly considered (cf. V.3.27).

2.23.5 "Composition is not a useful skill in today's society." The fallacy here is to overlook the importance of university training as a way to acquire cognitive processing strategies, not just a heap of facts. Writing offers the greatest opportunity for taking stock of and fitting together one's knowledge (cf. Berthoff, 1972; Elbow, 1973; Lemke, 1974; Emig, 1977; Nystrand, 1977; Nystrand & Widerspiel, 1977; Olson, 1977a; Cooper & Matsuhashi, 1978; Murray, 1978; Irmscher, 1979b; Bereiter, 1980; Macrorie, 1980; Odell, 1980; Wason, 1980; Applebee, 1982; Shanklin, 1982; cf. I.3.17; III.3.42; IV.2.33; V.3.10, 15, 31). Literacy was therefore a major contributor to the evolution of social complexity and technology (I.1.13). Everyday speech is less adapted to assembling and reworking large-scale messages, or to preserving them for future consultation. Thus, most skilled professions in literate cultures demand writing abilities (Faigley, Miller, Meyer, & Witte, 1981).

2.23.6 Writing might seem unimportant because university curricula neglect it. A national survey directed by Arthur Applebee (1981, 1982) learned that writing takes up 41% of class time in English, and 48% in the sciences, but mostly in short-answers, fill-in-the-blanks, or multiple-choice tests, where "right" and "wrong" answers are easy to grade (cf. I.2.13). Only 10% or less of class time is spent on composing extended texts, whose diverse, individual formats are harder to grade, though showing more reliably whether knowledge has been integrated and digested.

2.23.7 "Composing is an art, a special talent, and cannot be taught." Steinberg (1980: 156) recalls "the romantic model": "that truly creative writing is mysterious and non-rational, the result, ultimately, of inviting the muse rather than of employing consciously an ordered, rational process." This myth probably stems from the origins of *creativity,* which begins by de-stabilizing everyday beliefs, questioning the obvious, or placing old bits of knowledge into new patterns (cf. I.3.10; III.2.15; Ghiselin, 1975: 357f). Until a new configuration of meaning falls into place, its inconsistencies resemble those typically found in irrational reasoning (III.3.15). But whereas irrationality preserves or perpetuates inconsistencies, creativity brings forth an insightful new order. Writing is therefore essentially orderly in its outcome, despite intermediary transitions in cognitive organization.

2.23.8 "Non-traditional students lack the potential for academic suc-

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[17] I am indebted to Martha Hardman for the Aymara example (cf. Hardman et al., 1975; Hardman, 1981).

cess." This myth arose when non-traditional students found little help in "remedial" programs that merely rehearsed the tasks of traditional schooling all over again. But if their needs are met, non-traditional students can do as well as anyone else (cf. I.2.1). Educational research points up the importance of tailoring the school to the learner (cf. Hunt, 1972; Gordon, 1979; I.2.21; II.2.32.4; V.2.8; VI.1.33ff; VI.2.26; VI.3.14), for example, allowing variable time for acquiring or performing a task (cf. Carroll, 1963; Bloom, 1974). Prior experience leads high-risk students to see achievement as a forced choice between total success vs. total failure (cf. Atkinson & Feather [Eds.], 1966; Holt, 1970). The SCOPE inquiry into student attitudes revealed that high-risk students typically have a need to expect success before they undertake a task (only a third of the conventional students felt this way). Erratic performance is natural in stressful areas, such as composition instruction. Still, I have found many non-traditional students bright, capable, and articulate, once they attain enough success to overcome their anxieties, inhibitions, and alienations (cf. Shaughnessy, 1977).

2.23.9 Blaming failure on "low abilities" among learners is more convenient than developing more effectual educational approaches (cf. I.2.1; I.3.2). Arguing from a simplistic model of "intelligence",[18] Arthur Jensen (1969, 1973) claimed Black children to be genetically inferior. The inability of other researchers to equalize performance with less culturally biased tests was taken as further support of this outrageous claim (Jensen, 1980). What Jensen's own fragmented, decontextualized "scientific" mentality prevents him from seeing is that high-pressure test-taking itself is a heavily acculturated middle-class activity (cf. Thorndike, 1968; Fishman, Deutsch, Kogan, North, & Whiteman, 1967; Roth, 1974; Marks, 1982). Tests "are unfair to culturally deprived children," who, "in comparison with their middle-class agemates, have fewer test-taking skills, are less responsive to speed pressure, are less highly motivated in taking tests, have less rapport with the examiner, and are less familiar with the specific vocabulary and tasks that make up the content of the tests" (Ausubel, 1967: 313). Even if content items are shifted toward Black culture, the testing situation retains its fundamental imbalance. Moreover, the whole notion of "intelligence" is so poorly understood at present (I.3.2ff) that it is irresponsible to use test scores to slam the door on disadvantaged children.[19]

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[18] Jensen's (1973) model of intelligence has two "levels," "I"and "II": ability and memory for associative learning (I) vs. for conceptual learning, reasoning, and problem-solving (II). Level I is claimed necessary for level II, but not vice-versa—an assertion not supported by the evidence (Horn, 1976; cf. Grover, 1981). Jensen's model neatly legitimizes the independence and primacy of behavioral-experimental psychology as over against cognitive psychology.

[19] Case histories show that people's lives and self-respect have been badly damaged by how they scored on the insensitive tests marketed by the Educational Testing Service, against whose judgements few students can effectively protest (cf. Nairn, 1980; I.3.5f). The "verbal" parts of those tests are, in my judgment, especially arbitrary and questionable (cf. I[20]).

2.23.10 "Compensatory education programs haven't worked well in the past." In early years, the value of these programs was not clear (cf. Blocker, Plummer, & Richardson, 1965; Roueche, 1968). Direct evaluation was still rare (cf. Kendrick & Thomas, 1970). According to occasional probes, only a third of the non-traditional students entering special programs at community colleges completed the two years of study (Ludwig & Gold, 1969; Snyder & Blocker, 1970). But this discouraging record is misleading. Colleges and their staff were ill-prepared:

> "Remediation efforts [. . .] consisted largely of watered-down versions of regular college courses. Each department in the college assumed responsibility for organizing and teaching the course, and in many instances instructors believed that the integrity of the department and the scholarly content of the discipline must be protected. Students, meanwhile, continued to fail and to resent even more the subject and the traditional manner in which the educational process was conducted. Instructors were assigned to remedial courses based on the pecking order of seniority and tenure in the department. (Roueche & Kirk, 1973: 11)

The upshot was a paradox. The least experienced faculty had to teach the most difficult courses without appropriate textbooks, syllabuses, or compensation in lower teaching loads and higher pay. There was no terminology for explaining to these students what their problems were and how writing is organized. Traditional grammar is not an effective aid in such settings (cf. V.2.1, 16, 27).

2.23.11 Under such conditions, compensatory education programs could hardly succeed. But when the programs are appropriately re-designed, clear benefits are attained, as Roueche and Kirk (1973: 82ff) have shown. Layout and materials must be genuinely *innovative;* simply repeating time-worn drills won't help (Mellon, 1981: 56; cf. I.2.22). *Non-punitive grading* alleviates the success-or-failure fixation mentioned in I.2.23.8. Coursework should be *self-paced* to accommodate individual differences (cf. I.2.23.8). Course materials must be *demonstrably relevant* to the skills being acquired (I.2.23.1). *Genuinely committed instructors* should be assigned on a voluntary basis. *Reliable counseling services* should be provided by the college. And, finally, *a smooth transition to regular coursework* should be provided later on.

2.23.12 "Soon, computers will take over all the writing from human beings anyway." This myth reveals one among many popular misunderstandings of the nature of computers. The present volume, for example, was written on a "word processor," in this case a micro-computer with a text-editing software package; yet in no sense did the computer do the writing. It simply offers capabilities for drafting, formatting, word-searching, cross-referencing, indexing, and printing that reduce the mechanical drudgery of writing and revising (cf. V.1.50). But the human still decides what to

say. Automatic text production programs so far write in a stilted, limited style below the versatility of high school writers. These programs function only as prototypes for research (e.g. Klein et al., 1973; Goldman, 1975; Wong, 1975; Meehan, 1976; Cohen, 1978; Davey, 1978; Mann & Moore, 1980). No one plans to market them widely. Besides, even if text production could be computerized, humans would make a grave mistake in abandoning writing as a mode of consolidating and developing knowledge (I.2.23.5) and of finding an individual voice (I.2.8.6).

2.24 These, then, are some obstinate myths about composition and its chances in the schools. The literacy crisis, whatever its origins and status may be, at least assures us that specious, convenient rationalizations of writing failure can no longer be accepted at face value. The proper recourse is rather to design realistic, workable models of the writing process, and from there, the coursework to guide that process for all learners, irrespective of their social and personal backgrounds.

3. EVALUATION AND GRADING

3.1 Widespread anxieties about literacy are closely related to the heavy pressure in American education to *quantify performance*— as if learning would instantly cease without constant checking and measuring (cf. I.3.27). Throughout schooling, children endure batteries of diagnostics and tests that put a numerical value on everything conceivable. Test results are popularly misunderstood to be not a diagnostic for guiding a child's evolution and expansion, but as a statement of the limits to which the child can aspire (I.3.4). The tests become self-fulfilling prophecies for an entire school career, and—when scores and grades are used in hiring—beyond into professional life. Graduation from high school or college now depends on "competency tests," especially in English (cf. Cooper, 1981b; Mellon, 1981; Myers, 1981; Odell, 1981). Frequently, such tests are devised by "educational theorists and researchers and curriculum specialists" who "slight or ignore the basic questions about competency testing in language, reading, writing, and media" (Cooper, 1981a: xiii). Hence, the tests reflect little awareness of current theories of cognition and communication (I.2.15; VI.3.2).

3.2 Standardized testing has gone far beyond specific classroom tasks to become a widely respected measure of general *intelligence* and *aptitude*. A century ago, Francis Galton (1883) (a cousin of Charles Darwin) asserted that intelligence is an inherited, i.e. genetically determined, ability. This view was accepted by Alfred Binet, who devised an IQ test still in use today in its "Stanford revision," and by a long succession of later psychologists (e.g. Spearman, 1904; Burt, 1940; Jensen, 1972). Marks (1982) maintains that the view survived because it was congenial to such ideologies as Darwin-

ian evolution and competitive commerce; but the view is still empirically unwarranted and theoretically confused. Even today, researchers have no secure consensus about the nature and constitution of intelligence (cf. the controversy in Sternberg & Detterman [Eds.], 1979). Some see it as a single general capacity, others as a set of more or less independent factors, and still others as the interaction of a general capacity with the sub-factors it supervises (survey in Das, Kirby, & Jarman, 1979; Sternberg, 1979). The "aptitudes" measured by the tests might well be chance products not based on any inherent personal merit or capacity, but rather on the conditions of the testing situation as such. The Federal Trade Commission found in a 1979 study that coaching schools for test-taking significantly improve one's scores. But surely these schools don't suddenly raise one's intelligence.

3.3 The psychological and social impact of the testing situation itself is precarious. Many tests deliberately pose tasks not found either in school or everyday life, as if abilities could exist in a vacuum, devoid of purpose and context (Cicourel, 1974). The tenet of experimental psychologists that "objective validity" is guaranteed when subjects don't know the point of a test makes sense only if we assume that abilities are wired into the brain, waiting to be detected when people are caught off guard. Success in real life seldom depends on performing novel and meaningless tasks. Standardized testing eradicates the crucial distinction between what is known and what can be accessed and performed on a single occasion (cf. Kintsch, 1977: 442; I.2.8.2). High-pressure performance under extreme time restrictions *overloads* processing and *degrades* performance (cf.III.1.17; III.3.3ff; V.1.15). On such testing, people may underperform at least as much as they could overperform if they had the chance to practice ahead of time. Hence, the tests "measure what people cannot do, rather than what they can do" (Shuy, 1981a: 169). Whether or not overload occurs is related less to one's *intelligence* than to one's *threshold of anxiety.* Many famous thinkers do not work well under high pressure, yet average children have to do so if they want to reap the benefits allotted on the basis of test scores.

3.4 Test-taking is a "social activity" (Roth, 1974) for which children are unequally prepared, regardless of their mental potential (I.2.23.9). Even if the scores did yield an accurate measure, they only gauge the status quo, not the child's capacity for development (Fishman et al., 1967: 163). Yet neither the uncertainty about intelligence nor the irrelevance of the tests has prevented the misuse of scores to judge children and to stereotype their abilities at a fixed level. The child's personal development is programmed to run a certain way, and, because the mind is influenced by the model it builds of itself, the child tends to conform to the level "predicted" by the tests. Standardized testing teaches the child to accept a mental profile obtained under unfavorable, uncontrollable conditions as a statement of immutable endowments, like the features of the face. If "unintelligent" children do something clever or remarkable, it must be an accident; "intelligent" children

doing exactly the same thing are revealing their "genetic" capacity. The reverse interpretation is placed on mistakes and failures.

3.5 The psychological and social repercussions of testing intelligence and aptitude came quite unexpectedly. Standardized testing was originally conceived to be profoundly democratic, allowing capable students of all social classes to demonstrate their potential on equal grounds. But instead, a new caste system arose, based on test-taking skills; and not surprisingly, the system tallied excellently with the old one based on social status and wealth (Burt, 1943; Nairn, 1980). A College Board Report on the SAT scores of 647,031 students tested in 1973-74 revealed that scores corresponded perfectly to parental income. Aptitude and intelligence seem to be about as hereditary and predictable as money. Moreover, surveys show that aptitude tests, such as those administered by the Educational Testing Service (ETS), are poor predictors of achievement. A careful investigation of some 827 validity studies conducted by the ETS between 1964 and 1974 showed that "ETS aptitude tests on the average predict grades only 8 to 15% better than random prediction with a pair of dice" (Nairn, 1980: 59f).[20] Grades in turn have been found to be poor predictors of scientific or technical creativity in a later career (Taylor, Smith, & Ghiselin, 1975).

3.6 Suppose now that intelligence is *qualitative,* not *quantitative,* i.e. to be *described with attributes,* not *measured in numbers.* Its key factor is the ability to treat any task by specifying high-powered procedures. As the child's intellect evolves, these procedures emerge from a steady increase in the elaboration, differentiation, and complexity of cognitive organization (cf. Piaget, 1976, 1977). Intelligence therefore depends on whether the continual re-organizing of cognition happens to create the procedures for a strategically designed processing system—a development which educational institutions can hardly support if they understand it only vaguely. Usually, the child is left alone to make sense out of massive course content in math, social studies, history, etc., with whatever cognitive resources and strategies happen to develop on their own. It is assumed that force-feeding a child with facts and figures ensures an optimal mind. At every step, tests are administered, not to see if the child is thinking, but to see if the facts and figures were absorbed. Tests of "IQ" and "aptitude" complete the picture by gauging a few effects of a cognitive evolution barely addressed in its own right by school instruction. Obviously, this "intelligence" is more a *by-product* than a *determiner* of the child's struggle to work in an environment of scrutiny and high pressure.

3.7 In some areas, competition and comparison can be irrelevant, even

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[20] Specifically, the SAT is, on the average, 11.9% accurate in predicting first-year college grades. According to the 1977 report for the Carnegie Council of Policy Studies in Higher Education, the accuracy of the LSAT is 13%, that of the GRE 11%, and that of the GMAT a mere 8% (Nairn, 1980: 60ff).

misleading. The abilities of two children might be simply different realizations of general human potential. The dimensions that make them comparable on a standard scale could be totally unrelated to their most important capacities. For example, creative achievement transcends the conditions in which it occurs, and succeeds precisely by setting its own standards (cf. I.2.23.7; Ghiselin, 1975). The insistence on standardized measures therefore necessarily bypasses creativity, and may even discourage it (cf. Getzels & Jackson, 1962).

3.8 In real life, a significant accomplishment normally emerges from a painstaking series of approximations that are technically wrong or unsatisfactory, but point the way to something better (Papert, 1980). An initial discontent with the current state of affairs triggers a search for an objective whose nature, at the outset, may be wholly unknown. Progress is riddled with miscalculations, backtrackings, revisions, and rejections until the objective gradually comes into view. Similarly, entry into a new, unfamiliar domain of more complex skills is necessarily marked by an increase in errors over the previous stage of limited, but well-rehearsed skills (I.2.17; I.3.2, 24; III.1.23, 28; V.2.15ff, 28; VI.3.13). However, conventional schooling sets its own rigid "learning objectives" above the child's creative discovery, and is intolerant toward the provisional errors such discovery entails. As errors are constantly corrected, suppressed, and punished, children decide to content themselves with the old, familiar skills and to forego the unrewarded and stressful passage to new skills or creative insights (I.3.27).

3.9 The assignment of grades in the classroom occurs in this larger context of testing and measuring. Here also, evaluation may rely on unrealistic, high-pressure situations where approximations are not tolerated and creativity is discouraged. Like test results, grades have the psychological role of interpretive frameworks that both teachers and learners apply to daily activities (I.3.4). The accumulating series of grades singles out numerous learners, perhaps permanently, as "average" or "below average," i.e. as "low-ability" persons to whom education typically offers little respect or resources (cf. I.2.23.8ff). The Darwinian "grade curve" aggravates matters by forcing superior ratings to be balanced out with inferior ones. Even the "C" grade for the large group in the middle, though designated "average," is widely considered stigmatizing (VI.3.5).

3.10 Grading is another manifestation of our society's conviction that competition should be the measure and goal of all things. This credo has brought great advancements in business and sports, yet is hard to apply to intellectual or creative faculties that transcend normal standards (I.3.7). In some areas, competition may level cognitive originality and individuality simply by failing to recognize and reward it; ratings are based on aspects that make each learner's achievements comparable to everybody else's. In sports, players do best within fixed rules and scoring techniques. Cognitive growth flourishes when a learner decides to break old habits of thinking and find new measures for new achievements.

3.11 Grading also shares with testing a predominantly *negative* outlook: responding not to the total achievement, but to the number of superficial errors that can be detected and counted. Usually, the mere quantity of errors, rather than the processing slips or overloads they reflect, decide what the grade should be. Yet studies of cognition show that errors are a normal, inevitable by-product of efficient processing (cf. Norman & Shallice, 1980; Norman, 1981; Neisser, 1982). The expectations and assumptions built into rapid, automatic actions are perforce wrong some of the time. Error quotas are marginally relevant as long as debugging skills are available (Papert, 1980). Thus, negative grading is a form of punishment for being human. Learning progresses much faster if grading reflects the students' accomplishment, not the number of mistakes. Achievement cannot be meaningfully defined or pursued as the mere absence of errors which, as I stressed already (I.3.8), are necessary by-products of significant advancements and new skills.

3.12 The problems of testing and grading are extremely acute in the composition class. Here, the artifact to be graded is a personal processing outcome whose real complexity is utterly belied by a grade on a scale with anywhere from five to thirteen slots (depending on whether the record office allows "plus and minus grades"). Teachers may append commentary, but students have become conditioned to notice and react to the grade itself. The personal nature of writing reinforces the psychological repercussions of red marks and bad grades, as if, once more, the individual learner were on trial (cf. I.2.12).

3.13 The composition teacher is again entrapped in a dilemma by popular attitudes (cf. I.2.18). Parents, school boards, administrators, and students clamor for the simplistic numerical measurements grades embody. Protests that literacy is not quantifiable in such a way go unheard in the scramble for the magical "grade point average" that stands at the threshold of high-paying professions. Understandably, composition teachers are forced to navigate within this narrow-minded outlook. By attending only to the *paper as an artifact,* and overlooking the *processes* that produced it, teachers have at least some evidence to justify their ratings. Teachers may be well aware that there is no such thing as an "A paper" or an "F paper" independently of the context of its production, and yet invoke this fiction as protection when called to account. Just as no text is *meaningful* apart from context, no text has *value* without context. Like the scientists depicted in I.1.3f, teachers have to supply the context in order to reach any evaluation at all. The only question is whether this context is expounded well enough that students can also supply it and judge by themselves the merits of their writing. In my view, this additional step is the most essential precondition to resolving disputes and uncertainties regarding literacy inside and outside the schools (VI.3.17).

3.14 All too often, grading was based on a counting up "errors"," i.e. violations of such "rules" as were surveyed in I.2.14ff. These error sums

were placed on a "curve," and the grades were assigned to yield the proportions which rendered the curve symmetrical. However, this method would be objective only if the notion of "right vs. wrong" were at all appropriate for the majority of events in text production. In reality, composition teachers are hard pressed even to agree on common mechanical errors (cf. I.2.11f, 16ff; I.3.17; V.2.30, 32, 39; VI.1.12). In Greenbaum and Taylor's (1981) study, teachers showed little consensus in recognizing and naming errors: the judgements of most teachers were in the minority on at least some examples, and over 35% of the labels given were inaccurate. Moreover, there was a tendency to find non-existent errors — especially strong, as Deaux (1981: 76) found in another project, among inexperienced instructors. Paper-correcting expends atypically heavy resources on scanning the "shallow" text levels (in the sense of III.1.13) for events that would be perfectly acceptable under more natural conditions. Greenbaum and Taylor (198l: 173) cite the "anxiety" of failing "to catch all the errors," intensified by "insecurity about grammar and usage" (cf. I.2.10). Hairston (1981) found an even greater diversity of attitudes about errors among professionals in business.

3.15 Consequently, most composition specialists concur that grading should not be determined by counting errors. They recognize that a negative, reactive orientation is not effectual in teaching (cf. Porter, 1962: 15; Zoellner, 1969: 280; Irmscher, 1979a: 148ff; Kinneavy, 1981: 67). Mechanical errors are still commonly marked, except in special programs (e.g. Staton, 1981), though many teachers assign no great importance to the markings (Applebee, 1981: 74). However, students apparently need some retraining before *they* cease to be still intensely preoccupied with the error as a signal of intellectual or moral breakdown. They focus at once on any visible marks, sometimes ignoring the larger issues of evaluating and revising prose.

3.16 According to Applebee's (1982: 372) survey, 58% of the teachers comment on *content organization*. But a "content" grade not based on mechanical errors is no simple issue. It may be partly a rating of the *ideology* inferred from the paper, i.e., the conceptual framework in which the process of "ideation" (in the sense of III.2.14) takes place. This ideology emerges from one's "belief system" (cf. III.3.15) about what is true and valuable in the world (that is, in one's model of the world, I.1.8). This standard is precarious when the students do not share the teacher's ideology and come to "the wrong conclusion" (Fishman et al., 1967: 161). Or, they may try to represent an ideology which is not theirs, but which they have come to know through long experience with teachers (cf. III.3.30). It is ominous that speech in behalf of views one doesn't believe in has a noticeably higher percentage of errors (Mehrabian, 1971); students may well underperform if obliged to write insincere essays.

3.17 The "content" grade may also reflect the writer's *conceptualiza-*

tion strategies, i.e., ways for organizing knowledge (cf. III.2.20ff; VI.2.27ff). These strategies figure prominently in recent rhetorically-based approaches to composition (e.g, Christensen, 1963; Winterowd, 1970; D'Angelo, 1979a), looking back to a rich tradition in argumentative rhetoric (cf. Perelman & Olbrechts-Tyteca, 1969; Corbett, 1971; Kinneavy, 1980). Teachers want good writing to respect "logical standards": induction, deduction, consistency, and procedures for drawing conclusions. Jane Harper Yarbrough found that teachers in high schools and at the University of Florida labeled content problems in selected passages from student writing as "faulty logic" more often than in any other terms. However, the label was used for passages whose problems bore little resemblance to each other. The teachers apparently treated "faulty logic" as a cover term for all manner of problems in reasoning.

3.18 Plainly, a "content grade" has merit only if based on clearly defined aspects. Yet "except for occasional brainstorming sessions reported by about a fifth of the teachers, there is no systematic attempt to provide students with strategies for recognizing what information might be relevant" (Applebee, 1982: 373; cf. VI.2.32). Rhetorical approaches could consider the use of *hierarchies:* co-ordination, subordination, addition, contrast, etc. (cf. Christensen, 1963, 1965; Pitkin, 1969, 1977; Grady, 1971; Winterowd, 1970a; D'Angelo, 1974; Nold & Davis, 1980; VI.2.22); or the performance of *discourse actions:* stating, restating, expanding, qualifying, conceding, evaluating, and so on (Larson, 1967). Logical approaches could consider the *accuracy of facts* —the aspect teachers prefer (Applebee, 1981: 74). However, stressing facts is inappropriate for some types of texts and situations, e.g the personal essay, the journal, or the creative story; and may be unduly colored by issues of ideology (I.3.16). Literacy shouldn't be uncritically equated with knowledgeability (cf. I.2.8.8).

3.19 That teachers mark an error or a problem, either in mechanics or content, is itself a socially significant action (cf. Kroll & Schafer, 1978; Bartholomae, 1980; Butler, 1980; Williams, 1981a). They must first *respond* to it as an error in their social role as a higher authority with legitimate and relevant expertise. They must also decide the consequences: grades, advisement, revision, etc. In an *authoritarian* setting, rules, errors, and punitive grading (cf. I.2.16) are emphasized at the expense of the students' insights or recourses. However, the complexity and variety of language usage renders such a stance precarious. English teachers are atypically inclined to respond to errors, whence their tendency to mark non-existent ones (I.3.14). Students are subjected to unnecessary, intimidating language intervention normally reserved for young children. This experience is unsettling for adolescents who feel stigmatized as childish. The tendency to be defensive and make excuses (I.2.12) is presumably a reflex to protect the students' emergent self-identity.

3.20 The authoritarian approach is also undercut by the lack of consen-

sus among authorities and evaluators about "rules" and grading standards (cf. I.2.16.4). Diederich, French, & Carleton (1961) had freshman papers rated on a scale from one to nine by teachers in composition and in social and natural sciences, plus writers, editors, lawyers, and business executives. The results fluctuated bewilderingly. 30% of the papers received every grade on the scale, and 100% received at least five different grades. The contention that no paper has value without context (I.3.13) was strongly confirmed.

3.21 Since the authoritarian approach is rationally untenable, the alternative must be a relationship of *negotiation* and *equality.* Here, the instructors' advisement and evaluation strives to represent a socially general response by expounding and reacting to the standards of professional writing. Fair grading systems can be established on imperatives like these:

3.21.1 Task-relevance: Consider the importance of instructional goals and the relative difficulty of their attainment.

3.21.2 Achievement: Gauge the effort expended and the results attained by each student.

3.21.3 Accessibility: Select and grade tasks the typical (not just the "talented") student can realistically be asked to encompass.

3.21.4 Transparency: Define all criteria such that the students as well as the teacher can apply them reliably.

3.21.5 Input-output: Reward only the skills that are being actively taught.

3.22 Traditionally, teachers have rated a paper by comparing it to: (a) an *idealized version;* (b) the *version they would have written;* (c) *prestigious texts* (e.g. literature, essays, science reports, etc.); or (d) *other student papers obtained on the same assignment*. These comparisons are oriented toward versions many students couldn't possibly write: this remoteness of the frames of reference violates the imperatives of accessibility and transparency. To demand that students have the cultural and social prerequisites for such comparisons violates the imperatives of achievement and input-output. To assume that all students expend the same effort for a given result violates the imperative of task-relevance. Like the marking of errors, such comparisons rate the paper for what it is *not* (cf. I.2.16.6), rather than taking it seriously as a stepping-stone to progress. A creative paper shouldn't be punished just because the unskilled writer doesn't reach the ideal. Moving to a higher plane of writing skills naturally leads to a temporary rise in the errors and problems until full control is attained (Bereiter, 1980: 76; Elbow, 1981: 100f; Keech, 1981: 59f; cf. I.3.8).

3.23 Fair grading should measure the individual student's progress at that particular stage of development (imperatives of task-relevance, achievement, and accessibility). Moving from incompetent to average means confronting a vastly more complex and unmanageable problem domain than moving from fairly good to very good. It seems unjust to rate the

former progress with a "C" and the latter with an "A"," solely because of an abstract quality difference in papers produced. Instead, we can base the grade on the *difference between samples produced at the start of the course vs. those produced at the end.* This policy requires techniques that use performance to infer processes and problems. The evidence obtained should not be treated as a judgement of the writer's *intelligence* or *abilities,* but only of his or her *current skill level.* A single strategy, e.g. relying on the habits of spontaneous speaking (cf. V.3.10ff), might produce diverse error types, whereas several strategies might produce just one error type, e.g. spelling mistakes (V.1.14ff, 40ff). Errors or problems so diagnosed should not just be counted up for a grade (I.3.14), but should be used to guide individual advisement and training modules (imperatives of accessibility and input-output). Only errors or problems that persist throughout the course despite explicit, workable training should count toward the final grade. Total failure wouldn't occur unless a student refused to participate (I.2.5; I.3.27).

3.24 Surely no grade can be fair if students have no realistic chance to control the situation. Therefore, students must learn to judge and revise their own work. They should expect errors and problems as natural side-effects of entering an unfamiliar domain of skills (I.3.8, 22). Practice in editing helps to break down the large task of writing into manageable sub-tasks (imperatives of accessibility, transparency, and input-output)—particularly useful for non-traditional students (I.2.21; VI.3.13f). Individualized instruction allows the flexibility to deal with the particular skills and problems of students from varied backgrounds. We can construct and update a personal profile for each learner, so that needed training is selected and placed in focus. In my experience, a modest, tolerant, and readable workbook is helpful for showing how to revise. Individualization also enables personal negotiation of topic (cf. III.2.13). A "pointless" topic invites a "meaningless paper" (Booth, 1975: 75), [21] since boredom reduces the total allotment of cognitive resources that writers are willing or able to make (cf. I.3.27; III.3.2.9). Motivating topics make the whole task easier and more fluent (cf. Graves, 1973; Keeney, 1975), and decrease the processing overload unskilled writers often encounter (cf. I.3.3). Though professional writers in real life may not be free to choose their own topic (Redish, 1981: 155), they are seldom asked, I think, to write on topics they have never studied or thought about.

3.25 Unskilled writers learn more from revising and reworking an unsuccessful paper than from throwing it aside with a feeling of incompetence and failure. By learning to edit, the students realize that errors need not be

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[21] Applebee's (1982: 374) national inquiry turned up "impossible topics" in English classes, such as this one for ninth-graders: "In a well-organized essay of 200-500 words, answer the question: how is Odysseus a model for youth of all times?"

stigmatizing or stressful. Real editing (rather than mere recopying) requires concrete editing tactics for specific problems. I can then indicate which problems a paper contains, but leave the students to detect and resolve them. This use of modules supports *selective focus:* bringing one sub-task into the center of attention, and setting others temporarily aside. Students work more confidently and effectively if they don't try to watch for too many things. In class, students use other people's samples in a handbook (Beaugrande, 1982a), so that no personal attacks are implied. (Even anonymous passages from the current class can elicit resentment.) Students are advised about their own work in an interview setting, where they are less conspicuous and hence less sensitive. I have found that untrained writers gain crucial self-confidence from the tangible success attained via revising, and lower their anxieties about writing. Presumably, these changes in outlook reduce the tendency to perform below one's knowledge and abilities (cf. I.2.8.2; I.2.10; I.3.3), and account for the observed disappearance of mechanical errors without remediation.

3.26 In-class quizzes consist of short passages to be revised. Ratings are given only for the factors currently in focus. Other problems or mistakes can be marked, but not rated. If a quiz involves several factors, students are advised to edit in successive stages. This training is continually transferred over to their own writing. I withhold definitive grades until the student decides that a version is the final product. Revision is encouraged as long as a paper indicates weaknesses that could justify a low grade. This method tries to live up to the grading imperatives advocated in I.3.21. The revision modules make it plain what goals are considered important and difficult (task-relevance). The use of personal profiles records individual progress during the course (achievement). Explicit revision tasks are readily understandable and manageable for the average untrained writer (accessibility and transparency). No prior assumptions are made other than that students are speakers of colloquial English. [22] Finally, the end result is a set of skills that were explicitly addressed and practised (input-output).

3.27 Many school settings are influenced by the facile assumption that students are naturally lazy (cf. I.2.23.1). Incessant tests and quizzes are rationalized on the grounds that students won't work unless you threaten and scrutinize them constantly. This myth is "a consequence of attempts to force an irrelevant curriculum on students" (Combs, 1979: 73ff):

> Seeing no meaning in what they were asked to learn, students were not motivated to learn [. . .] it took a lot of effort to work under such conditions [. . .] Teachers, on the other hand, confronted with unwilling learners, found it necessary to increase the pressure to *make* students learn [. . .] Kids will learn difficult things without the use of coercion if what must be learned

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[22] If the students are not native speakers of English, their problems are quite distinctive. To date, I have not pursued this matter very far (cf. Beaugrande, 1982g).

is (1) relevant to the present needs of the student, (2) paced to current status and capacity, and (3) interesting and rewarding to the learner.

Composition will be very hard if it is reduced to a stressful, frustrating confrontation with odd "rules" and "errors" (cf. I.2.17). The students who need the most help are the most endangered by any attempts to try out new words, phrasings, or styles. Students can be genuinely overloaded by writing tasks devoid of meaning and purpose, and will understandably try to escape them. My own experiences with "problem" learners has invariably been that they were not lazy or stupid, but alienated and unmotivated. If I gave them tasks of clear relevance, they performed perfectly well.

3.28 Admittedly, designing new, individualized instruction increases the load of the teacher as it reduces that of the learner (cf. V.2.27; VI.3.5) The additional work can be offset in several ways: (a) a drastic reduction in teacher-performed correction of papers in favor of student-performed editing; (b) strict and well-justified limits on the number of students an instructor supervises; (c) a shift away from writing many different papers toward revising until superior products emerge; and (d) a reduction in class meetings in exchange for interview time. Classes can be devoted to issues that concern the majority of students. So far, the approach has brought about encouraging improvement among the large middle group whose skills would conventionally be classified as "average" (with a hint of something gone wrong, cf. VI.3.5). Though entering the course in a mood of inadequacy, anxiety, and pessimism, they are surprised to find writing manageable after all. Their attitudinal and cognitive change is frequently impressive, particularly in comparison to students who either refuse to participate in the training, or who are proficient already and don't genuinely need such a course. These two groups are comparatively small in my classes.

3.29 Learning to write, and indeed any act of writing, is a process with no point of definitive completion (cf. III.1.26; VI.1.25; VI.3.28). In the same way, we cannot set a threshold where a composition coursework is indisputably finished, any more than a threshold where a paper is perfect for once and for all. High grades should reward significant progress, though a teacher's ultimate ideal may not have been reached (cf. I.3.21). The proper conclusion to instruction is the point where the students grasp the writing process well enough to direct their own future evolution. The best teacher is the one who becomes expendable because the students have taken over his or her role themselves.

4. TEXT AND DISCOURSE AS EVENTS

4.1 The previous sections addressed the context of a scientific inquiry into text production and writing. The objectivity, consistency, and generality to which science aspires are to be found in processes, not artifacts (I.1).

Such a science has a responsibility toward society: creating a corpus of knowledge about language to replace public attitudes detrimental to literacy education (I.2). This corpus in turn supports a justifiable and equitable methodology of evaluation and training (I.3). In this context, composition can profit little from a sheltered preserve of theory without practice (VI.3). We must rather account for the real human activities of producing and receiving texts in the social and psychological frameworks of normal life (I.1.15). Consequently, we must begin by establishing that texts and discourses are *events,* not static objects presupposed at the outset of the inquiry.

4.2 Language is a SYSTEM—an assembly of elements whose FUNCTIONS are their contributions to the workings of the whole. Language in use is a dynamic system moving from one STATE to another. The language system is composed of LEVELS: concurrent modes of organization for selecting and combining communicative elements (sounds, words, syntactic patterns, concepts, ideas, etc.) in the various phases of processing (cf. III.2.5-40). These levels operate as *sub-systems* whose *interaction* constitutes the action of the main system (III.2.3ff). *mapping* comprises the processes that correlate the elements and functions of one sub-system with those of another.

4.3 Linguistics studies language with the help of *taxonomies:* sorting schemes that list each element according to its identifying *features* (II.1.5). This approach works best if the system is compact and the features are plain; otherwise, headway is slow and schemes are periodically replaced. Taxonomies of the sound system in phonology have proven more durable than those for syntax, semantics, and pragmatics (II.1.6) —domains whose "features" are hard to define (III.1.16). The real events of language are not just abstract clusters of static features, but the outcome of human processing actions. We should not stress theoretical analysis to the exclusion of active synthesis (I.4.14).

4.4 Here, systems theory helps to situate language in the larger context of communication and cognition. Theories encompassing that context are properly *antecedent* to theories of language (cf.I.1.12). Linguistic syntax is a special case of *linear* processing: a mode of *behavior* and a mode of *intelligence* (cf. IV.1.4). Semantics is a special case of the processes of *conceptual* processing: creating, storing, recovering and utilizing meaningful knowledge (cf. III.2.20ff). Pragmatics is a special case of *goal-planning:* setting up an intended state of the world and implementing steps to attain it (cf. III.2.6ff). These definitions stress that language is one mode of processing among human actions at large (cf. II.2.32.1ff).

4.5 A system in use is being *actualized,* i.e. some of its options are being *activated* (taken from storage and implemented). Any resulting artifact is itself an *actual system,* as opposed to the *virtual system* of options awaiting use. Text production is one example of actualization, and the text

itself is one example of an actual system. Any further utilization of a text, such as reading, interpreting, quoting, etc., is also actualization and activation, though under new conditions affected by the original event of production, and by the surface text as artifact (if available)—an illustration of intertextuality (I.4.11.6; cf. II.2.22; III.1.1, 9). Actualization includes *selecting* options and *combining* them into STRUCTURES, where a "structure" is two or more elements with a relation obtaining between them (cf. II.1.1; IV.1.1). (Some authors prefer the term "structuration" over "actualization," e.g. Wienold, 1971). A structure treated by processing as a single unit can be termed a CHUNK, and may range from a LOCAL (small-scale) MICRO-STRUCTURE, over to a GLOBAL (large-scale) MACRO-STRUCTURE (cf. III.1.10). A chunked micro-structure constitutes a MICRO-STATE of the actual system, while a chunked macro-structure constitutes a MACRO-STATE.

4.6 The distinction between virtual and actual systems is crucial for realistic theories of cognition and communication, because the nature of any system is determined by the uses people make of it. Language items and configurations are INSTRUCTIONS about what to do during processing (cf. Weinrich, 1976). Alongside the resources of the system, users need PROCEDURES to access them, where "procedure" is defined as a configuration of steps carried out in order to obtain a result. For instance, the GRAMMAR of the language only defines itself when put to use (Lenneberg, 1975; I.4.10, 14; II.3.14; V.2.17, 27). The LEXICON is, in a virtual perspective, the repertory of words and expressions available in a language, and could be envisioned as an ordered listing like an everyday dictionary with an alphabetical format, plus implicit and explicit cross-references (implicit ones appearing when one word is defined with other words). The repertory can be further classified into CONTENT WORDS (nouns, verbs, adverbs, and adjectives) with a fairly stable conceptual content, and FUNCTION WORDS (prepositions, conjunctions, articles) whose contribution is largely to provide a framework for the content words (cf. Miller et al., 1958; Bolinger, 1975).[23] In an actual perspective, we must explore what procedures allow entries from the lexicon to be accessed, so that words can be learned, stored, recognized, and retrieved (cf. III.3.10ff; V.1.19, 28). Here, the meaning of a word is not a neat, stable definition, but the result of a cognitive operation. Knowing what a word means is thus having an ordered set of hypotheses about processing actions to perform on the word. The ordering of these hypotheses is strongly influenced by current context, not just by the sequence of definitions offered in a dictionary.

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[23] Even the classic dichotomy of content words vs. function words is fuzzy in some areas. For example, pronouns are usually (but not always) derivative upon noun phrases for their content, yet assume the same grammatical roles as the latter. I suggest a differentiation in terms of memory search grids in III.3.13.

4.7 These considerations have led to recent discussions on classifying knowledge into DECLARATIVE (i.e., statements) vs. PROCEDURAL (i.e., operations) (cf. Winograd, 1975; Bobrow & Winograd, 1977; Goldstein & Papert, 1977; Winston, 1977). However, it would hardly be economical for humans to maintain two separate stores. More likely, they maintain one unified knowledge store so richly organized and interconnected that it can be accessed and used both as substance and as actions. Knowing what something is relates closely to knowing how to do things with it.[24] One of these perspectives may dominate the other on a given occasion, depending on the exigencies of processing (cf. IV.2.33). Active processing MEDIATES between one's knowledge and the current situation (cf. I.1.7; I.4.11.5f; II.2.10, 20ff; III.3.2.10) and decides what is RELEVANT at that moment (cf. III.2.15, 20; III.3.14; VI.2.2f, 6f, 11, 32).

4.8 If communication does not consist of passing stable word-meanings back and forth, how do people know what they mean? The answer can only be that processing itself, far from being chaotic or random (I.1.3), must have a sufficiently well-structured, complex order to manage so many texts and communicative situations. This order guarantees that different people sharing a pervasive cultural consensus normally attain a comparable processing outcome from the text or situation at hand (cf. I.1.7). Processes are strategically organized to watch selectively for relevant indicators and to fit powerful procedures to current specifications (cf. Bobrow & Winograd, 1977). These procedures could be either ROUTINES (habitual actions for everyday contexts) or SPECIALISTS (actions that are triggered only when specific conditions are met) (cf. III.1.14, 27; Winograd, 1972; Minsky, 1979). A skilled text producer can activate a "logic specialist" that checks for consistency (II.3.3); a "scheduling specialist" that monitors the order in which things are done (III.1.23; III.3.4.9); a "style specialist" that controls word selections (cf. III.2.11, VI.1.6); and so on. The specialists would remain inactive until context requires them. In absence of special circumstances, processing can apply a DEFAULT (an item or operation selected unless it is ruled out) or a PREFERENCE (a choice normally made over others). Defaults and preferences can be *overridden* as seems expedient. People understand each other to the extent that their processing is relatively uniform in its preconditions and consequences.

4.9 The TEXT can be defined as a naturally occurring manifestation of language, i.e. as a communicative language event in a context. The SURFACE TEXT is the set of expressions actually used; these expressions make some knowledge EXPLICIT, while other knowledge remains IMPLICIT, though still applied during processing. A DISCOURSE is a set of texts considered to be mutually relevant. The totality that bears on a discourse can be

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[24] Compare Ryle's (1949) "knowing how" vs. "knowing that"; and Shiffrin and Schneider's (1977) "actional" vs. "informational" knowledge.

called the UNIVERSE OF DISCOURSE. The text and the discourse are by nature SYSTEMIC, i.e. work as a system (I.4.5). As a text is produced or received, the system is actualized and traverses a series of STATES. Under the conditions outlined in I.4.6-8, the organization of any state depends partly on the virtual repertory of elements and options, and partly on the current conditions. In terms of cybernetics, the system regulates itself as its states succeed one another, either by "assimilating" an event into the system, or by "accommodating" the system itself (cf. Piaget, 1977). Any marked change elicits a compensatory change somewhere else in the system. Thus, special demands of context can be met with a suitable adjustment. For example, a word used in an idiosyncratic way, e.g. 'sisters' in Shakespeare's line

(1) Her art sisters the natural roses *(Pericles,* V, i, 7)

is understood according to its setting. Participants in communication construct and test *hypotheses* based upon their *expectations* about what normally happens. In effect, people constantly *build models* of what is going on (I.1.14), and fit in whatever evidence they can gather. The models are only *approximations* (I.1.10), but they enable communication to proceed without having to spell out every bit of context.

4.10 Modern linguistics has been most concerned with virtual systems (II.1.2). For instance, the abstract "grammars" of the 1960's can be viewed as statements of the syntactic expectations shared by the speakers of a language. Such a grammar could be consulted to decide if a sentence is "grammatical" (II.3.5, 14). However, such judgements are abstract in the sense that people (a) are most certain of their grammar when they actively use it; (b) need not agree about the ultimate borders of the grammar; and (c) given proper motivations (social roles, cognitive overload, inattention, stress, etc.), can produce sentences they or others would not consider grammatical. Since the text is defined as a real event, its "grammaticality" affects its status less than do the standards based on its relevance to the communicative situation. EFFICIENCY is the utilization of a text (by producer or receiver) with the least outlay of effort (I.2.8.3). EFFECTIVENESS is the degree to which the text has an impact on the situation and so forwards one's chances of reaching one's goals (I.2.8.4). APPROPRIATENESS is the degree to which one's choices fit the current setting. These standards may fluctuate together or independently. Effectiveness might call for strange, attention-getting devices that arouse interest, but decrease efficiency. The text producer should strive for the level of difficulty appropriate to the audience.

4.11 The notion of TEXTUALITY serves better than "grammaticality" as the criterion that distinguishes between a text and a non-text. Textuality can be defined according to at least seven standards (cf. Beaugrande, 1980a; Beaugrande & Dressler, 1981; and references there):

4.11.1 COHESION subsumes the procedures whereby the SURFACE TEXT is organized as a sequentially related configuration of language items. Cohesion rests upon syntactic formatting (reconstructable via "linguistic rules") and upon such procedures as *recurrence* (re-use of the same expressions); *paraphrase* (presenting the same content in different expressions); *parallelism* (filling the same surface patterns with different items); *pro-forms* (place-holders such as pronouns); *ellipsis* (an incomplete pattern whose omitted items are readily supplied from the setting); and *junction* (connecting words to link sequences) (cf. IV.2.37-44, 51f).

4.11.2 COHERENCE subsumes the procedures whereby a configuration of concepts is assembled into a TEXTUAL WORLD: the total knowledge activated while processing the text. A CONCEPT is a configuration of knowledge characteristically stored and activated together. PRIMARY CONCEPTS are the most basic to the organization of meaning (actions, events, objects, and situations); and SECONDARY CONCEPTS serve to differentiate and delimit the primary ones (time, location, cause, reason, instrument, and so on).[25] The PROPOSITION can be defined as two concepts plus a relation obtaining between them (i.e., a conceptual structure); the RELATION determines how the concepts are mutually relevant, e.g. that one "event" is the "cause of" another "event." Several propositions become a conceptual CHUNK when they are combined and processed as a single unit (I.4.5). REFERENCE is the relationship of a concept or chunk to a real or imaginable entity in one's model of the world (cf. II.2.16; III.2.22). In principle, reference is an aspect of the whole text-world model, not of single words. This model includes commonsense world-knowledge not made EXPLICIT in the text, but contributed by various processes: SPREADING ACTIVATION, where an activated concept spreads its status to whatever is closely related in memory storage; INFERENCING that builds bridges among explicitly activated concepts (e.g. reasoning about causality); and by UPDATING that changes what is true in the textual world as knowledge is presented. These processes are supported by preorganized patterns of world-knowledge in memory: a FRAME is an *array* of knowledge (e.g., what one knows about houses); a SCHEMA is a *progression* (e.g., what happens if you build a house or walk though it from room to room). All these patterns and processes make it clear that coherence must not be confused with cohesion.[26] The textual world contains more than the surface text, and is not held together in the same ways. Cohesion

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[25] An empirical typology of concepts or propositions has only begun to emerge from research (cf. C. Frederiksen, 1975, 1977; Beaugrande, 1980a). Any typology is likely to have drawbacks because concepts are constituted in context, not simply drawn from an immutable list (cf. III.3.14).

[26] Some researchers conflate cohesion with coherence, perhaps because predicate logic obscures the distinction (cf. critique in Morgan & Sellner, 1980). For example, Halliday and Hasan's (1976) "lexical cohesion" is a misleading term to the extent that "cohesion" is in the text, not in the "lexicon."

presupposes coherence (Morgan & Sellner, 1980). Discourse may be cohesive, but not fully coherent (2), or coherent, but not fully cohesive (3):

(2) The slithy toves did gyre and gimble in the wabe. (Lewis Carroll)
(3) As far as I know / no one yet has done the / in a way obvious now and interesting problem of // doing a / in a sense a structural frequency study of the alternative // syntactical / uh / in a given language / say / like English / the alternative/ / uh / possible structures (Charles E. Osgood)[27]

Some mental disorders (aphasia, schizophrenia, etc.) may impair cohesion but not coherence, or vice-versa (cf. Gosnave, 1977; Rochester, Thurston, & Rupp, 1977; Luria, 1979).

4.11.3 INTENTIONALITY subsumes the text producer's attitude that the presented configuration is to be regarded as a cohesive and coherent entity, RELEVANT to (i.e. affecting the chances of) the PLANS and GOALS of the producer. A PLAN is a set of steps intended to lead to a goal; a GOAL is a state of the world whose attainment is envisioned (and usually desired) by the planning agent (III.2.6ff). These notions are central to the domain of "pragmatics" (I.4.4).

4.11.4 ACCEPTABILITY is the text receiver's attitude to treat the presented configuration as a cohesive and coherent entity, relevant to the receiver's plans and goals. Both intentionality and acceptability have THRESHOLDS OF TOLERANCE that apply when the standards of cohesion or coherence are not fully maintained, as in (2) and (3). Plans and goals make a text useable and understandable, even if it would seem disordered or meaningless in isolation. Relevance determines what possible meanings deserve consideration (I.4.6; III.2.33).

4.11.5 SITUATIONALITY subsumes all the ways in which a text is relevant to (affects the evolution of) a real or recoverable situation. Within the situation, a spoken text constitutes an UTTERANCE ACTION, and a written text an INSCRIPTION ACTION, where ACTION is defined as an event enacted by an agent to change a situation.[28] One's reaction to a situation is normally MEDIATED by one's model of what's going on (I.1.7). MONITORING occurs when the text serves mainly to give an account of the situation; MANAGING occurs when the text serves mainly to guide the evolution of the situation toward one's goals.

4.11.6 INTERTEXTUALITY subsumes the ways in which the text presupposes knowledge of other texts. When the text is remote from others in time or topic, this factor is also substantially MEDIATED. For example, a

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[27] Osgood (1963: 739) identifies this speech as his own. I translate his notation into mine as best I can; "/" marks a short pause, and "//" a long one. See IV.2.14-34 for a discussion of pauses in text production.

[28] Some philosophers and logicians stipulate that there must be an *intention* for every action (cf. papers in Rescher [Ed.], 1967). However, a certain margin of discrepancy between intention and action (cf. I.2.8.2; III.3.2.5) doesn't disqualify many everyday discourse actions. The logically clear notion of "intention" is operationally very complex.

dialogue is usually less mediated than a scholarly citation. Whenever the PRESENTER of a text is not identical with the PRODUCER, e.g., when a passage is quoted or a stage play is performed, or the AUDIENCE is not identical with the ADDRESSEE, e.g., when a personal message is intended for later publication, the current text can be mediated via the situation of its original occurrence.

4.11.7 INFORMATIVITY is the extent to which text events are uncertain, new, or surprising. In cybernetic terminology, informationality is the degree to which an event disturbs the STABILITY of a textual system and requires REGULATION (I.4.9). Informativity can be operationally subdivided into FAMILIARITY: the extent to which some item or operation has been encountered by the processor; and INFORMATIONALITY: the extent to which any part of a text is unpredictable in view of the rest (III.3.2.8f).[29] An INFORMING ACTION presents predominantly new knowledge, whereas an INVOKING ACTION presents predominantly familiar or given knowledge (III.2.10).

4.12 Cohesion has been the principal concern of *text linguistics* (for survey and sources, see Beaugrande & Dressler, 1981; Beaugrande, 1983). Cohesion is the most obviously "linguistic" (language-centered) aspect of textuality. However, the text is not *language alone:* it is defined as a communicative manifestation in a social and psychological context. Researchers who claim to study language by itself (I.1.3; II.1.6f, 14; II.3.7) are in fact supplying the context themselves. Any statements about language in the abstract are ultimately derived from experiences with texts and discourses. Consequently, an interdisciplinary forum is now emerging for an encompassing exploration of texts in human interaction, as illustrated by new journals, e.g.. *Discourse Processes* (Ablex) and *Text* (Mouton). The other aspects of textuality besides cohesion are being increasingly emphasized by research from cognitive psychology, ethnomethodology, sociology, anthropology, neuroscience, artificial intelligence, philosophy, semiotics, and cybernetics. The unification of these disciplines gives rise to *cognitive science,* represented by the journal of that name (also published by Ablex) (and cf. Norman [Ed.], 1981).

4.13 A fundamental step is to distinguish between an OPERATIONAL approach and a LOGICAL one (cf. II.3.5; III.1.2.8; III.1.8f, 30; III.2.14, 31,40; III.3.13; IV.1.5; IV.2.53ff, 66ff; V.3.25; VI.3.19). The former encourages us to cut the pie in different ways from the latter. In the traditional philosophical or logical perspective, the investigator's own reasoning (classifying, categorizing, asserting) was the primary mode of discovery. For example, language was cut up into the levels of sounds, forms, and meanings, and each level had its own taxonomy (I.4.3). Theories were advanced and

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[29] I had not drawn this distinction (Beaugrande, 1980a) until I recognized its importance for theories of learning and performance (cf. Beaugrande, 1982b; 1982i).

judged on their logical appeal (completeness, consistency, elegance, etc.). In the empirical or operational perspective, on the other hand, discovery hinges upon seeing how something works and building a model of that. Theories are advanced and judged on their ability to account for real events. For example, the levels of language must now be shown to have a real and distinctive identity in communicative and cognitive processing (III.2.32-40); and a taxonomy of sounds, words, phrases, sentences, or concepts should follow the differentiations humans make when using language. (For instance, whether "modifier" is one operational category or is subdivided into "adjective," "adverb," "participial," "prepositional phrase," etc., depends on whether and when people make the distinction.) Operational models are harder to design, but create better conditions for rational adjudication and cumulative progress.

4.14 What a language entity is—a text, paragraph, statement, sentence, or whatever — is thus defined not by abstract "features" or "markers," but by what people *intend* it to be. For the native speaker, the grammar of a language is a set of procedures for using the language, not a theoretical classification of words and patterns (V.2.17, 27). The *synthesis* of grammatical formats is always presupposed before any linguistic *analysis* can be undertaken (cf. I.4.3); and these two perspectives might have quite different priorities. An element is classified not by what it *is* in the linguist's scheme, but by what it *does,* i.e. by its *function* in the language user's processing. A single element may have several functions, and a single function may be assigned to several elements. For example, the "linearization" of a text is not the concern of an autonomous level of syntax; it reflects both phrase formats and the requirements of other levels: goal-planning ideation, conceptual development, and sound/letter linearization (cf. IV.2; VI.2). The fact that words are in linear order must now be explained in terms of human intentions and actions that put them in order.

4.15 The strict *logical distinctions* of older theories (cf. II.3.4) often prove to be *operational gradations.* Depending on context, one aspect or classification may *dominate* others without by any means *excluding* them (III.1.17, 24, 29; III.2.5, 10). Operations adapt to their contexts of use, and may redefine language elements by repeating, intensifying, or innovating. Such cases usually encounter a TRADE-OFF: if the gradation reaches an extreme, its categories or results revert to the opposite extreme. For example, making a text very rewarding to read means making it very hard to write (III.3.16, 42; IV.2.67; VI.1.25; VI.2.37). A balance must be maintained between undue extremes on such gradations as: fast vs. slow, precise vs. fuzzy, certain vs. uncertain, general vs. specific, explicit vs. implicit, elaborate vs. plain, changing vs. repetitive, new vs. given or expected, innovative vs. commonplace, large chunks vs. small ones, and so on (cf. III.1.15; III.2.25; III.3.4.1-10; IV.2.38, 43; IV.3.23, 28; VI.1.34; VI.2.2). What is or can be done at any moment depends on what else is going on and how much resources are available (III.3.2ff). Psychologists distinguish a

curvilinear function (a rising, then falling slope) from a *linear* one (a continually rising slope) and an *asymptotic* one (a rising slope that levels out and stays constant) (cf. Fiske & Maddi, [Eds.], 1961; Estes, 1964). Thus, operations are always subject to the conditions obtaining in the contexts where they occur. For instance, whether you want to repeat or restate something depends on how unfamiliar or complex your materials will seem to the audience: you must navigate between the extremes of confusion vs. boredom.

4.16 Unlike a logical category, an operation may be *degraded* or may *fail* on a particular occasion. A PROBLEM can be defined as a sequence of system states whose passage from the initial state to the goal state might not succeed (cf. Newell & Simon, 1972; Winston, 1977). The *problem space* is the set of all relevant states that may be traversed. As the probability of failure rises from low to high, the problem goes from *trivial* to *serious* (III.1.17). Since the production and reception of texts demands the assembling of systemic options into configurations (I.4.5), these processes qualify as PROBLEM-SOLVING (Beaugrande, 1980a). Depending on context, the seriousness of the problem posed by any operation may call for varying quantities of resources. Detailed research could show how hard text processing is under given conditions, and what sorts of breakdowns or errors are likely to result (cf. III.1.17-20; III.3.1-4). Such inquiries would be an important complement for the less formal view of text production as problem-solving (cf. Rohman, 1965; Young, 1968; Berthoff, 1971, 1972; Larson, 1972; Odell, 1973; Lundsteen, 1976; Coe & Gutierrez, 198l; Flower, 1981).

4.17 Though the transition from logical to operational language research is far from completed, some implications will be pursued in the following chapters. A theory of text production should be specified within theories of cognitive processing and human interaction. Issues such as resources, memory storage and search, scheduling, motor actions, feedback, attention, motivation, and many more, deserve consideration. The present volume is intended to consolidate some findings and proposals into a research program. To obviate the many disclaimers I should make later on, I want to stress now that the theory, research, and practice presented here (especially my own contributions) should be considered provisional. Many empirical results were drawn from pilot studies. Much recent work is necessarily exploratory, not assertive; approximative, not formal; qualitative, not quantitative; and probabilistic, not law-like. I have sometimes gone beyond the intentions of the original researchers in drawing implications or suggestions from their work. However, I hope that future data-gathering will be done within a continuing discussion of the design of theories and models in evolution. Because of its key role in the whole enterprise, *teaching qualifies as research*. Theories must never lose sight of the pressing need to promote and guide literacy as a social and educational concern. Though I cannot claim to offer up the "right answers" about text production and composition, I would be content if I can help out toward asking the right questions.

II

Scientific Precursors

1. STRUCTURALISM AND LINGUISTICS

1.1 Many diverse trends have carried the label "structuralism," sometimes against their will. Different structuralist approaches shared some consistent, stable tendencies, yet often disagreed violently about the nature of their enterprise. Their investigations of language or language-related domains were dominated by the search for WELL-STRUCTUREDNESS—a common ambition of scientists (I.1.3). If a "structure" is two or more elements with a relation obtaining between them (I.4.5), structuralism is the exploration of formal units and their patterns. In some domains, the nature of those units and patterns, and the methods for uncovering them, appear comparatively straightforward. But language offers considerable latitude for controversy.

1.2 Ferdinand de Saussure's pioneering "course in general linguistics"[1] (1916) proved enormously influential and conformed to the conventional ambitions of scientists depicted in I.1. Because it was published by his pupils after his death, the basic tenets of his theory remained open to differing interpretations (cf. Wells, 1947a; Godel, 1966). Saussure defined what he called "langue" "as a purely relational structure, as a pattern, as opposed to the usage [. . .] in which this pattern is accidentally manifested" (Hjelmslev, 1947: 73); the "usage" was termed "parole." In effect, Saussure was selecting the *virtual system* over its *actualizations* (I.4.5) and inaugurating an abstraction that became a fundamental methodological step for most schools of modern linguistics. Saussure also proposed several further abstractions:

1.2.1 Language should be studied as *synchronic* system: a configuration of elements captured at a single point in time; the *diachronic* perspec-

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[1] I translate into English any quotations that require it.

tive of the system evolving and changing in historical time was relegated to a separate field (termed "philology" or "historical linguistics").[2]

1.2.2 Language was to be considered a system of *signs,* i.e., perceivable traces with a conventional meaning and purpose. Each sign would arbitrarily relate an "acoustic image," later called a "signifier," to a "concept," later called a "signified." Saussure (1916: 98ff) hoped this approach would supplant the popular view (going back at least to the account in the Book of Genesis) that a language item is a "name" for a "real thing" in the world. However, as Helbig (1974: 39f) remarks, Saussure himself fell back into this view by proving the arbitrariness of sound-meaning relations on the grounds that the same real object has different names in different languages (cf. Gardiner, 1932: 29ff; Benveniste, 1939: 24). The alternative would have been to recognize that meaning is constituted during usage (Schmidt, 1969; cf. I.4.6f; III.2.26); and Saussure had already excluded usage from linguistic inquiry (II.1.2).

1.2.3 As a system, language was to be described via the notion of *opposition:* each sign or element would be defined by how it differs from all others signs. To be sure, exact recordings and measurements reveal that every utterance is physically different from all others, even when the same person repeats the same words. However, linguistics should be concerned with only those differences that are SYSTEMIC, i.e., essential to the definition of the system. (For example, Arabic has two /k/ sounds, one pronounced in the back of the throat and one in the front, whereas English treats both as the same sound: the difference is systemic in Arabic, but not in English.) Systemic differences rest upon *distinctive features.* (For the Arabic example, the two /k/ sounds differ in the distinctive features of "back" vs. "front", yet share other features, e.g., the "stop" of the air flow.) The sounds of a language form a system based on these opposed features (II.1.5).

1.3 These abstractions—synchronic systems of signs defined by mutual oppositions and distinctive features—became the cornerstone of structuralist approaches, both inside and outside linguistics. Such abstractions lend considerable importance to the reconstructive actions of the investigator: not just to uncover units and features, but to decide what constitutes a feature and which features should be postulated. Martinet (1962: 59) surmised that the structures were "nothing but a frame *invented* by the linguist in order to help him classify the data. In other words, a structuralist is not one who *discovers* structures, but one who *makes* them" (emphasis added). As Hartmann (1963a, 1963b, 1964) has emphatically demonstrated, signs and sign patterns have reality only as actual occurrences. To have an abstract system, the speakers of a language (including a linguistic investigator)

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[2] "Philology" usually denotes language inquiry (e.g. Delbrück, 1904) as developed before the rise of modern linguistics. "Historical linguistics" is usually the extension of the latter's methods to language history.

must first synthesize real experiences and invent their underlying principles (I.4.12). This factor was overlooked in a "science" whose "empiricism" "suppresses the constructive role of operations"; yet "in 'operating' on the objects, the subject alone, by his action, elaborates structures" (Piaget, 1976: 132). The "objectivity" of the human sciences is the result, rather than the exclusion, of cognitive (subjective) activities among the scientists themselves. Cognition is controlled by one's prior model of the world (I.1.8).

1.4 It is fair to say that the central enterprise of modern linguistics has consisted of *assigning to language theoretical substrates of structure* (Beaugrande, 1982d, 1983a). This trend brought a steady increase in the theoretical well-structuredess of language and thus rendered it a more convincing object of scientific investigation (cf. I.1.3). However, the scientific climate led many structuralists to act as if the structures were *situated in the object of inquiry.* As long as the human processes of discovering and utilizing structures were carried out without acknowledgement by the structuralists themselves (cf. I.1.3), the most interesting aspect of the enterprise remained hidden from view. As structuralism moved toward more complex domains of language, unity and consensus steadily diminished, because the investigators had to supply more diffuse, elaborate contexts.

1.5 The history of structural linguistics supports this contention. The most successful project was *phonology,* the study of sound systems. The positions of the vocal organs during the production of language sounds were used for classifying the sound system into units called *phonemes:* the smallest sound units capable of determining meaning. Phonemes were "systemized" according to whether the vocal cords vibrate and how the tongue, lips, teeth, gums, palate, etc. participate. The catalog of "distinctive features" included "voiced," "unvoiced," "dental," "palatal," "glottal," and so on (cf. Trubetzkoy, 1939). Jakobson, Fant, and Halle (1952) reaffirmed Saussure's outlook (II.1.2.3) by situating all features in *binary* oppositions such as "+/− voiced," "+/− dental," etc. The binary opposition became a further hallmark of structuralism,[3] and obscured the recognition of gradations (cf. I.4.15).

1.6 Phonology proved to be the most enduring success of structuralist linguistics precisely because its categories are closely allied to observable sound events. The problem of discovering structures vs. creating them was not acute as long as researchers agreed on units and features—easy enough in regard to sounds. This success brought enough credibility to structuralism that researchers widely accepted and applied its basic assumptions; later structuralist explorations of language attempted to generalize the principles

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[3] The binary opposition is vacuous unless both sides are relevant alternatives. Otherwise, we could put "+/-" in front of anything because its presence is trivially the opposite of its absence (cf. Werth, 1976). Linguists tended to use the "+/-" symbol as a trademark for making vague concepts look "scientific."

that had worked for phononogy (Pike, 1967: 95; Koch, 1973-74: xvi; Quirk, 1976: v). Yet the correspondence between sound systems and the "deeper levels"[4] of language, such as meaning and purpose, is far from obvious. The processing actions that investigators had to perform in order to discover structures were much more complex than what was needed for sound events (II.1.4). By asserting arbitrary ties between meanings and words, structuralism precluded a study of meaning in terms of conceptual events (II.1.2.2). They failed to appreciate the difference between the *total* units and features that analysis can abstract vs. the *relevant* features which are actually consulted and utilized in language processing. The latter are most essential for theories of communication and cognition, even in phonology (Beaugrande, 1978b).

1.7 The structuralist offshoot known as "Russian Formalism" can illustrate my point. Around 1916, a circle of Russian scholars, including at various time Roman Jakobson, Lev Jakubinskij, Viktor Šklovskij, Boris Eichenbaum, Boris Tomaševskij, Viktor Vinogradov, Jurij Tynjanov, and Vladimir Propp, merged into a "society for the study of poetic language." These "Formalists," as they soon came to be known (cf. Eichenbaum, 1965 [1927]),[5] analyzed units and features in such literary text types as poems, short stories, folktales, and novels. Literature was defined by its additional "structuration" (cf. I.4.5) — most obvious in poetry — that "de-automatizes" language processing and hence intensifies and diversifies literary communication (cf. VI.1.1f, 7). Jakobson's detailed analyses (e.g. Jakobson & Lévi-Strauss, 1962; Jakobson & Jones, 1970) "surprise the examiner himself by unexpected, striking symmetries and asymmetries, balanced structures, efficient accumulation of equivalent forms and salient contrasts" (Jabobson, 1968: 602f). However, it is hard to tell how many of these structures are relevant to, or experienced in, the act of producing or receiving the poem, and how many are derived from the language system as such (cf. discussions in Posner, 1971; Lotman, 1976; Werth, 1976; Beaugrande, 1978c, 1978d; Dillon, 1978; Koch, 1978). We need to know how representative the refined methods of the Formalists in finding structures might be for literary communication at large. Some literary scholars have at least expressed a self-awareness of their own role as processors (e.g. Riffaterre, 1966; Fish, 1970, 1976, 1980; Iser, 1980). Ultimately, only general empirical studies among authors and audiences can uncover how people make structures (cf. Wienold, 1972; Groeben, 1980; Schmidt, 1982). The same demand holds for ordinary communication as much as for literature.

1.8 Soon after the Formalists went to work, a "Linguistic Circle" assembled in Prague to investigate language. At the First International Con-

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[4] On the notion of "depth," see III.1.13f; III.2.5f.

[5] I place in square brackets original reference dates that bear on the discussion. The Formalists wrote mostly in Russian, so that their impact on Western methods was long delayed until translations were made (e.g. Todorov [Ed.], 1965; Matejka & Pomorska [Eds.], 1971).

gress of Slavists in 1929, the structuralist approach was affirmed (1929 report cited in Jakobson, 1973: llf):

> Were we to comprise the leading idea of present-day science in its most various manifestations, we could hardly find a more appropriate designation than *structuralism*. Any set of phenomena examined by contemporary science is treated not as a mechanical agglomeration but as a structural whole, and the basic task is to reveal the inner, whether static or developmental, laws of this system. [. . .] Therefore, immanent structural considerations of language were predestined to take a prominent place in the debates of the Congress.

The Prague School, dating from 1926, developed a variant of structuralism that sought to relate structures to their functions (cf. surveys in Mathesius, 1947; Trnka, 1957; Garvin [Ed.], 1964). However, an operational definition of "functions" requires a greater consensus about the nature of the system and its elements than the Saussurian abstractions allowed. Research was mostly limited to phonology and word order (survey in Firbas & Golková, 1976; cf. IV.2.63).

1.9 A rival school, convening in Copenhagen in 1933, preferred the designation "glossematics" (cf. Hjelmslev, 1943, 1953; Siertsema, 1955; Uldall, 1957). The Danish scholars claimed to follow Saussure's theories most faithfully.[6] They introduced a still greater abstraction by electing to study only "form" and to disregard "substance" (whereas phonology was allied to substantive sound events). Language was seen as a system composed entirely of abstract relationships ("functives") among elements ("terminals") that could be either "constants" or "variables" (cf. Uldall, 1957: 9f). This austerity made glossematics the most radical version of structuralism and placed extraordinary demands on the linguist's powers of structural analysis. Not surprisingly, glossematics offered few attempts to describe real languages (e.g. Togeby, 195l). Nonetheless, the glossematists Hjelmslev (1943) and Uldall (1957) recognized that the *text* is systemic (cf. Gülich & Raible, 1977: 92ff; I.4.5).

1.10 In the United States, structuralism came under the dominance of physicalism in science (see II.2.25). American research, far from working through difficult philosophical abstractions, sought language in observable events in order to describe it in "physical terms" (Bloomfield, 1936; II.2.1ff). Again, the dilemma arose of knowing what "observable events" mean in communication. Though once a pupil of Sapir's (1921) "mentalist" approach, Bloomfield (1933: 162f) averred that linguistics must "always start from the form and not from the meaning," because "meanings cannot be defined in terms of our science." Meaning resulted from the "speaker's

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[6] A letter to Hjelmslev is extant from Charles Bally, Saussure's successor in Geneva, certifying that the Copenhagen school had indeed most fully understood Saussure's injunction to study "language in and of itself" (cf. Helbig, 1974: 62). Like Formalism, Glossematics suffered from a language barrier—Hjelmslev's fundamental book was in Danish.

situation" and the "hearer's response"; hence, "a scientifically accurate definition of meaning for every form in a language" would require "a scientifically accurate knowledge of everything in a speaker's world" (1933: 139; cf. IV.2.65). So Bloomfield (1933: 77) elected to use only "differential meaning"—a tenet fully in line with the structuralist notion of opposition (II.1.2.3). The investigator would proceed by asking "informants" (naive native speakers) whether or not two linguistic forms mean the same thing. Bloomfield's successors (e.g. Bloch, 1948; Harris, 1951; Fries, 1954; even Chomsky, 1957) felt that if meaning could not be *exactly defined,* then it should not even be *consulted* in the study of language. Harris (1951: 3) proposed instead to found linguistic inquiry wholly on "the distribution or arrangement within the flow of speech of some parts or features relative to each other." Meaning was to be used only as a "short-cut," under the condition that a purely formal analysis of distributions would eventually arrive at the same results.

1.11 This reduction of language to physical events and formal patterns could not be upheld in practice. Bloomfield's followers "bypassed the the mention of meaning without bypassing the use of meaning" (Pike, 1967: 61). Linguists must consult meaning in order to decide which "parts or features" in the "flow of speech" should be studied in their distribution; which pairs of items should be presented to informants; and so on. (For example, linguists would isolate 'imp-' as a segment in 'impish', but not in 'impious', although '-ish' and '-ious' are both common adjective endings; and 'impart' and 'implore' would never be construed as the 'art' and the 'lore' produced by 'imps'—precisely because linguists know what the words normally mean. No purely formal analysis, however involved, not even listing every known use of all English words beginning with 'imp-', forces us to the conclusion we arrive at so effortlessly by relying on meaning; the "short-cut" (I.1.10) is the only road.) Hence, the interesting object for study would be the cognitive processes of linguists or informants who discuss, analyze, or give opinions about language. These processes determine the value, consistency, and reliability of the whole enterprise and would reveal whether agreement or disagreement is systemic (in the sense of II.1.2.3) or purely accidental.

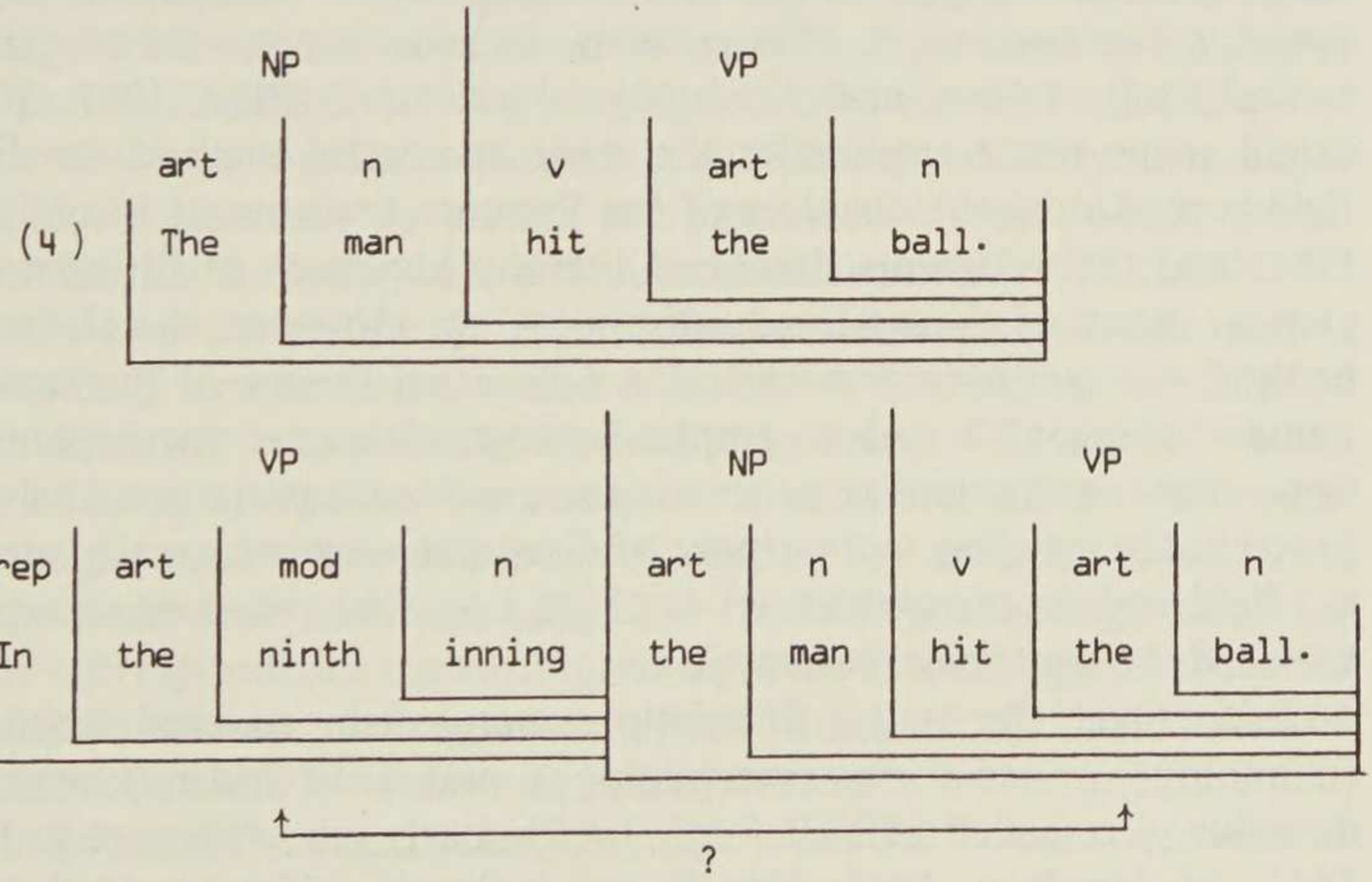
1.12 *Morphology* closely resembled phonology, but dealt with the forms, rather than the sounds, of words (cf. de Courtenay, 1972 [1888]; Sapir, 1921; Nida, 1947) (cf. II.1.6).[7] In analogy to a "phoneme" (II.1.5), a

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[7] The first account of "morphology" in linguistics appears to be that of de Courtenay in the 1880's. For a time, this area was eclipsed by the great success of phonology, until its importance for fieldwork brought it back into prominence, thanks to Sapir, Nida, Pike, and their co-workers. To limit the cataloguing, "morphemes" were eventually restricted to function words and affixes, while the content words were called "lexemes" (cf. Weinrich, 1976). An unresolved difficulty in the "synchronic" approach (II.1.2.1) is that many morphemes in English are recognizable as word-parts only from a historical standpoint, e.g., 'en-' in 'enchant', or '-fy' in 'satisfy'. Again, the structure varies according to who is doing the analysis, a professional linguist or an everyday language user.

morpheme was defined as the smallest unit of form that could determine meaning. Every word should contain at least one morpheme, plus any morphemes made of *affixes:* parts added either before (prefixes), inside (infixes), or after (suffixes) the word stem. Hence, a word like 'unbeliever' would contain three "morphemes." An utterance would be a sequence of morphemes, and hence a framework of *slots* that could be occupied by given classes of *fillers.* For example, the subject slot of the sentence takes the filler class "noun phrase." The *distribution* of a language element, i.e., the sum of all the slots it can fill (Harris, 1951; Gleason, 1955; cf. II.1.10), should give an exhaustive account of its use and meaning. This postulate is essentially correct (Beaugrande, 1980a: 7), but it is hardly practicable to assemble all the occurrences of a word or word-part. Linguists had to be content with a few occurrences which they (or their informants) considered representative by virtue of knowing the language.

1.13 A popular structuralist approach was *immediate constituent analysis* (cf. Wells, 1947b; Fries, 1952; Gleason, 1955; Hockett, 1958). A sentence was dissected into steadily smaller pieces until every unit was classified as a part (i.e. an "immediate constituent") of a larger unit. To start, the sentence would be cut into clauses, and each clause cut into subject vs. predicate. That all-time great linguists' evergreen in (4) is easy to dissect, whereas in (4a) the predicate is partly before and partly after the subject:



KEY. art:article; mod:modifier; n:noun; NP: Noun Phrase; pre:preposition; v;verb; VP: Verb Phrase

As we see, the method works fine when grammatical units are *continuous,* i.e., if their constituents are directly *adjacent* (IV.1.3), but leads to difficulties if they are discontinuous. Though most linguists asserted that speech was primary over writing (e.g. Saussure, 1916; Bloomfield, 1933; V.3.1),

and the success of phonology (II.1.6) firmly anchored speech sounds in the theoretical layout of the discipline, constituent analysis usually took the short-cut of using *written sentences* already segmented by the investigator into written words. This discrepancy was even more pronounced in the terminology of transformational grammar (e.g., "right-branching" vs. "left-branching" is oddly metaphorical unless sentences are written down) (cf. II.3.13). Indeed, the written modality is generally better than speech for defining the sentence (cf. II.3.13, IV.2.17, V.2.18, 30, 33, 45; V.3.7ff; VI.1.10).

1.14 Despite these difficulties in both theory and practice (I.1.11-13), American structuralism made important contributions to language exploration by conducting *fieldwork* on remote languages about which very little was known. In order to record and describe a language without a grammar or dictionary (and sometimes without even a bilingual interpreter) the linguist had to take account of communicative and cultural settings. The *tagmemics* developed by Pike and his associates (cf. Pike, 1967; Pike & Pike, 1975; also Longacre, 1964, 1976) expressly went beyond sentence patterns to apply the slot-and-filler approach (I.1.12) to human behavior at large (II.2.25). The "tagmeme" itself was defined as a slot plus the class of items that could fill the slot. It made no difference if the slot appeared in a sentence or in a football game. The linguist was to be a "human observer" who "demands the right of multiple perspective, the recognition of parallel, *simultaneous* reaction to criss-crossing, intersecting vectors of experience, mental tools, values, and psychological pre-sets" (Pike, 1967: 10).[8] This broad scope made tagmemics the most successful method for linguistic fieldwork. Under the auspices of the Summer Institute of Linguistics, the Pikes and their students described literally hundreds of little-known languages, many of them already disappearing. However, the slot-and-filler method was too narrow a basis for a "unified theory of the structure of human behavior." It fails to emphasize communicative participants' intentions, plans, and cognitive processes responsible for patterns of behavior. In practice, the meaning and purpose of discourse were informally supplied by the fieldworkers themselves (cf. I.1.3; II.1.3), who relied on commonsense knowledge about social interaction.

1.15 Over the years, linguistic structuralism covered word sounds (phonology), word forms (morphology), and word order (syntax). These domains were called LEVELS (cf. I.4.2). Early researchers (e.g. Hockett, 1942: 20; Moulton, 1947: 225; Trager & Smith, 1951: 81; Hall & Trager, 1953: 57) insisted that the levels be independently studied and described. A complete account of language would be the sum of the descriptions of all its levels. However, the actual result was an extreme *fragmentation* (cf.

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[8] Unfortunately, the slot-and-filler approach is poorly suited to representing the "simultaneous" processing envisioned here (cf. IV.1.7).

I.1.3)—language taken to pieces until its multi-level unity in communication faded from view altogether. Too much after-the-fact *analysis* obscured the *synthesis* that creates language samples in the first place (cf. I.4.3, 14). Predictably, the ban on level-mixing soon evaporated, at least in practice. Yet a preference for "modular" research on language has only recently yielded to an "interactive" approach (cf. III.1.27; III.2.3ff).

1.16 Syntax became the decisive testing grounds for structuralism. To see why this level resisted a transfer of methods from phonology and morphology, we must bear in mind that a taxonomy is expected to offer an exhaustive catalog of elements in a system (I.4.3). This requirement posed no obstacle to phonology, because the sound systems of languages are fairly compact. In morphology, most languages have, besides their basic vocabulary of *content words,* a limited number of *function words* and/or *affixes* (cf. I.4.6; II[7]). But in syntax, the feasibility of an exhaustive catalog of phrases and sentences seemed very doubtful. They might well be too numerous for a linguist to list.

1.17 This critical impasse was resolved with Chomsky's (1957) notion of "transformation" borrowed from Zellig S. Harris (1952). Harris's earlier (and barely noticed) paper had suggested using transformations for distilling out "equivalent" distributions of items in a discourse.[9] Chomsky's theory postulated a small set of rules to make basic sentences, plus a larger set of rules to "transform" basic patterns into any other possible sentence of the language. This solution eliminated the need for an exhaustive catalog of sentence patterns while preserving the characteristic scientific ambitions of linguistics: well-structuredness, formality, and abstraction. Any sample sentence could be described by stating the patterns and rules which would "generate" it, that is, assign to it a structural description (cf. II.3.5, 9).

1.18 It was probably inevitable that this new direction, though temporarily upholding structuralism, would eventually transcend the confines of the latter. Research was shifting from the structures themselves over to *structure-building operations*. Naturally, the question of whether the operations of the grammar were also those carried out by speakers and hearers could not remain unnoticed very long. The field of "psycholinguistics" for testing the correspondence between human processes and linguistic theories was already on its way (cf. Osgood & Sebeok [Eds.], 1954). The contact of linguistic structuralism with other aspects of human behavior and mind profoundly influenced the direction of language research. The next sections of this chapter retrace that evolution.

1.19 Structuralism had its weaknesses, and its critics have been numerous. Yet we should not overlook its substantial contributions. The rigorous definition of theoretical language units, and of procedures for discovering

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[9] For example, Harris (1952: 27) "transformed" 'satisfied customers' into 'customers are satisfied' to make the phrase "equivalent" to 'you will be satisfied'.

those units, helped to render language research consistent, reliable, and cumulative. The systemic nature of language came into new focus, along with the role of differentiation within systems. If structuralism failed to recognize the contribution of human processing to the structures of language, it was only following the spirit of the times (I.1.3f). Placed in a proper context, the structuralist heritage can continue to serve us in future explorations.

2. PHYSICALISM AND BEHAVIORISM[10]

2.1 The prestige of physics as a science (I.1.1ff) understandably encouraged researchers to treat language as an agglomerate of *physical mechanisms* that can be externally observed and measured —an outlook we can call PHYSICALISM. The philosophical direction known as "positivism" (cf. John Stuart Mill, 1843) had in part prefigured this outlook. Karl Spencer Lashley, at a 1948 symposium fittingly titled "cerebral mechanisms of behavior" (proceedings in Jeffress [Ed.], 1951), stated the credo: "Our common meeting ground is the faith to which we all subscribe, I believe, that the phenomena of behavior and mind are ultimately describable in the concepts of the mathematical and physical sciences." Willard van Ormen Quine (1971: 142) asserted in a 1968 lecture "that knowledge, mind, and meaning are part of the same world that they have to do with, and that they are to be studied in the same empirical spirit that animates the natural sciences." The commonsense dictionary definitions cited in I.1.1 imply that "science" itself is pre-empted, at least in America, by the "natural sciences" that "deal with objectively measurable phenomena."

2.2 It was thus not surprising that American linguistics and psychology sought to gain credibility by looking for physical events. Margaret Floy Washburn (1916: 11f) depicted speech as a "successive movement system," i.e., as "a combination of movements so linked together that the stimulus furnished by the actual performance of certain movements is required to bring about other movements." John Broadus Watson (1920) viewed thought as inaudible movements of the vocal organs, and Louis Max (1937) saw consciousness as "motor activity." Agnes Thorsen (1925) concluded that thought processes could be detected by studying tongue movements (cf. V.1.31). Burrhus Frederick Skinner has, for almost 50 years, advertized his "conditioning" theory as scientific because its "results may be formulated in centimeters, grams and seconds" (1982: 48).

2.3 Physicalist approaches tend in two directions. The first direction is to reduce all human actions, including those of cognition and communica-

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[10] II.2 and II.3 are complete revisions of a discussion previously developed in Beaugrande (1982c).

tion, to *detectable body functions,* notably those of the *nervous system.* We might strive to record which parts of the brain perform given operations, consulting (a) patterns of excitation measured with an electroencephalograph (a brain-wave recording device); (b) concentrations of blood flow measured with positron emission tomagraphy (a technique for displaying proportions of radioactively labeled substances in the body);[11] (c) dysfunctions resulting from brain damage, e.g. aphasia (language impairment caused by a lesion or tumor); and so forth. This direction has developed along with recent advances in neurology and neuroscience, but fundamental obstacles persist:

2.3.1 The correspondences between patterns of neural excitation and language events are not clearly defined. A recording from an electroencephalograph does not by itself suffice to reveal the organization of a specific language event. The location of the neural activity is also inconclusive. The finding that language is dominantly centered in the left hemisphere of most people's brains is too simple to yield a theory of discourse. Glassner (1981: 152) found from electroencephalographs that creative ("exploratory") text production causes higher activity in the right hemisphere, while the reporting of familiar material has the same effect on the left. Yet this finding does not provide us with a detailed theoretical model of writing.

2.3.2 Recorded activities of the nervous system could hardly be matched up with the many cognitive and communicative events that are not observable. The recordings themselves are the only evidence. We cannot watch, for example, a writer's brain considering several language options and eventually selecting one of them. We couldn't use the pattern of brain waves or blood flow to identify the options and the selective processes. We have only the final word choice, plus the writer's introspective self-commentary — evidence after the fact, not of the fact (cf. III.1.2.8).

2.3.3 The effects of brain damage are typically very gross, yielding dysfunctions mostly in large complexes of language behavior. The location of the damage accounts for some differences. Damage to Broca's area (in the inferior frontal gyrus of the language-dominant brain hemisphere) impairs text production, while damage to Wernicke's area (in the posterior part of the temporal lobe of the language-dominant brain hemisphere) impairs reception (cf. Broca, 1865; Wernicke, 1874). But text production and reception are themselves constituted by elaborate complexes of activity that could be sorted out only if impairments were much more specific.

2.3.4 Finally, the human nervous system is enormously adaptive and flexible, not just for different persons, but also for the same person at different times. Early researchers (e.g. Eberstaller, 1890; Cunningham, 1892) already found that the organization of brain surfaces is far from identical

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[11] On positron emission tomography, see Ter-Pogassian, Raichle, & Sobel (1980).

for everybody—a finding borne out by recent studies of language localization (Whitaker & Selnes, 1975).

2.4 For all these reasons, it seems implausible that a theory of cognition and communication can be *strictly derived* from neurological observations. Already proposed theoretical models of language operations can be *tested,* but hardly *created,* by observing the activities of the nerves. The differences between brain hemispheres might account for aptitudes of language learning during maturity (cf. Lenneberg, 1967; Scovel, 1969); for inclinations toward induction vs. deduction (Winterowd, 1979); for creative vs. stereotyped expression (Glassner, 1981, 1982; cf. II.2.3.1); or for sound/letter correspondences in spelling (V.1.26). But only a theoretical model of text processing can effectually suggest why any of this should be so.

2.5 The other direction for a physicalist approach to cognition and communication would be to consider the *human* a simple mechanism determined by the *environment* and its *visible objects.* Manipulating these things should then provide all needful insights about the human. This outlook was the basis for the research paradigm known as BEHAVIORISM (due especially to Watson, 1920; Pavlov, 1927; Skinner, 1938). Its central project was to observe an "organism" receiving an external STIMULUS and making a RESPONSE. By REINFORCING the response with either a positive or a negative reaction, the investigator could CONDITION the organism to behave in desired patterns. The conditioning could make the organism select a given action and perform it with FREQUENCY (number of acts and rate of occurrence) and FLUENCY (the smoothness of transitions among stages of the act). In accord with the ambitions of the time, the stimulus-response mechanism was claimed to follow a strict "law" of effect (Skinner, 1938; Keller & Schoenfeld, 1950) like the "laws" of the natural sciences, notably physics (cf. I.1.1; II.2.1).[12]

2.6 LEARNING takes place if the conditioned organism increases the frequency and fluency of the desired action. TRANSFER occurs if the activities of the test session carry over to typical behavior (cf. Greeno, James, DaPolito, & Polson, 1978). A DISTRACTOR is a task that interferes with actions and learning. In *classical conditioning,* the experimenter takes the initiative by stimulating the organism to do something, and replaces the organism's natural response with an arbitrarily induced response (cf. Pavlov, 1927, and his famous dogs). In *operant conditioning,* on the other

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[12] Bruner (1982: 42f) suggests that "extremist behavior modification" was appealing as an "omnipotence fantasy": the power to "condition" "all human actions—even thoughts, language, and supposed motives or personality traits." In fact, Skinner (1982: 49) has lately been talking of how behaviorism can solve "the problems of the world today." At best, behaviorism turned into politics would be a benevolent dictatorship. But Skinner probably realizes and regrets that his theory has been a dangerous modern weapon against creative thought and freedom of decision (cf. II.2.20, 28), and an apology for senseless, authoritarian punishments (e.g., electric shock for "therapy").

hand, the experimenter waits for the organism to display some bit of naive behavior and then uses reinforcement to shape and control (cf. Skinner, 1938, 1953, 1957; Bachrach [Ed.], 1962; Wolpe, Salter, & Reyna [Eds.], 1964; Krasner & Ullmann [Eds.], 1965).

2.7 The clearest successes of behavioral conditioning were obtained with animals of limited reasoning abilities, such as rats, cats, dogs, and pigeons. With enough training, these animals could be taught to carry out tasks like activating levers or running mazes (see Bachrach, 1964, for one spectacular case). The animal had to be periodically rewarded (usually with food) or punished (usually with an electric shock) to show what sorts of behavior were or were not desired. The studies of "visceral learning" by Neal Miller and co-workers (cf. Jonas, 1973) suggested that even involuntary acts such as heartbeat could be shaped by expert conditioning.

2.8 This reasonably secure body of research was then *extrapolated* (in the sense of I.1.12) to the study of human language. Some experimental techniques derived from conditioning became standard fixtures of research. In *paired-associate learning,* test persons are given a list of word-pairs to remember, then "stimulated" with a word, and required to "respond" with its paired word (cf. Murdock, 1963). The pairing can be varied according to whether the two words are similar or different in sound, word-class, meaning, and so forth (cf. Deese, 1965; Kintsch, 1968; Kintsch & Buschke, 1969). Today, the learning is attributed not to a simple strengthening of an undifferentiated association, but to the selection of some aspect of the stimulus that sets it apart from others (Greeno et al., 1978). Hence, learning word lists without context may be be harder and shallower (in the sense of III.1.11) than learning from contextualized discourse (cf. Kircher, 1971; Brown, Campione, & Barclay, 1978), because the latter provides much richer means of differentiation (cf. IV.1.8f). In principle, the correlation between natural and experimental conditions is far from clear (cf. III.1.1, 3; III.2.40; IV.1.9; IV.2.16, 21; V.1.13f, 19).

2.9 The stimulus-response scheme (II.2.5) became the basis for behaviorist theories of language. Bloomfield (1933) depicted discourse as a response to an event or situation, with visible objects in the main focus (cf. II.2.23). In his example, Jill is stimulated to hunger upon seeing an an apple tree, but alas, she is not sufficiently athletic:

> Instead of struggling with the fence and tree, she made a few small movements in her throat and mouth, which produced a little noise. At once, Jack began to make her reactions for her; he performed actions that were beyond Jill's strength, and in the end, Jill got the apple. (Bloomfield, 1933: 24)

This *reductionism* converts discourse into a "few small movements" in the "throat and mouth" and "a little noise." The cognitive processes whereby Jill formed a plan to attain her goal and constructed an appropriate utterance action, and the contexts that make the action meaningful, are ignored.

The food reward reinforcing her act is the classic enticement of the animal conditioner (II.2.7).[13] Jack's agency is limited to "enacting Jill's response" when stimulated by "movements" and "noise" to obtain food at the risk of breaking his crown. He could be replaced by a chimpanzee, a superior tree climber, had that animal not been eschewed by American behaviorists as too intelligent.[14]

2.10 Like most reductionist theories, behaviorism presented as *general cases* only those *special cases* it could deal with (I.1.3). It also obscured the difference between external and internal actions, between performance and knowledge (cf. I.2.8.2; I.3.3, 11; III.3.2.2; IV.1.12, 48; V.1.14f; VI.3.22). Some situations do stimulate people to perform discourse as a response — a special case I call *situation monitoring* (I.4.11.5). But this monitoring is normally *mediated* by the cognitive organization of the text producer and by the exigencies of text production (what to mention, how to describe it, what motives to follow, etc.) (cf. I.4.6). If discourse is mediated by the intent to steer the situation toward one's goals, we have *situation management* (I.4.11.5; cf. Beaugrande & Dressler, 1981: 163ff). By trying to stretch monitoring to include management, behaviorist language theories like Bloomfield's deny the importance of plans, goals, and world-models in human communication. No explanation can be found for how humans decide what environmental events are relevant, and what response might be appropriate.

2.11 Hobart Mowrer (1954) thought of the sentence as a conditioning device: the subject is the conditioned stimulus and the predicate is the unconditioned one. Understanding the sentence means "pairing" the subject and predicate in a new "association" (cf. II.2.8). If a text producer sees Tom stealing money, the utterance

(5) Tom is a thief.

takes "Tom" as a known point of departure and impels the hearer to pair "Tom" with "thief." The effort required to learn this new association varies according to the text receiver's situational role, e.g. Tom's mother vs. a policeman (Osgood, 1963: 748). With only the stealing event in view, Mowrer's example is pure situation monitoring. Still, Mowrer recognized the distinction between given vs. new (here, context vs. observed event) in a sentence or utterance (IV.2.63), whereas Bloomfield did not. However, having visible

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[13] The intrusion of the apple tree in place of the hill-and-water-pail scheme may be a Biblical allusion (Genesis 3:6), though Bloomfield's sexism impels him to give the initiative to the man rather than to the woman.

[14] Kintsch (1977: 440f) remarks on the ominous consequences of selecting particular animals for learning experiments. Thorndike (1911) put cats in cages with levers and concluded from observations that rote repetition and trial-and-error should become the foundations for American learning theory—which they did, for decades (cf. Das et al., 1979: 3ff). Kohler's (1925) chimpanzee showed substantial reasoning powers, but these tests were mostly ignored by American educators.

objects be the "stimulus" for the utterance—the favorite example for behaviorists (cf. II.2.5, 9, 23; IV.2.56) — is just a special case. It's hard to see any stimulus-response scheme in a text such as:

> (6) What a piece of work is a man! How noble in reason! How infinite in faculties! In form and moving how admirable! In action how like an angel! In apprehension how like a god! *(Hamlet,* II, ii)

A behaviorist would predict that Hamlet should say:

> (6a) What a piece of conditioned behavior is a man! How observable in response! How law-governed in faculties! In form and moving how statistical! In action how like a mechanism! In apprehension how like a rat!

And even (6a) is still not a direct "response" to a situation, but a statement mediated by the goal of propagating a reductive theory.

2.12 The most ambitious behaviorist theory of language was Skinner's (1957) account of "verbal behavior" derived from his work with operant conditioning (II.2.6) of animals (Skinner, 1938, 1953). He classified utterances as types of "verbal operants." A "mand" was "a verbal operant in which the response is reinforced by a characteristic consequence," e.g., the "mand" 'Pass the salt' being reinforced by getting the salt (Skinner, 1957: 35f). A "tact" was "a verbal operant in which a response of a given form is evoked (or at least strengthened) by a particular object or event or a property of an object or event," e.g., 'How do you do?' for a greeting and 'Thank you' for a service (1957: 81f). "Mands" and "tacts" (derived by dismantling the words "commands" and "contacts") were central to Skinner's approach because they are special cases where discourse actions fit the stimulus-response scheme most closely.

2.13 To appreciate how such a bias abrogates communicative relevance (II.2.10), consider Skinner's (1957: 253f) list of "all the available techniques" for "evoking verbal behavior," e.g., for eliciting the word 'pencil'. We can: (a) "mand the response by saying to the subject 'Please say "pencil"'"; (b) "make sure that no pencil or writing instrument is available," and offer the subject "a handsome reward for a recognizable picture of a cat"; (c) "provide echoic stimuli (a phonograph in the background occasionally says 'pencil') and textual stimuli (signs on the wall read 'PENCIL')"; (d) "produce interverbal responses: the phonograph occasionally says 'pen and _____' and there are other signs reading 'PEN AND _____'"; or (e) "put a very large or unusual pencil in an unusual place clearly in sight—say, half-submerged in a large aquarium or floating freely in the air near the ceiling." The word 'pencil' seems to be a "mand" in (a) and (b), and a "tact" in the other cases, especially (e). Only (b) has any motivational relevance to the speaker's goals. "Echoic stimulation" and "interverbal responses" are special cases with the least resemblance to creative communication. Though methods (a) through (e) should elicit the word

'pencil' from the most rat-brained person, they hardly represent the natural conditions for saying 'pencil', let alone for composing utterances like Hamlet's in (6). A composition teacher who tried to "evoke" student essays with such methods could reach the age of retirement before one paper got finished.

2.14 Most of Skinner's examples were either one-word utterances like 'pencil' or else standing phrases in "mands" and "tacts" (cf II.2.12). He barely touched on the complex activities of "textual behavior." Since physicalists stress the environment over the human being (II.2.5), Skinner (1957: 311) saw the text producer as a mere "interested bystander" impelled not by creativity, but by the stimulus-response mechanism. In Skinner's (1957: 346) view, a text might be (a) made of "memorized sentences emitted as purely interverbal sequences"; (b) "reproduced as echoic of textual behavior"; or (c) "blended" from "a few key responses with stock patterns." To engage in "composition," the text producer could use: (a) "the essential operants," (b) "the interverbals possibly arising from these operants in the course of emission (often composing thematic groups of responses)," and (c) "the autoclitic framework" (1957: 353f). Thus, the formatting of texts depended "autoclitics": "responses within behavior which is based upon or depends upon other verbal behavior," such as: "informing the listener of the kind of verbal operant it accompanies"; "describing the state of strength of a response"; "indicating the emotional or motivational condition of the speaker"; and so on (1957: 315f). Grammar and syntax would be "autoclitic processes" that signal the relationships among the "manded" responses to "a particular object or event or a property of an object or event" (II.2.12). This account implied that the "key" content words (nouns, verbs, and modifiers) are selected before function words, and that the main vocabulary is chosen before the phrasing to put it in (cf. III.2.30; IV.2.10, 15, 26ff).

2.15 Still more unsatisfying and reductive was Skinner's (1957: 438ff) treatment of "thinking," "verbal fantasy," and "rationalization." Here, he could do no more than assert that text producers are "automatically reinforcing themselves." Skinner thus abandoned his only firm ground — the externalized stimulus-response scheme. Chomsky (1959: 37f) objected here "that a person can be reinforced though he emits no response at all and the reinforcing 'stimulus' need not impinge upon the 'reinforced person' (it is sufficient that it be imagined or hoped for." Skinner had finally tossed out the evidence on which the behaviorist approach had been originally founded. The extrapolation from the animal-conditioning laboratory to human behavior became a leap of faith, a palpable metaphor, or an "outrageous hyperbole" (Lazarus, 1982: 43) (cf. I.1.3, 12). Without a unifyingtheory of communication as such, Skinner could only transpose the notions of operant conditioning wherever he saw a vague resemblance between discourse events and stimulus-response chains. Chomsky (1959: 430) concluded:

> Skinner [. . .] utilizes experimental results as evidence for the scientific character of his system of behavior, and analogic guesses (formulated in terms of a metaphoric extension of the technical vocabulary of the laboratory) as evidence for its scope. This creates the illusion of a rigorous scientific theory with a very broad scope, although in fact the terms used in the description of real-life and of laboratory behavior may be mere homonyms, with at most a vague similarity of meaning.

2.16 In the behaviorist view, the proper place to look for meaning was not the human mind, but the environment, (II.2.5). Bloomfield (1933: 144) equated meaning with the "speaker's situation" and the "hearer's response" (II.1.10; II.2.9). Skinner's (1957) "tacts and "mands" also discount meaning itself in favor of its external consequences. "Tacts," being evoked by objects, events, and their properties (II.2.12), fall under the general notion of REFERENCE: the capacity of language to point to objects and situations in a (real or envisioned) world (I.4.11.2; III.2.22). This notion was central to the philosophical trend of positivism, with its credo that natural science was the only legitimate vehicle for knowing about the world (II.2.1). Thus, the meaning of a statement became equivalent to the state of the world that makes it true or false.[15] A unification of behaviorism with the theory of reference was undertaken by Willard Quine (1960, 1968, 1971). His approach depicted "knowing a word" as having "a phonetic[16] part" "achieved by observing and imitating other people's behavior," and a "seantic part" whose "paradigm case" is the word's reference "to some visual object" (Quine, 1971: 143). A comparison with Saussure's "acoustic image" and "concept" (II.1.2.2) at first suggests that Quine has regressed to the pre-structuralist standpoint in which words are names for things.

2.17 However, Quine mistrusted this approach to reference because the relationship between a word and the thing it stands for is a mental construct (cf. II.3.1). He wanted to replace the things themselves with people's responses to things. He asserted that "there are no meanings, nor likenesses nor distinctions of meaning, beyond what are implicit in people's dispositions to overt behavior" (1971: 143). We best understand speakers by "seeing what is stimulating" them (ibid.). The clearest case would be "direct ostension": "pointing your finger" at "an opaque surface"; if you point in order to illustrate not the object itself, but its abstract properties (e.g. pointing at grass to illustrate 'green'), you engage in "deferred ostension" (1971: 148f). Reference becomes "darker" when we move away from ostension

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[15] In philosophy, this outlook has been called "truth-conditional semantics," and variously applied in "model-theoretical," "extensional," and "truth-functional semantics" (cf. Lyons, 1976, for discussion). The analogy between world/statement vs. stimulus/response made the same fixation on "truth" a common shibboleth of behaviorism and mentalism.

[16] The "phonetic part" would have to be the simple word-sounds, in contrast to the "phonemic" value of those sounds in a language system (II.1.5). Later in the same paper, Quine switches to the "phonemic" standpoint (1971: 152).

toward "denotation" (the capacity of words to mean things). Quine (1971: 153) hinted at the hope that all other uses of language are a "grand and ingenious permutation" of the basic "denotation" of "familiar terms." If we explain the meaning of one term by using another term, and the meaning of the latter by using still another term, we are threatened by an *infinite regress* [17] we could eventually break by pointing to an object (1971: 153).

2.18 Ultimately, Quine conceded that reference is (for his approach, at least) "inscrutable," because "reference is nonsense except relative to a co-ordinate system" (1971: 153). What a word means depends on its place in a system of meaning (cf. I.4.5; III.2.22). Quine (1968) therefore had to be content with an "ontological relativity" that permitted so many "ingenious permutations" and "compensatory adjustments in the interpretations" of words. Here, Quine seemed to unintentionally swing into line with the structuralist conception of "systems of opposition" that make language meaningful (II.1.2.3). In fact, however, he demanded not a theory of abstract systems, but "a relational theory of objects" to explore "not what the objects of a theory are, absolutely speaking, but how one theory of objects is interpretable or reinterpretable in another" (1971: 153f). The meanings of words would be explained by a theory of how objects are relatable in "space," "position," "velocity," etc. in a "co-ordinate system" (ibid.), such that people can translate object systems into language systems, and, on that basis, from one person's language system to another person's (cf. Osgood's scheme in II.2.23).

2.19 Quine's demand clearly transcended the narrow framework of orthodox behaviorism set down by Skinner (1957). In effect, Quine admitted that people's "dispositions to overt behavior" do not arise from a simple stimulus-response chain, but from the position of any stimulus event or object in a relational system. Experiments have indeed shown that the language used to refer to visible objects depends on what the text producer considers necessary and relevant in the current context, for example: how many objects are similar or different, and in what ways (Krauss & Weinheimer, 1967; Olson, 1970; Osgood, 1971); how an object is located in a system of classes subsuming, or subsumed by, other classes (Collins & Quillian, 1972; Smith, Shoben, & Rips, 1974; Osgood, May, & Miron, 1975); what traits of an object are thought more or less essential to its nature (Rosch & Mervis, 1975; Rosch, 1977); and so on. Incorporating such factors makes behaviorist approaches to communication seem less narrow, though still incomplete.

2.20 Charles E. Osgood refined his model with the notion of MEDIATION—in my definition, the degree to which a processor imposes its own

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[17] The regress is more often ended by a processing threshold (cf. I[6]). The recourse to pointing is a special case.

outlook (organization, priorities, beliefs) upon a situation (cf. I.1.7; I.4.6; I.4.11.5; II.2.10). Osgood's approach interposed mediation between the stimulus and its response, for instance, to explain why a person doesn't react to a word the same way as to the thing the word refers to: "the mediating reaction to the sign is not the same as the reaction to the significate, but rather consists of those most readily conditionable, least effortful, and least interfering components of the total original reaction" (Osgood, 1963: 740). Osgood comes close to saying that word meanings are dynamically constituted on each occasion (I.4.6); but he would attribute the effect to behavioral impulses, whereas cognitive decision-making gives to human processing at least as much initiative as to the environment.

2.21 Osgood's mediation theory sought to resolve the matter of initiative by introducing PROBABILITIES into the stimulus-response mechanism in place of the natural "laws" imagined by orthodox behaviorists (II.2.5). He argued that "'decision' in behavior is simply selection of the momentarily most probable alternative"; and that "'control' over behavior is simply the way in which combination and patterning" modify "the momentary probabilities" of the alternatives (1963: 741). Lounsbury (1954) extended Hull's (1943) work on habits and suggested that utterances are controlled by "habit family hierarchies" determining what actions or reactions are probable. Probabilities can be "reshuffled" in context, so that the same stimulus can elicit different responses. If this view holds, each successive word in an utterance should be more probable than the one before it, as context continually narrows down the likely choices (cf. Goldman-Eisler, 1958a; cf. IV.1.1, IV.2.15). However, this strict correlation was not found (Tannenbaum, Williams, & Hillier, 1965). In fact, the end stretches of utterances are often devoted to new or unexpected material (IV.2.63f).

2.22 Still, Osgood's model allowed a more refined outlook on discourse than orthodox behaviorist ones. He broke down the simple stimulus-response concept into three "stages" that were carried out during both "decoding" and "encoding" (Osgood, 1963: 740). A presented text would be first registered as a "pattern of sensory signals," then "integrated" (or "chunked", I.4.5), and finally assigned a "representation" (or meaning); to produce a reply text, an "intention" to be "meaningful" would be relayed to the "skills" of "integration" and from there to "execution" (1963: 741). Hence, the whole process is both psychologically and physiologically reversible: production and reception are mirror images of each other (cf. III.1.9). The person's vocabulary is stored in a huge "word form pool," a catalogue of "surface expressions" (the forms of words, not their meanings).[18] These forms are passed to a "semantic key sort" that decides what meaning is most probable, where "meaning" is defined by Osgood as a "bundle of

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[18] On how word forms are accessed, see V.1.34ff.

simultaneous semantic features."[19] In a sentence (or text), these feature bundles are integrated by a "cognitive mixer" that establishes "congruity" of meaning and eventually leads to the "total response." For example, to understand Mowrer's sentence (II.2.11)

(5) Tom is a thief.

a "semantic fusion" puts 'Tom' together with 'thief'; if we had:

(5a) Tom is not a thief.

a "semantic dissolution" would be done instead (Osgood, 1963: 748). The more complex a text, the more "mixing" is needed for "fusion" and "dissolution." The "features" in these "bundles" were explored by an experimental technique called "semantic differential," where test persons rated words on scales like "light vs. dark," or "pleasant vs. unpleasant" (Osgood, Suci, & Tannenbaum, 1957).[20]

2.23 In his early work, Osgood (1963: 741) resolutely denied the need for such notions as "cognition," "purpose," and "volition," and stretched his concept of "probabilities" to cover them all (cf. II.2.21). He carefully reduced all meanings to "past experience with behavioral outcomes" (ibid.). Later, Osgood (1971: 498ff) propounded a "non-linguistic cognitive system" "shared" both by "perceptual signs" and by "linguistic signs." This system was capable of the "representational mediation" that allows "perceptuo-motor behavior" to engender "symbolic processes." However, the treatment of meaning was still in terms of "patterns of stimulation, including previously learned signs, which regularly and reliably produce distinctive patterns of behavior" (1971: 523; cf. Quine's scheme in II.2.18). He sought to prove this view with his well-known experiment where students watched him put or move objects on a table and "simply described" the events to a fictitious "six year old boy just outside the door" (Osgood, 1971: 497). His students produced very similar sentences to describe a given event, depending on the visibility, salience, and similarity of the objects (e.g. moving rather than stationary) (cf. II.2.19; IV.2.56ff).

2.24 By seeking the basis of language in perceptual systems, Osgood in effect adopted the empirical correlate of Quine's philosophical account.[21] Though both scholars strove to found meaning on "overt behavior" and on responses to visible objects (Quine, 1971: 143; Osgood, 1971: 523, 497), they

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[19] "Semantic features," an ingenious extrapolation from sound features (II.1.5f), enjoyed some vogue, especially as a way to make static objects out of word meanings. But nobody could devise a catalog of them for more than a handful of contrived examples (usually objects like chairs, whose parts or traits made obvious "features"), and the "+/−"mania soon reached bizarre extremes (cf. II [3]).

[20] Though interesting, the "semantic differential" approach is not a theory of meanings so much as a theory of responses to meanings (connotations, attitudes, emotions).

[21] There is little evidence that Quine or Osgood directly inspired each other. More likely, they converged accidentally in their attempts to solve the problem of relating things to words.

both had to expand the behaviorist-physicalist framework by postulating complex systems that determined the real significance of external events or objects. Ineluctably, the "stimulus/response" mechanism became a commonplace (and hence unnoticed) metaphor for *causality.* For the sake of orthodoxy, researchers would say "stimulate" instead of "present," "make happen," "cause," "enable," and so on. Such usage often had little relation to the original context of animal-conditioning (cf. II.2.7, 12, 15).

2.25 Among structuralist trends, American descriptivism and tagmemics proved the most congenial to behaviorism, e.g., in Bloomfield's account of meaning (II.1.10; II.2.9, 16). Pike's tagmemics leaned toward behaviorism as a vehicle for fieldwork (II.1.14). The fieldworker immediately sees "the interdependence of language and non-language behavior" and must "correlate particular sequences of sounds" with the "particular environment in which they are uttered and with the particular non-language activity which is going on" (Pike, 1967: 29). However, this "unified" approach was rejected by most linguists in both European structuralism and American mentalism, mainly because they hoped to separate "pure" language from everything else. Thus, language as behavior had no common ground with language as an abstract system, because the two *reductions* of language went off to the opposite extremes. Unfortunately, this divergence prevented a dialogue or integration that would have benefited both sides.

2.26 Behaviorism had a profound impact on *education* and *child development programs.*[22] Behaviorists found in children's language good support for their views. Skinner's (1957) "mands" and "tacts" (II.2.12), Quine's (1960) progression from pointing to objects over to using language to refer (II.2.17), and Osgood's (1971) "conditions for sign learning," were all illustrated with children's behavior. The motive is clear: children fit the behaviorist world-view much better than adults, allowing this extrapolation: animals = children = all humans. For instance, the pairing of words with visible objects (a type of "paired-associate learning," II.2.8) is really feasible only for a young child with a minimal vocabulary (Gough & Hillinger, 1980: 183).

2.27 It follows that behaviorist learning techniques work best for training young children (or the mentally retarded) in rudimentary, emergent skills, when complexity has not yet imposed severe demands on cognitive organization. Later, the techniques become steadily less helpful, because they ignore more elaborated processing capacities in favor of wasteful, eventually unmanageable methods of rote repetition and reinforcement. Whether anything useful is learned and retained from behaviorist schooling

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[22] All behaviorist educational programs inherit the contradiction between making learners self-reliant and creative vs. applying a theory best suited for making them pliable and "conditioned" (cf. II[12]). The tactics are well-known: rote repetition, punishment ("negative reinforcement"), and a simplistic equation of observed behavior, especially errors, with the child's true abilities (cf. I.3.3, 9).

is pure chance, as long as the educators don't understand the processes of cognitive reorganization that, according to Mandler (1979), are the necessary preconditions for learning from repeated experiences (cf. II.3.31; III.1.28; IV.2.38). Thus, behaviorist education, like Darwinism, weeds out children for whom it doesn't happen to work; and any inequities are rationalized as results of "genetic intelligence" and "aptitude" (I.3.1ff).

2.28 Nonetheless, education is concerned with behavior in the project of improving human skills, including writing. It is unwise to lose sight of the fact that writing is an action. Porter (1962) criticized composition classes that violate these basic conditions for improving behavior: (a) the behavior has consequences, (b) learning doesn't have to be done in a single leap, and (c) overzealous punishment does not suppress behavior altogether. Similarly, Zoellner (1969) advocated his "behavioral pedagogy of composition" because writing instruction so often flouts learning theory by being intransigent toward errors, disregarding students' "here-and-now behavior," failing to appreciate and work with approximations, and attempting to impose conformism (cf. also Zoellner, 1971; I.2.17ff; I.3.7ff). Zoellner (1969) extrapolated from "operant conditioning" (II.2.6) to advise that the instructor should wait for students to "emit" a desired "bit of behavior" and should then "shape" and "reinforce" it with frequent reactions. Since behaviorism offers no standards of value or communicative relevance, Zoellner focussed on *fluency:* the rate and ease at which students write (cf. II.2.5; II.3.21, 38). Students were to "blurt" something out[23] and instantly record it on a blackboard or drawing pad. This record serves as an *approximation* to be used in later stages of the writing. The student must not be asked to *think,* lest there ensue "an immediate drop in the density and variety of external behavior": the student's "body tenses up, he [sic] becomes motionless, his face takes on a wooden expression, and his vocalization drops to zero" (1969: 298).

2.29 This emphasis on fluency suggested that fast, easy writing equals good writing (compare Zoellner, 1969: 270ff). Yet good writers are often not rapid or fluent (Boyle, 1969; Elbow, 1975; Lowenthal & Wason, 1977; Murray, 1978; Atlas, 1979; Odell, 1980; Wason, 1980), mostly because they expend so much effort. Zoellner extended over to writing the popular view (I.2.8.3) that fluent speech is a hallmark of literacy. However, due to differences in rates and processing conditions of the two modalities, a transfer of the rhythm and tempo of speech over to writing can be an impediment to composition as much as an aid (V.3.10-37). Student writers rush along, inserting fillers, trivialities, needless words, and restatements, just to keep moving. And since speech is not preserved, little use is made of the opportu-

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[23] Zoellner uses the term "visceral blurt" as a facetious metaphor alluding to Miller's "visceral learning" (II.2.7).

nity writing offers to look back and build directly upon what was already said.

2.30 Zoellner contended that students can talk out their message in a "sustained, rapid-fire segment of sound stream" that "communicates quickly and effectively" (1969: 273), though their writing may be muddled. His appraisal of the need to transfer speech skills over to writing was sound, but he failed to spell out the steps in the transition. He had to presuppose that "the student has already thought the rhetorical problem out, and that it is only necessary to get him to *say* what he already knows" (1969: 299). As in operant conditioning, the experimenter/teacher begins the "shaping" only after the animal/student emits some "naive behavior" (II.2.6). For Zoellner (1969: 303f), a failure to write what one wants to say is like a pathological deviation between a brain impulse vs. a motor action, sometimes called "schizokinesis" (Gantt, 1953)—as if writers' problems are comparable to mental illness. By decrying "thinking" (II.2.28) and taking for granted the resolving of "rhetorical problems," Zoellner neglected the cognitive processes that control organize, and evaluate the content of writing.

2.31 Because the stimulus-response scheme abridges relevance and creative initiative (II.2.10, 13, 28), educational behaviorism at large deals only with gross externalizations of crucial cognitive developments (II.2.27). The status of any observed event as an indicator of underlying skills is drastically over-simplified. No doubt Zoellner himself evaluates student papers by standards wholly unrelated to operant conditioning. He publicly opposed the "behavioral objectives" that clutter up education as disguised demands for "middle-class" uniformity and "cultural coercion" (Zoellner, 1971: 231f), e.g., Lois Caffyn's (1969: 72) goals of habitually using "preferred" language, listening eagerly and courteously, and attending community meetings and clubs. (I know *I* don't do these things, yet I can't see how my writing is any the worse for it.) Yet the individualism Zoellner (1971) favored is irreconcilable with his extrapolation from operant conditioning which, if anything, massively steers each individual toward predetermined ends —to be "conditioned" means to conform. The "shaping" can be tailored to the student, but the standards for judging what to write and how to react to it cannot be derived from the rat-training sessions Zoellner extolled.

2.32 Even Caffyn's more convincing "objectives" of discussing issues, sharing experiences, and responding to fine distinctions, are mere labels for undefined cognitive and social developments. Writing is a genuine mode of human behavior, involving manifest actions, and it is organized in a real time progression (cf. Matsuhashi, 1979, 1981, 1982; Bereiter, 1980; Flower & Hayes, 1980, 1981). But conventional behaviorism is too simple and reductive to be more than a precursor for a science of composition. In future work, we must find new approaches, but we should also bear in mind some behaviorist tenets:

2.32.1 A theory of human language should be an integral part of a general theory of human behavior (Skinner, 1957; Osgood, 1963; Pike, 1967). We must always keep in view the "broader field" of "the behavior of a most complex creature in contact with a world of endless variety" (Skinner, 1957: 456).

2.32.2 "What needs to be explained is the total speech episode," including "all relevant events in the behavior of both speaker and listener in their proper temporal order" (Skinner, 1957: 36). In this "total event," "language behavior and non-language behavior are fused" (Pike, 1967: 26).

2.32.3 "The listener" (or audience) is "an essential part of the situations in which verbal behavior is observed"; "the change which is thus brought about in the behavior of the listener is appropriately called 'instruction'" (Skinner, 1957: 172, 362; cf. I.4.6; III.2.26).

2.32.4 Language education should be based upon "the actual here-and-now behavior of a given student or a given classroom of students" (Zoellner, 1971: 232).

2.32.5 Learning works best as a series of successive approximations moving steadily and confidently toward an end result (Sidman, 1962).

2.33 Carl Frederiksen (personal communication) remarks that experimental psychology is inherently behaviorist to the extent that it observes and measures the responses of test persons to induced or manipulated events. Teaching has the same orientation to judge performance in terms of tasks and results. Thus, *teaching is research* (I.4.17; III.2.40; VI.3.25) by virtue of this analogy. However, we need a comprehensive model of writing that shows how behavioral evidence relates to the larger context of cognition and communication. Not until then can we co-ordinate daily practices with the totality of our enterprise.

3. MENTALISM AND TRANSFORMATIONAL GRAMMAR

3.1 Whereas PHYSICALISM seeks explanations in observable mechanisms, MENTALISM looks to the mind and its capacities. Mentalists explore the ideas, idealizations, abstractions, intuitions, and so on, that *underlie* external events and behavioral dispositions. In American language research, mentalism had been represented only in a few studies (e.g. Sapir, 1921; Whorf 1965 [1944]). Bloomfield's (1933, 1936) vigorous advocacy of physicalism determined the course of structuralist linguistics for decades (II.1.10). Even in the study of meaning, mentalism was lamented as "vitiating" and "pernicious" (Quine, 1971: 142). Though physicalism and behaviorism were eventually recognized as inadequate, they were difficult to revise, as we saw from the efforts of Quine and Osgood (II.2.16-23). The terminology lived on, but more as a set of orthodox metaphors than as a description of human communication (II.2.15, 24).

3.2 The rehabilitation of mentalism in American linguistics and psychology came when *formal logic* was conspicuously introduced into theory and method. One of the early projects of positivism (II.2.1, 16) was to build a perfectly consistent and complete logical basis for mathematics and science (Russell & Whitehead, 1903). Gödel's (1934) proof that every logical system allows true statements you can't prove and false ones you can't disprove put an end to that project, but not to the longings of scientists for such a system. In effect, the argumentative procedures of science continued to resemble those of axiomatic logic (cf. Stegmüller, 1976). Moreover, logic commands the respect of the general public who only vaguely understands its intents and limits (cf. Beaugrande, 1980a, 1981b). Logical languages fall far short of the flexibility, complexity, and subtlety of "natural" (i.e. non-artificial) languages like English, and fail to account for the participation of producer and receiver, and the informativity and situationality of the text. Logic presupposes well-defined classes, subclasses, and instances. Its conclusions are often so trivial and predictable that real people wouldn't utter them in everyday communication. Hence, the use of logic as a *model* for human thought and language entails a different, though hardly less radical, *reduction,* than that of physicalism (II.2.9f), and is thus open to principled objections. A more interesting issue is *how people* (including philosophers) *perform processes they consider "logical,"* e.g., defining classes and drawing conclusions.

3.3 In common parlance, "logic" designates reasoning procedures that emphasize truth, consistency, completeness, and causality. This kind of logic is popularly thought to be the ideal mode of thinking and communicating (cf. Olson, 1977a, 1977b). For example, composition teachers watch for violations of logic in students' papers (I.3.17). However, too much stress upon logic can be inhibiting to creative learning processes whose approximations and diversities are wrongly looked upon as embarrassing. Seymour Papert (cited in McCorduck, 1979: 290ff, cf. Papert, 1971) remarks:

> We all know that we have all these horrible moments of confusion when we begin a new project, that nothing looks clear and everything looks awful, that we work our way out using all sorts of odd little rules of thumb, by going down blind alleys and coming back again, and so on, but since everyone else seems to be thinking logically, or at least they *claim* they do, then we figure we must be the only ones in the world with such murky thought processes. We disclaim them, and make believe we think in logical, orderly ways.

The logical ideal thus plays down the intuitions, inferences, defaults, and approximations of everyday reasoning (cf. Piaget, 1976; Collins, 1978; Papert, 1980), and may mislead learners to simply give up trying. The real role of logic in cognition and communication is more likely that of a *community of specialized processes* (I.4.8; III.1.23); this "logic specialist" can be consulted as needed, but doesn't dictate what a person can think, say, or mean.

3.4 The popular wishful thinking about logic helped to ease the entry of mentalism into linguistics and psychology. Chomsky's (1957) "grammar" promised to relieve a crisis in taxonomic structuralism: the unwieldy complexity and variety of language syntax (II.1.16f). He suggested that a natural language like English is composed of an *infinite set of sentences,* in the same way as logic permits unlimited *embedding* (inserting one instance of a structure inside another) and *recursion* (repeating a formative operation over and over) (cf. IV.2.13, 70; IV.3.37). Thus, no exhaustive catalog of surface patterns could or should be undertaken. His own system was an *extrapolation* (I.1.12) from "axiomatic logic" (also called a "calculus"): a logic founded on a set of "strings" (sequences of symbols or words) called "axioms" because they are accepted a priori. The axioms are created by means of "formation rules." All the strings of the logic can then be made by applying "derivation rules" to the axioms. Only the strings so derived count as "well-formed." The meaning of a string is determined by applying "interpretation rules." Only well-formed strings can be interpreted—ill-formed ones are considered meaningless. Two or more strings can be linked with "connectives": 'and', 'or', 'if [. . .] then', and 'if and only if' (also written 'iff'). Whether a string so connected is as a whole "true" or "false" is decided by consulting "truth value tables."

3.5 At first glance, all these notions suited the purposes of logic for building formal proofs. The analogy between a logical language and a natural language also seemed reasonable. The "strings" were the *sentences.* The "axioms" were *kernels* (or "kernel sentences"). The "formation rules" were called *phrase-structure rules,* and the "derivation rules" *transformational rules.* A "well-formed string" would be a *grammatical sentence* (or "well-formed sentence"). The logic itself was the *grammar* for the language in question, e.g. English. The "transformational grammar" propagated by Chomsky is one type of *generative* grammar: one capable of assigning a structural description to all the strings it allows (cf. II.1.17). Other grammars, both transformational and generative, were proposed once the trend started, but Chomsky stipulated most of the "standard" assumptions. For example, he rejected the notion of *probability* in linguistics on the grounds that every sentence has close to zero probability—logically true, but operationally false. Though the detailed surface structure of a complete sentence may often be unique, participants in communication have elaborated expectations about what concepts, goals, and actions are more or less probable in a given context. (II.3.14; IV.1.2; IV.2.15, 54).

3.6 Despite common talk of a "Chomskyan revolution," the new grammar actually upheld many contemporary attitudes in science and linguistic theory. The place of logic in positivism and popular opinion (II.3.2f) made it a good candidate for extrapolation. The already central notion of the "sentence" attained an even higher theoretical status when it became axiomatic, i.e. postulated a priori (II.3.4f). The notion of "deep structure" lent

new impetus to the established striving for well-structuredness by adding theoretical substrates of structure (cf. I.1.3; II.1.4), e.g., to distinguish between superficially similar sentences like (Chomsky, 1965: 22):

(7) I persuaded John to leave.
(8) I expected John to leave.

Thus, the overall scientific climate favored the new grammar despite its innovative terminology.

3.7 This success determined the priorities of language study. First, the *primacy of syntax* was established not only over meaning and purpose, but also over phonology and morphology (cf. Householder, 1965; Dik, 1967). Researchers would say things like:

> The fluent speaker's ability to use and understand speech involves a *basic* mechanism that enables him to construct formal syntactic structures [. . .] and two *subsidiary* mechanisms: one that associates a set of meanings with each formal syntactic structure and another that maps such structures into phonetic representations. [emphasis added] (Katz and Postal, 1964: 2)

Second, the *independence of syntax from the rest of language* was implied by the design of the logical model. Third, the *independence of language from sociological and cognitive contexts* had to be postulated if the grammar alone was to stipulate which sentences were well-formed or grammatical. The abstraction of the language system from language use—prefigured in Saussure's (1916) dichotomy of "langue vs. parole" (II.1.2)—was renewed as "competence vs. performance." Fourth, language was defined as a means of *predication,* i.e., the assigning of "arguments" to "predicates" to form "propositions" (e.g. Jarvella, 1977). The meaning of "propositions" depended on the conditions under which they are true (Chomsky, 1965: 22).

3.8 Chomsky soon went beyond the domain of formal grammar. According to his own testimony (1975), he felt provoked by the "intellectual scandal" of physicalist and behaviorist theories, especially Skinner's. Transformational grammar appeared suitable for the role of a rival theory of human processing. Admittedly, there was no hard evidence that humans produce and understand utterances the same way that the grammar handled sentences. Yet psycholinguistics, a field striving to merge linguistics with psychology (II.1.18), readily took this correlation as a working hypothesis (e.g. Miller, 1962; Mehler, 1963). Soon after, Chomsky's (1965) version of the grammar ventured into extensive psychological implications. Even in his early Skinner review, Chomsky (1959: 56) vacillated: on the one hand, he warned that "the construction of a grammar that enumerates sentences in such a way that a meaningful structural description can be determined for each sentence does not in itself provide an account of this actual behavior"; on the other hand, he considered the "grammar" to be "a statement of the

integrative processes and generalized patterns imposed upon the specific acts that constitute an utterance," and the "rules of the grammar" to be "the selective mechanisms involved in the production of a particular utterance."

3.9 This ambivalence persisted throughout transformational grammar and engendered a double-faced terminology whose formal definitions in the theory were at variance with their commonsense meanings: "competence," "generate," "speaker-hearer," "language acquisition device," and so forth. Ironically, Chomsky fell prey to the same predicament he diagnosed in Skinner (II.2.15): "the terms used in the description of real life" and those of the abstract grammar were often "mere homonyms." The grammatical terms became pervasive, hardly noticed metaphors (cf. I.1.3).[24] The correlation between the grammar and the human mind, like that between logic and language, was simply asserted and accepted as an act of faith. The finding that more complex sentences are harder to process would be predicted by almost any grammar, not just by Chomsky's.[25]

3.10 Chomsky himself apparently considered empirical discovery via observation comparatively inessential. He averred (1965: 15, 19f) that "the description of speech habits" and the discovery of "patterns" in "a corpus of observed speech" could "preclude the development of a theory." "Reliable operational criteria for the deeper and more important notions of linguistics" would never "be forthcoming"; the "sharpening of the data by more objective tests" was "a matter of small importance," since "objectivity can be pursued with little consequent gain in insight and understanding." A better source of evidence was the linguist's "intuitions" as a "native speaker"—an "enormous mass of unquestionable data."

3.11 Though intuitions play some role in most sciences (cf. I.1.8), linguistics was the only discipline to proclaim openly that the "intuitions" of the investigator are "unquestionable data." The supplying of contexts, previously unacknowledged in scientific procedure (I.1.3; II.1.3, 7, 11, 18), came out in the open, but with important restrictions. The bias toward mentalism and formal logic prevented an examination of the really broad contexts of communication in social interaction. On the contrary, Chomsky's approach obscured rather than clarified the correlation between theory vs. empirical evidence observed in everyday language (cf. Beaugrande, 1982d). First, such evidence was "performance," and the theory was directed to "competence"; "psycholinguistics" was expected to explain away discrepancies between performance and competence (Slobin, 1971).

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[24] Chomsky (1965: 9) acknowledged that his terminology had created a "continuing misunderstanding," but saw "no reason for a revision." The "misunderstanding" was apparently an advantage.

[25] Specifically, Chomsky's model predicts that processing times reflect the number of transformations people are doing in their heads to work down to, or up from, "deep structures"; this "derivational complexity hypothesis" was not confirmed (cf. Kintsch, 1974; Levelt, 1978).

Second, the theory focused on "deep structure," whereas real language events provided no evidence except "surface structure," whose nature was repeatedly redefined in "extensions" of the "standard" theory (cf. Chomsky, 1965 vs. 1972 and 1976).[26] Third, contrary evidence could be accounted for by adding new rules and leaving the theory itself untouched. Fourth, the role of context in defining grammatical categories was disregarded (I.4.6; V.2.27; Lenneberg, 1975); the more "abstract" the grammar, the less secure its constructions.

3.12 It would have been necessary to test the more fundamental claims implied by transformational grammar: (a) that the structures of various sentences are derivable from each other by applying formal rules; and (b) that simple structures are more basic to language (and to knowledge of a language) than complex ones. Though seemingly reasonable, these claims may be either trivial or misleading, depending on how we interpret them:

3.12.1 The two claims are *trivial* in the sense that the grammar itself stipulates the same categories for all structural descriptions. Hence, any sentence structure can by definition be derived from any other by manipulating shared categories. The number and elaboration of categories and rules also decide what counts as simple or complex. The two claims are thus inherent in the grammar itself, though so far, no complete grammar of this kind has been designed for any natural language.

3.12.2 The two claims are *misleading* in the sense that the decision to create one sentence structure in preference to any other, e.g. an active vs. a passive, is guided chiefly by meaning and purpose, e.g. the desire to express an event with a particular focus (cf. IV.2.56, 61; VI.1.22); syntactic rules only specify the options. Hence, the operational relationships among different sentence structures are semantic and pragmatic, not just syntactic. Consequently, purely syntactic rules yield no realistic measure of *processing complexity.* (cf. II.3.21ff). What is experienced as simple or complex depends on the total processing demands within the current context, including a person's language skills. "The job of syntax is not central but rather peripheral in ordinary language—merely accommodating lexical decisions made on the basis of the fleeting interests and motivations entertained by speakers" (Osgood, 1971: 529). No one has yet proven that the categories and structures posited by the grammar play a prominent part in normal communication.

3.13 The problem of empirical reality can be illustrated with the common assumption that the *sentence* is the primary unit of speech production and comprehension (Ohmann, 1964a; Bever, Lackner, & Kirk, 1969; cf. sur-

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[26] In the "standard theory" (Chomsky 1965), surface structure was given no role in the interpretation of a sentence. In the "extended standard theory" (Chomsky, 1972), both deep and surface structure were admitted to the interpretation. Most recently, in "trace theory" (Chomsky, 1976), the representation is a single level of surface structure annotated by "traces" that in effect preserve the predicate/argument structure of the sentence as a proposition.

vey in Levelt, 1978). This assumption is not borne out by everyday speech (cf. I.4.11.2; IV.2.17; V.2.18, 30, 33, 45; V.3.7ff; VI.1.10), where the boundaries of phrases and clauses often reflect intonational and conceptual units, not just syntactic ones. This discrepancy obliges the proponents of abstract grammars to manipulate evidence, e.g., to (a) convert it themselves into well-formed sentences; (b) assert that well-formed sentences "underlie" the evidence; (c) exclude any evidence that doesn't happen to be a recognizable sentence; (d) invent their own examples as needed; (e) rely only on a written sampling, where sentences are usually complete and their boundaries well-marked (what Abercrombie, 1965, calls "spoken prose"; cf. II.1.13);[27] or (f) use the term "sentence" inconsistently to mean not just a grammatical structure, but also a predication, a proposition, an utterance action, a speech act, and so forth (cf. Beaugrande, 1980a: 11ff).

3.14 All these recourses can be found in mentalist linguistics. As a result, evidence was subordinated to theory in unprecedented ways. Real discourse came to be regarded as deformed and degenerate (e.g. by Ohmann, 1975: 298; Stockwell, 1977: 168). Paradoxically, this attitude is just as evaluative as that of traditional prescriptive grammar, though for different reasons. The old grammarians unabashedly defended their own usage as "good" and "proper," as meeting the demands of social prestige, elegant diction, and rhetorical effectiveness. The new grammarians propagated their own usage by allowing their language attitudes and social commitments to influence their judgements of grammaticality. People most readily recognize a banal sentence as grammatical, not because they have "internalized" a grammar of "well-formedness," but because they can easily imagine a context where the sentence would be used (Bolinger, 1968; McCawley, 1976; Snow & Meijer, 1977). Therefore, the old grammarians' samples taken from outstanding writers and orators of the day could seem deviant, marginal, or ill-formed to the new grammarians (cf. VI.1.1f) who presented English as a flurry of inane sentences about 'John' and 'Mary'--the star-crossed pair whose ideal, abstract exploits provided the content of linguistic samples for years to come. English was converted from a vehicle of memorable style into an infinite set of banalities.

3.15 With so many empirical limitations, standard transformational grammar can be no more than a *partial theory of literal paraphrase*. Humans would create sentences in ways comparable to the grammar if they had to recast a sentence into a close paraphrase using the same word-stems.[28] This occasion is rare in comparison to looser paraphrasings, re-

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[27] On Olson's recent project to salvage the approach by transferring it from speech to certain kinds of writing, see V[26]and VI[23].

[28] Two syntactic formats may behave similarly, e.g., appositives and relative clauses (IV.3.37), without the one being "derived" from the other, or both from one "deep structure"; at least, establishing such causalities would be an arduous and gratuitous task in view of the more pressing language problems we face.

ports, gists, and so on; and even rarer among the totality of language activities. Chomskyan linguistics was thus forced to exclude major aspects of language and insist on a version of "competence" so narrow as to be irrelevant.

3.16 However, "transformations" could be useful in a broader science of text and discourse not centered on abstract syntax. Configurations mapping from one language level or processing phase to another are presumably "transformed," e.g., when an array of goals of concepts is projected onto a linear surface text, or vice-versa (cf. IV.1.7-9). According to Wundt (1970 [1900]), text production takes a mental configuration (an "idea" in the sense of III.2.14) of simultaneously activated components, organizes it into grammatically or logically related segments within an orderly hierarchy, and finally transforms it into the surface sequence in the text. Other types of transformations have been envisioned that convert: (a) a spatial representation into linear syntax (Degerman & Mather, 1972); (b) a "logical form" into a sentence, as in "generative semantics," a counter-movement inside transformational grammar (cf. papers in Steinberg & Jakobovits [Eds.], 1971); (c) one gestalt-like configuration into another (Piaget, 1976: 130f); (d) the order in which concepts are activated into the order in which those concepts are expressed (Osgood & Bock, 1977: 91); (e) an underlying content hierarchy into a story, as in the "story grammars" developed by cognitive psychologists (see especially Johnson & Mandler, 1980; survey in Beaugrande, 1982d); or (f) a text into an elaborate network of logical representations, as in János Petöfi's (1980) "text-structure/world-structure theory." Some of these transformations also go in reverse. The proposals all concur that transformations need not convert one syntactic pattern into another, but rather a non-linear pattern into a linear one (or vice-versa). This approach to "transformation" deserves more research.

3.17 In language education, mentalism has played a decidedly smaller role than behaviorism. Speculations about an innate "language acquisition device" (cf. Chomsky, 1965: 32, 38) that extracts a "grammar" from linguistic experience implied that language education isn't needed at all. In that case, language teachers have nothing to do; and whatever successes the child attains with language would not go to the credit of the schools. In order to yield an educational tactic, mentalist linguistics had to be combined with behaviorist methods: "transforming" sentences for a specified purpose (cf. V.2.20ff). As Francis Christensen (1963: 155) observed, "the chapters on the sentence" in traditional composition handbooks "all appear to assume that we think naturally in primer sentences, progress naturally to compound sentences, and must be taught to combine the primer sentences into complex sentences—and that complex sentences are the mark of maturity." Accordingly, Chomsky's grammar became a new classroom tool for this old enterprise. Bateman and Zidonis (1963: 2f) experimented with the precept that "generative grammar [. . .] is in essence a representation of the psy-

chological processes of producing sentences"; hence, "pupils must be taught a system that accounts for well-formed sentences before they can be expected to produce more of them." Soon after, SENTENCE-COMBINING was launched by Hunt (1965): the application of transformational grammar to make longer, more elaborate sentences out of shorter, simpler ones.

3.18 In the following years, sentence-combining developed into the largest domain of writing research (cf. surveys in Daiker, Kerek, & Morenberg, 1978; Daiker, Kerek, & Morenberg [Eds.], 1979; Morenberg & Kerek, 1979; Kerek, Daiker, & Morenberg, 1980). This domain promised the *well-structuredness* that makes research problems widely attractive (I.1.3). The method worked with simple statistical tabulations: numbers of words in clauses or in sentences, number of clauses per sentence, and so on. The central entity was the "T-unit," i.e., an independent clause with all materials that depend on it.[29] A "T-unit" could thus be punctuated as a sentence, whether or not the writer did so (compare Hunt, 1964, 1965). Such units are usually easy to recognize in prose passages, and difficult cases can be excluded from the data.

3.19 Hunt's (1964) project "analyzed by transformational methods" the "differences in grammatical structures written at three grade levels"—fourth, eighth, and twelfth grades. He found that "older students increase the length of their T-units by using more subordinate clauses as well as non-clauses"; he concluded that "T-unit length is a more valid index of maturity in writing—at least in the early grades—than is (a) sentence length or (b) clause length [or] (c) the subordination ratio" (1964: 50). Note that "the word 'maturity' is intended to designate nothing more than 'the observed characteristics of writers in an older grade.' It has nothing to do with whether older students write 'better' in any general stylistic sense" (Hunt, 1965: 5). Hunt's special use of the term "maturity" set a trend still beset by controversy today (cf. survey in Faigley, 1980).[30] Mellon (1969: 15f) "stipulatively defines" the "maturity of sentence structure" in "a strictly statistical sense, in terms of the range of sentence types observed in representative samples of student writing." O'Hare (1973: 35) avers that his method "would increase the syntactic maturity in students' free writing." The group at Miami University (Oxford, Ohio) holds that, of the three measures of-

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[29] The "T-unit," a "terminable" sequence that could be a "terminal string" (sentence) in transformational grammar (cf. Hunt, 1965) suppresses the empirical fact that the writer did put periods in some places and not in others. The distinction between the period vs. the means for linking independent clauses (semicolon, co-ordinative junctive) is sacrificed along with the conceptual and pragmatic motives that influence sentence boundaries. At least, a new theoretical justification for this alteration of the data is needed, now that the original theory has declined (II.3.44).

[30] Faigley (1980: 293f) found, for example, that cookbooks yield ratios below Hunt's figures for fourth graders.

fered by Hunt (cited above), "the single most accurate index of syntactic maturity for writers beyond the high school level is clause length, the mean number of words per clause," while "T-unit length" is "the second most accurate index," and "subordination ratio" is not "reliable" "at the post high school level" (Daiker et al., 1978: 39).

3.20 Like many terms of transformational grammar (cf. II.3.9), the term "maturity" in these studies is given a theoretical definition at variance with its everyday meaning. "Maturity" normally designates a furthering of the processes traversed between childhood and adulthood. Sentence-combining researchers have taken one common, but not necessary, *symptom* of these processes and interpreted it as a *cause* or at least as a *defining feature.* Their thesis is then: "if children in lower grade level intensively practice that skill which enables older—more 'mature'—students to produce writing characteristic of *their* own level, then such practice will help accelerate the younger children's maturation as writers" (Kerek et al., 1980: 1068). Though educational methodology typically hopes to force "growth" via behavioral drills, the theoretical justification is by no means obvious. Older students typically smoke more tobacco, drink more alcohol, and commit more vandalism than younger students do; but no one proposes teaching the younger ones to act out these symptoms in a classroom in order to "accelerate their maturation." External differences at various age levels should figure in education only if we can explain the relevance of the observed or rehearsed behavior to cognitive and social advancement.

3.21 By themselves, the tabulations in sentence-combining research (II.3.19) only indicate *syntactic complexity.* Counting the number of *different* structures would measure *syntactic variety.* The *rate* and *smoothness* with which students create sentence structures would yield measures of *fluency* and *fluency* of syntax (cf. II.2.5). But these measures are all we can determine simply by counting, and whether they are relevant contributors to "mature" writing" is still an unproven hypothesis. Several disputes bear on that hypothesis.

3.22 First, the particular tabulations are open to challenge. Christensen (1968) found his notion of a "mature style" was reflected not in the dependent clauses, but in *free modifiers* (adjuncts appended to entire clauses), especially in sentence-final position (compare Johnson, 1969; Wolk, 1970; Faigley, 1979a, 1979b). Shaughnessy (1977: 187-225) defined writing maturity by the size and variety of *vocabulary:* the types, not the numbers, of words in the text (cf. Grobe, 1981; Nelson & Piché, 1981); word-frequency statistics (e.g. Kučera & Francis, 1967) could be used to measure the rareness of a writer's choices. The word counts also ignore how length and complexity adapt to a particular *mode of discourse* (cf. Crowhurst & Piché, 1979; Faigley, 1980; Witte & Davis, 1980). Finally, the *role of the writer* must be kept in view. Syntactic proportions do not make Ernest Hemingway less "mature" than Edward Gibbon (cf. Hayes, 1969). Short,

simple sentences can be the sign of the mature "tough talker," while the immature "sweet talker" and the dehumanized "stuffy talker" tend toward long, complex ones (Gibson, 1966). All these considerations suggest that the usual tabulations do not equal maturity.

3.23 Second, complexity shifts are not the only differences linked with age level, nor are they necessarily so. Loban's (1976) twelve-year longitudinal study observed a general rise in complexity with increasing age, but specific constructions proved to be unreliable signals. Higher numbers of dependent clauses appeared as time passed and correlated with the higher abilities of students as gauged by other tests—but only for *spoken* language (cf. II.3.24). In *written* language, these increases leveled off by eighth grade and disappeared by tenth grade, long before the college level. Thus, specific constructions may indicate maturity for some writers, but not for others. For instance, a writer might prefer the "free modifiers" counted by Christensen over the "dependent clauses" counted by Hunt and his successors (II.3.19); the additive construction may have the same implications for maturity as the hierarchical one (cf. Faigley, 1980: 296f):

> Frequency count indicators of growth become equivocal when applied to specific usages, because linguistic devices are often substitutable for one another, so that the increase in the use of one may result in the decrease in the use of another. (Bereiter, 1980: 76)

Moreover, Witte and Davis's (1980) study suggests that syntactic complexity is not a stable trait of a person, but varies to fit different contexts (cf. II.3.37, 41f; IV.2.60; VI.1.11).

3.24 Third, complexity correlates with social standing (Beaugrande, 1981d). The higher syntactic complexity of middle-class speech over working-class speech was observed by Basil Bernstein (1962: 225ff) on precisely such indicators as number of dependent clauses. Oevermann (1970) found the same correlation for German school children. Apparently, the long contact of middle-class speech with the modality of writing has led to an elaboration of syntactic options for differences that working-class speech maintains with intonation and non-verbal signals. Perhaps sentence-combining researchers harbor the ambition to foster upward social mobility as well as maturation. If so, they should gather more extensive sociological data about their enterprise (II.3.29).

3.25 Fourth, there is good evidence that a rise in syntactic complexity need not improve writing quality (cf. Perron, 1974; Callaghan, 1977; Sullivan, 1977; Stewart, 1978). Readers react to complexity in various ways (cf. Nold & Freedman, 1977). Sentence-combining might bewilder students with so many structures that "they lose control of their sentences" (Maimon & Nodine, 1979: 240). An extreme gap between complexity and quality was found among Gosnave's (1977: 43f) aphasics who insisted on displaying their syntactic accuracy, fluency, and complexity, despite instructions "to

utter simple (that is, kernel) sentences"—yet their discourse was largely incoherent.

3.26 Fifth, unskilled writers may uncritically equate "good writing" with complexity and struggle so hard that they attain the opposite effect (cf. II.3.46; VI.1.28):

> The inexperienced writer draws on the same passive constructions, the same circumlocutions as the bureaucrat, who uses these syntactic strategies deliberately, as a way of blurring and suppressing information. How ironic it would be if so-called "remedial" English were to produce no more than a mastery of bureaucratic syntax! (Shaughnessy, 1977: 87)

Bureaucratic syntax illustrates how complexity can damage readability (cf. Flesch, 1972; Williams, 1979b; Faigley, 1980; II.3.33; III.3.16; V.2.35; VI.1.26). Shaughnessy (1977: 77) compared sentence-combining to "finger exercises on piano" and cautioned that writers may "self-consciously decorate their thoughts rather than developing them." In Williams' (1979a: 28f) test population, all the teachers from highschools and most from colleges gave high evaluations to the heavily nominal style often criticized in classes and handbooks. Williams noted teachers "apparently take a nominal style as evidence of thoughtful mature writing" (cf. also Freeman, 1981; Nelson & Piché, 1981). If so, their quality judgements contradict the style they recommend to students. Williams added that nominalizations increase the ratio of words per clause—the key measure of maturity in sentence-combining research (cf. II.3.19).

3.27 Sixth, research has to control all the other factors and variables besides sentence-combining that affect the quality or maturity of student writing. The massive study at Miami University was a model of circumspection. A control group (who read and analyzed essays, discussed rhetorical principles, and studied modes of developing essays) ran alongside the experimental group (who did only sentence-combining all semester). Some 48% of the subjects were tested 28 months later for lasting effects. The researchers also controlled for a stunning range of variables: holistic vs. analytic ratings; students' scores on the ACT composite and SAT verbal tests;[31] instructors' experience, teaching abilities, age, sex, academic rank, and degree; the testing room's location, architectural style, temperature, light, comfort, and noise level; the time of day for the testing; and so on (cf. Kerek et al., 1980: 1086-1090, 1107-1120, and 1131f). Papers were rated for five entire days by 28 independent judges with advanced degrees and demonstrated expertise. Papers were so coded that the judges couldn't tell which group or test occasion was involved. Every paper was graded four times analytically and four times holistically, each time by a different judge.

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[31] On the poor predictive power of these tests, see I[20].

The judges were trained to use a uniform scale and grade each paper on its own merit, disregarding the factors of photocopy quality, handwriting, neatness, spelling, titles, and outlinings (Kerek et al., 1980: 1112).

3.28 This exemplary thoroughness proved rewarding. The experimental group outscored the control group not only on the conventional measures of syntactic complexity listed in II.3.19, but also on the both the holistic and the analytic ratings, including criteria whose relation to syntax is far from obvious (Kerek et al., 1980: 1111):

(a) "ideas: the extent to which the ideas of the essay are mature, insightful, and clear";
(b) "supporting details: the extent to which the ideas of the essay are supported by examples and details which are specific, appropriate, and fresh";
(c) "organization and coherence: the extent to which the thesis is developed in an orderly and logical way and to which sentence is linked to sentence and paragraph to paragraph through effective transitional devices";
(d) "voice: the extent to which the essay speaks with individuality and distinctness of tone" (cf. I.2.8.6);
(e) "sentence structure: the extent to which variety, maturity, and effectiveness of sentence structure is [sic] achieved"; and
(f) "diction and usage: the extent to which wording and phrasing are accurate, expressive, and concise, and to which the conventions of standard English are observed."

Only the "variety of sentence structure" mentioned in (e) directly relates to the syntactic manipulations stressed in sentence-combining. Still, the experimental group fared better on every criterion except (c) (Kerek et al., 1980: 1116f), even though the control group studied content organization, diction, usage, and rhetoric with the aid of McCrimmon's (1976) *Writing with a Purpose*.

3.29 The Miami study accounted for almost every factor except social variables (II.3.24). They might have probed social class status of the writers, not just verbal test scores (cf. I.3.1ff). Or, they could have selected judges from non-academic environments like industry and commerce, whose opinions would differ from those of English teachers (cf. Diederich, French, & Carleton, 1961; Faigley et al., 1981; Hairston, 1981). In any case, what we need now is not further studies that *replicate* the results of the Miami group, but studies that *explain* such results. Until then, the recommendation that "college courses" should "use sentence-combining" as the central "organizing principle of the syllabus" (Kerek et al., 1980: 1148; cf. Daiker, Kerek, & Morenberg, 1981) seems premature.

3.30 Several explanations are worth pursuing. The most facile would be the "Hawthorne effect": spurred on by the novelty, discovery, and conspicuousness of their performance, an experimental group usually out-performs

a control group.[32] The Miami study was a publicized, well-funded project in a small Ohio college where innovation would attract attention. But the Hawthorne effect could function only if the experimental group also knew how to manipulate the six criteria listed in II.3.28—i.e., if they already possessed such writing expertise that they shouldn't have been able to improve so markedly (indeed, shouldn't need composition instruction). An increase in motivation couldn't be decisive without the means to raise one's writing quality.

3.31 Another facile explanation is that the experimental group did more writing while the controls were reading and analyzing essays (cf. Kinneavy, 1979a: 11). This account would agree with the behaviorist view that "conditioning" leads to learning in proportion to the "frequency of trials" (cf. II.2.5); and with the information-processing view that extended trials render processing "automatic" and hence more rapid and efficient (cf. III.1.21). However, some research shows that writing practice alone need not improve quality (e.g. Heys, 1962; Arnold, 1963), just as repetition is no guarantee for learning (cf. II.2.27; III.1.28; IV.2.38). Practice might simply rehearse disadvantageous strategies and impede progress by locking the student into bad habits (I.2.23.3). In sum, we can reject this explanation also.

3.32 A more interesting explanation advanced by Kinneavy (1979a: 11) is that the results tell us more about judgments of English teachers than about quality of student writing. Superior holistic ratings correlated heavily with superior sentence structure from analytic ratings.[33] Kinneavy (ibid.) opines that ordinary English teachers, whatever they say they grade for, "really seem to grade a theme by the quality of its sentence structure"; "maybe English teachers are not the great judges of a theme that they are usually assumed to be. Conceivably, by quite specific norms, [e.g.,] factual and organizational criteria such as are used to judge the usual newsstory in journalism, or the rigid evidence that a scientist might require, or the careful definitions that a logician might demand in a classification paper, these papers might rate as vacuous, illogical, and undefined."[34]

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[32] The "Hawthorne effect" got its name from a study of working conditions vs. fatigue and monotony in the Hawthorne Works of the Western Electric Company in Chicago (Roethlisberger & Dikson, 1939).

[33] Kinneavy's (1979a: 11) published figure of 64% variance-accounted-for came from an early draft of Daiker et al. (1978). According to Kerek (personal communication), the figure was withdrawn when regressions showed it to be unreliable. All the same, the study itself suggests that holistic scoring contains a strong reaction to sentence structure. Research is certainly necessary on how a holistic score really emerges (cf. Freedman & Calfee, 1982).

[34] The copies of papers from the Miami project, kindly sent to me by Kerek, show that the students were writing personal essays on topics like "escaping from reality." Kinneavy's scientific, journalistic, and logical "norms" don't fit such papers, so that his suspicion quoted here can't be resolved. I can detect little difference in the basic content organization between pretest and post-test, but then I am not accustomed to assigning such topics and therefore am not well qualified to rate the papers.

3.33 Kinneavy's reservation is important. There can be no such thing as writing quality in a vacuum, but only for a given audience with particular expectations, values, and requirements (I.3.13). Hake and Williams found that English teachers rewarded the nominal style they "perceived as better organized, better supported, and better argued than the corresponding verbal paper" (Williams, 1979a: 28; cf. II.3.26). Yet nominalizing a paper scarcely affects how its content is organized or argued. Moreover, nominal style was found by Coleman (1964) to be harder to read than verbal; and is a notorious encumbrance in bureaucratic writing (VI.1.28). Accordingly, intensified research on the evaluative practices of English teachers is pressingly required (cf. I.2.19ff; I.3.13-20).

3.34 Still another explanation was tendered by the Miami group itself. Unlike most sentence-combining studies in the past, the Miami effort strove to integrate into sentence-combining some rhetorical considerations: "style, purpose and thesis, organization, logic and coherence, tone, punctuation and grammar, even diction" (Kerek et al., 1980: 1100). Sentence-combining may be neutral or negative unless students have clear motives for deciding when and whether sentences should be combined (Beaugrande, 1979b; Kinneavy, 1979b; Williams, 1979b; cf. II.3.26, 46). Measures of "rhetorical effectiveness" can hardly be attained by counting words in "T-units."

3.35 The most interesting explanation, in my view, is that a general process model of cognition and communication might allow us to define the relationships between sentence-combining and the criteria enumerated in II.3.28. Researching this point is far more urgent than replicating the usual projects (II.3.29). I shall try to outline first the theoretical and then the practical conditions under which sentence-combining might have a positive influence upon the overall complex activities of writing and writing instruction.

3.36 The first theoretical possibility is that sentence-combining brings to *conscious awareness* the syntactic formats that the student has already acquired for speech and now needs for writing (Shaughnessy, 1977: 78), especially since the latter modality is typically more complex and hierarchical than the former (V.3.13; VI.1.10). Proper sentence-combining practice could help students transfer their syntactic expertise from a familiar activity to an unfamiliar one. Their speech is often articulate, varied, and elaborate, but their writing suffers from inhibition and overload that lead to deceptively simple sentences. Explicit, orderly tactics to break apart or build up sentences are easier to follow than unqualified demands to revise or reword a passage, or to imitate models taken from skilled writers whose achievement looks unattainable.

3.37 Second, sentence-combining should, by raising awareness (II.3.36), increase the *familiarity* of syntactic patterns. Their *experiential complexity* would then be lower, though their *structural complexity* would remain constant (cf. II.3.12.2; III.3.2.7; III.3.4.3). Practice in constructing

elaborate sentences should render part-whole relationships easier to recognize and manipulate, and again combat overload (cf. Maimon & Nodine, 1978, 1979).

3.38 Third, the training could improve the *fluency* and *frequency* of writing sentences (cf. II.2.5; II.3.21), provided control increased also (Epes, 1981: 142). Writing either too smoothly and rapidly or too slowly and jerkily is equally risky. We need a method to define a strategic rhythm for the individual writer. The "speech rhythms" Jaffee (1977) observed to persevere for each person despite shifts in motivation, fatigue, attention, and mood, may correspond to personal "writing rhythms" (cf. Matsuhashi, 1979),

3.39 Fourth, greater familiarity and fluency, and lower anxiety, should improve students' *confidence* about managing sentences, and make it easier to vary, experiment, and innovate. Many students have been intimidated and feel incompetent to use grammar (cf. I.2; V.2). Explicit steps that demonstrate the formation of grammatical patterns can correct these negative outlooks. Discerning judgements can be made about non-strategic options within the grammar of the language, e.g. (Chomsky, 1965: ll):

(9) I called the man who wrote the book that you told me about up.
(10) The man who [sic] the boy who [sic] the student recognized pointed out is a friend of mine.

Students learn not to strive for sentences so complex as to be impractical (cf. II.3.46; VI.1.28).

3.40 Fifth, the training could promote *variety* (cf. II.3.21), such as the "elegant variation" traditionally prized in writing (cf. Fowler, 1965: 148ff). However, Fowler warns that variety for its own sake may be gratuitous, even damaging. Writers do better to consolidate a redundancy, e.g. in (11), than to hide it behind variation, e.g. in (11a):

(11) Vincristine *makes the patient* tired *most of the time* and *keeps the person* nauseated, too.
(11a) Vincristine makes the patient tired and nauseated most of the time.

Fowler inveighs against writers who are "intent on expressing themselves prettily rather than conveying their meaning clearly." Clarity sometimes demands stability, not variety, e.g. in *parallelism* (cf. IV.2.40). Variety should be used moderately as needed to prevent syntactic monotony.

3.41 Sixth, sentence-combining could be applied to controlling the *informationality* of a text: the rate at which new materials are added to what has been said so far. Short, simple sentences are suitable if readers might find the content difficult or unfamiliar; or if the writer wants to convey the impression of important content, e.g. Gibson's "tough talkers" (II.3.22) or newspaper writers (remember Hemingway's background as a journalist). Longer, more complex sentences go better with easy or familiar content (IV.2.60; IV.3.12, 17). Dependent clauses are good for incidental or uncon-

tested materials, as in Posner's (1980: 389) illustration, where the fact of the 'crossing' is taken for granted:

(12) That the soldiers crossed the border surprised even the intelligence service.

Only if informationality is kept constant does a structurally complex sentence exceed the processing load of a simpler one.[35]

3.42 Seventh, it follows from II.3.41 that sentence-combining could also aid in controlling the *chunking* of discourse (cf. I.4.5, 11.2; III.1.10; III.3.2.7). Sentence boundaries often, though not always, function as conceptual boundaries as well (cf. Goldman-Eisler, 1972: 111; Butterworth, 1975: 82; Just & Carpenter, 1980: 345f). The components of an event naturally form a chunk, and may readily fit into a sentence. Bransford and Franks found that readers who had seen a series of short sentences about one event, e.g. (13), believed they had seen a single long sentence, e.g. (13a) (Bransford & Franks, 1971: 332):

(13) The rock rolled down the mountain. The rock crushed the hut. The hut is at the river. The hut is tiny.
(13a) The rock that rolled down the mountain crushed the tiny hut at the river.

as if the memory itself does some sentence-combining on occasion[36] (cf. also Franks & Bransford, 1972; Griggs, 1974). Simple sentences are easier to read, but soon lose any advantages in speed or accuracy for answering content questions (Kintsch & Monk, 1972; King & Greeno, 1974). These various findings suggest that the length, complexity, and type of sentences affect the shallow, earlier stages of reading; more profound, lasting effects result from the density and integratedness of content.

3.43 Eighth, syntax is *operationally integrated* with the other levels of discourse processing (III.2.3ff). An evolution in syntactic capabilities could create favorable, though not obligatory, conditions for an evolution on other levels. For example, the ability to form complex sentences could support the ability to create compact hierarchies of conceptual content, as skilled adult writers do more often than children (Caccamise, 1981).

3.44 If we admit, pending new research, that the eight possibilities enumerated in II.3.36-43 could offer a theoretical basis for the positive effects of sentence-combining, the findings of the Miami project begin to make sense. Judges saw improvements in "ideas," "supporting details," and "or-

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[35] Taylor (1969) showed that latencies and pausings during sentence production correlated with topic difficulty rather than with length (number of words), structural complexity (determined by "immediate constituent analysis," e.g. N. Johnson, 1965, 1966; cf. II.1.13), or sentence type (simple active affirmative declaratives vs. passives, negatives, passive negatives, etc.). Compare II.3.12.2.

[36] In fact, the short sentences were interspersed among passages not even belonging to the same story. Yet the confidence in recognition was strongest for the combined versions like (13a).

ganization and coherence" because syntax was better used to control informationality (II.3.41) and chunking (II.3.42). "Voice" and "diction" could improve though syntactic variety (II.3.40) and personal confidence (II.3.39). "Usage" could profit from a rise in the familiarity of available formats (II.3.37) and in the fluency to handle them (II.3.38). Of course, these correlations are speculative until they are empirically tested. Theoretical research on sentence-combining is particularly urgent now that its original foundation, transformational grammar, no longer seems a viable theory of language.

3.45 On the practical side, the success of sentence-combining depends on a carefully designed approach. For one thing, the basic sentences to be combined should be *spontaneous, naturally occurring samples* students might actually write, not the unrealistic, forced constructions found in some experiments. Incautiously reducing complex sentences to basic ones for the students to recombine can produce versions that distort the original meaning (O'Hare, 1973: 90ff):[37]

(14) The assignments were English [vs. the English assignments].
(15) The reports were written [vs. the written reports].
(16) The formations were rising hundreds of feet into the air [vs. the formations rising hundreds of feet into the air].

Despite linguists' claims that transformations are "meaning-preserving" (Olson, 1977b: 19), such transmutations can alter or distort the sense by converting modification into assertion —a pragmatic distinction overlooked in a narrow syntactic theory (cf. II.3.12.2). In (14), assignments seem to hail from Great Britain; in (15), an action is announced rather than a kind of object; and in (16), the scenic marvels (according to O'Hare, already "one of Asia's greatest wonders") evoke redoubled amazement by quitting their moorings and floating aloft. Oddness results also from the placeholders needed to fill out grammarians' rules (O'Hare, 1973: 81-92):

(17) Most teachers have learned something.
(18) Something was only preliminary to something sometime.
(19) A grammar is supposed to account for something and something.

Real writers would produce such sentences only with satiric intent: an overview of teacher education (17), a "stonewalled" passage from a government statement (18), or the lesson we learned from mentalist linguistics (19). Yet the combined sentences students make out of these samples carry no sarcastic intent.

3.46 Another practical requirement for sentence-combining is to con-

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[37] O'Hare (1973: 37) used "sentences virtually identical to those written out by Mellon's group" (cf. samples in Mellon, 1969). But Mellon was after all working directly with and from the linguistic theory; O'Hare was not, and should have designed more realistic samples.

trol the danger of gratuitous, muddled complexity. A sample like (O'Hare, 1973: 91):

> (20) The princely heron, perched high on a rocky ledge whose height enabled the bird to survey the swirling blue-white waters that were below on three sides, tensed its wings for the spectacular plunge soon to be triggered by a school of approaching fish.

is too awkward and too redundant ('high/height', 'soon/fast approaching') to be a model for student writing. Shortening sentences and removing dependent clauses makes it not less "mature," but more readable:

> (20a) The princely heron perched high on a rocky ledge and surveyed the swirling white blue waters below on three sides. The wings tensed for the spectacular plunge toward a fast approaching school of fish.

Complex samples can also be confusing, e.g. (O'Hare, 1973: 89):

> (21) Connie's constant chattering, which kept the hunters from hearing where the dogs were running, irritated the men, who swore (that) they would never take her hunting again.

where the involved syntax leaves it unclear if all the 'men', or only some of them, were 'hunters'. Students who conclude that syntactic complexity is worth any effort should see nothing wrong with:

> (21a) The hunters were kept from hearing where the dogs were running, as they swore that never again would they take constantly chattering Connie who irritated the men hunting.
> (21b) Connie who constantly chattered and who kept the hunters who swore never to take her hunting again from hearing the dogs that were running irritated the men.

With 4 dependent clauses apiece, (21a) and (21b) are both more "mature" than (21) with 3 such clauses, according to Hunt's "subordination ratio" (II.3.19). The point should be clear. Without a clear rhetorical account of when complex sentences are or are not appropriate, sentence-combining offers no guarantee that writing quality will improve (II.3.39). I have to discourage my students from straining for ungainly, unnecessary complexity:

> (22) You go to registration at a time which is always inconvenient that is assigned by the office.
> (23) There are also parts of the body, of which the appendix is a good example, which are supposed to be remnants of organs that were useful to our ancestors, and which although no longer any use to us have not yet disappeared.

This striving can lead to sentence errors such as fragments and comma splices (V.2.35, 41).

3.47 Clearly, sentence-combining should not consist of pasting odd, silly basic sentences, e.g. (14-19), together into tangles of complexity, e.g. (20-21b). Instead, students should deploy strategies to combine their own

spontaneous sentences as a solution to problems in phrasing, chunking, and redundancy. Sentence fragments can be integrated into nearby sentences (V.2.36):

(24) I guess that's what makes a classic a classic. The ability to look completely different depending on how it's used. (D'Angelo, 1979a: 571)
(24a) I guess the ability to look completely different depending on how it's used is what makes a classic a classic.

Comma splices (25) usually link clauses that should be chunked into one sentence (25a), rather than broken up by replacing the comma with a period (25b) (V.2.43):

(25) The school didn't financially support the paper, all costs were raised by the journalism class.
(25a) The school didn't financially support the paper, since all costs were raised by the journalism class.
(25b) The school didn't financially support the paper. All costs were raised by the journalism class.

The vague 'this' at the start of a follow-up sentence (26) can be clarified more concisely by combining (26a) than by inserting a head noun (26b):

(26) They must know what they're doing at all times. This can be quite a problem. (15 words)
(26b) Having to know what they're doing at all times can be quite a problem. (14 words)
(26a) They must know what they are doing at all times. This requirement can be quite a problem. (16 words)

Needless words and redundancies can be eliminated by combining two or more sentences into one (VI.2.28, 31):

(27) Polygamy is a marriage in which one person is married to more than one person. A husband would have several wives, or a wife would have several husbands. Either way, the marriage is illegal.
(27a) Polygamy is an illegal marriage in which one spouse has two or more wives or husbands.

Such applications integrate sentence-combining into the framework of writing overall as a useful remedy for commonplace problems— rather than as an exercise unrelated to natural writing (cf. Moffett, 1968).

3.48 Mentalism, like behaviorism, has left behind some tenets that deserve to be respected by future research, such as:

3.48.1 "Linguistic theory is concerned with discovering a mental reality underlying actual behavior" (Chomsky, 1965: 4).

3.48.2 "Linguistic theory" "presents certain empirical hypotheses" that "aim to categorize the schematism that the mind imposes in examining the data of sense and acquiring knowledge of language" (Chomsky, 1975: 13).

3.48.3 "A grammar of a language" should "provide an explicit analysis" of "how a sentence is understood" (Chomsky, 1965: 4f).

3.48.4 The most striking aspect of "linguistic competence" is "the creativity of language" (Chomsky, 1966: 11).

3.48.5 "It is questionable whether the theory of meaning can be divorced from the study of other cognitive structures" (Chomsky, 1975: 23; cf. I.4.6).

3.48.6 What speakers may say at a single moment need not reflect the extent of their knowledge ("competence") about the language (cf. Chomsky, 1965: 4f).

3.49 Though mentalism, again like behaviorism, offered only a small part of the total picture of language, some of its central notions remain useful. Its limitations should not blind us to the contributions it can make to future investigations.

III

The Procedural Approach

1. DESIGNING A MODEL

1.1 Text production has been investigated relatively seldom (Fodor, Bever, & Garrett, 1974: 434; Goldman, 1975: 289; Osgood & Bock, 1977: 89; Rosenberg [Ed.], 1977a: xi; Levin & Goldman, 1978: 14; Kintsch, 1982: msp. 3).[1] It is not easy to control or to sort into component processes. As a task, text production is typically OPEN (adapting to a steadily evolving situation) rather than CLOSED (fixed for all situations) (cf. Poulton, 1957; Gentile, 1972; Schmidt, 1975; I.1.3); and OPEN-ENDED (not terminating definitively at a particular moment) rather than CLOSED-ENDED (with an obvious end) (Horowitz & Berkowitz, 1967: 207; cf. III.1.26; III.3.2.12). Text production is normally SPONTANEOUS (reacting to ongoing context) and EXTEMPORANEOUS (improvised, not previously prepared). When the production of one text follows upon reception of another, the two processing acts may be hard to sort out (Rosenberg, 1977b: 89). For all these reasons, it is unclear how far EXPERIMENTAL conditions can be comparable to the NATURAL conditions of text production (cf. II.2.8, 33; II.3.27; III.2.40; IV.1.9; IV.2.16, 21; V.1.13f, 19; VI.1.29f; VI.3.20ff).

1.2 In the experimental literature, most investigators presented test subjects a "stimulus" whose "response" was, or included, producing a text. The most common "dependent variables" whose quantity the experimenters were trying to predict were the test subjects' (a) *latency,* also called *reaction time* (how long they take to get started); (b) *time on task* (how long they take to get finished); and (c) *error count* (how often they go wrong).[2] Some common experimental designs were:

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[1] "Msp." indicates page numbers cited from a manuscript in press.

[2] Errors were usually defined as failures to follow instructions, or as observable "speech disruptions," e.g. false starts or 'uh's (cf. Mahl, 1956; Maclay & Osgood, 1959; V.3.12).

1.2.1 Duplicating a message. Subjects have to memorize and then utter a *whole sentence* (Lackner & Levine, 1975). A variant with a shorter span is *shadowing,* where people immediately repeat an acoustically presented message (Cherry, 1953; Broadbent, 1958; Neisser, 1967). Early research indicated that shadowing worked from a direct auditory trace of the message, but soon, the impact of conceptual content (Treisman, 1969) and personal involvement (Moray, 1959) became evident.

1.2.2 Using components in a message. The experimenter provides only *key words* that test subjects are to use in a sentence or utterance (Taylor, 1969; Gosnave, 1977). The sentence may have to define the key words (Reynolds & Paivio, 1968). Or, the experimenter provides *key clauses* to be combined into sentences (Opačić), 1973; Osgood & Bock, 1977) or completed to make sentences (MacKay, 1966). Or, the experimenter provides *key sentences* that must be used in a longer discourse (Levin, Baldwin, Gallwey, & Paivio, 1960). The sentence may be required in a particular place, e.g., at the end of the discourse (Osgood, & Bock, 1977; Tetroe, 1981).

1.2.3 Recasting the presented message. Test subjects are asked to *paraphrase* presented sentences (Martin & Strange, 1968; Gleitman & Gleitman, 1970; Fillenbaum, 1971, 1974). A less controlled variant is retelling in one's own words a *whole story* (Bartlett, 1932; Mandler & Johnson, 1977; Thorndyke, 1977; Mandler, 1978; Stein & Policastro, 1982; cf. surveys in Thorndyke & Yekovich, 1980; Beaugrande, 1982d). At present, these studies mainly concern comprehension and recall. The retelling as an act of production is less often in focus (e.g. Kintsch & Van Dijk, 1978; Beaugrande & Miller, 1980).

1.2.4 Verification of a message. In the paradigm of "sentence verification," subjects must say if the statement conveyed by a sentence is "true" or "false" in everyday life (e.g., 'Pines have purple needles') or in a presented picture (e.g., 'The star is above the plus') (Trabasso, Rollins, & Shaughnessey, 1971; Clark & Chase, 1974; Carpenter & Just, 1975). Latency and error presumably reflect the processes of comprehending the sentence and then searching out and comparing relevant knowledge in memory (Clark & Clark, 1977: 111f).

1.2.5 Responding to events or objects in a visual scene (cf. II.2.5). Test subjects describe in words what they see. The scene may be staged (Carroll, 1958; Levin, Silverman, & Ford, 1967; Osgood, 1971), or portrayed in pictures (Goldman-Eisler, 1961a; Fenz & Epstein 1962; Prentice, 1967; Turner Rommetveit, 1967; Tannenbaum & Williams, 1968; Flores D'Arcais, 1974; Kowal, O'Connell, & Sabin; 1975) or in films (Loftus, 1975). Many studies used "TAT" ("Thematic Apperception Test") cards whose pictures are calculated to raise particular topics (e.g. Benton, Hartman, & Sarason, 1955; Cervin, 1956; Sauer & Marcuse, 1957; Pope & Siegman, 1964; Martin & Strange, 1968). Most picture-response studies probed text production less than accompanying behavioral effects, e.g., of audiences approving vs. dis-

approving (Cervin, 1956); of speakers knowing or not knowing that they're being recorded (Sauer & Marcuse, 1957); of personal stress aroused by the topic (Fenz & Epstein, 1962); of using or not using key words (Martin & Strange, 1968); plus the physiological measures enumerated in III.1.4. More recent studies have probed how picture content is expressed in speech (Nelson, Reed, & McEvoy, 1977) or writing (Mosenthal, Davidson-Mosenthal, & Krieger, 1981; Mosenthal & Na, 1981).

1.2.6 Monologues. Test subjects receive a discourse topic and have to produce a monologue (Kanfer, 1959, 1960; Miller, Zavos, Vlandis, & Rosenbaum, 1961; Miller, 1964; Vlandis, 1964; Geer, 1966). These tests also focused on behavioral variables. Kanfer studied stress by applying electric shocks and clocking heartbeat and eye-blink. Miller, Vlandis, and their associates studied the impact of approving vs. disapproving audiences. Reece and Whitman (1962; cf. Reece, 1964) even asked for monologues composed of disconnected words.[3]

1.2.7 Dialogues. Test subjects are required to participate in a dialogue with the experimenter or with the latter's confederates. The most common situation was the *interview* (Krause & Pilisuk, 1961; Allen, Wiens, Weitman, & Saslow, 1965; Kasl & Mahl, 1965; Pope & Siegman, 1965, 1966, 1968; Cassotta, Feldstein, & Jaffee, 1967; Cook, 1969). Control can be tightened by making subjects answer a list of questions (Turner & Rommetveit, 1967; Fillenbaum, 1968; Ervin-Tripp, 1970). Sometimes, the dialogue is staged in a therapy session (e.g. Mahl, 1956; Panek & Martin, 1959; Drennen & Wiggins, 1964; Pope & Siegman, 1966), especially if the experimenters specialize in treating mental patients. Once more, text production was chiefly a vehicle for studying stress, anxiety, and so forth. However, recent probes demonstrate how interviews help to explore discourse (Labov & Fanshel, 1977; Wodak, 1981) and writing (Freedman, 1981; Odell, Goswami, & Herrington, 1982).

1.2.8 Self-commentary. Finally, text producers can be asked to report what they do (Lay & Paivio, 1969; Kowal et al., 1975; Daly, 1977; Flower & Hayes, 1980; Caccamise, 1981). Self-commentary suffers the limitations of introspective verbal reports (cf. Nisbett & Wilson, 1977, vs. Ericsson & Simon, 1980; Allport, 1980a).[4] Many operations are too intricate and rapid to be consciously monitored and reported, e.g., memory searches for content

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[3] Evidently, Reece preferred free associations (a common notion in the psychology of the times) over syntactic patterns because the latter present difficulties in deciding what counts as a single unit.

[4] Nisbett and Wilson argue that verbal reports are hard to disconfirm, and would be accurate only if "influential stimuli" are salient and plausible causes of "responses." Ericsson and Simon reply that verbal reports would be reasonably accurate unless the verbalization directs attention to processes that wouldn't normally receive it, so that people are inferring rather than remembering, and the reports are too general. The debate is inconclusive, since Nisbett and Wilson cling to behaviorist assumptions, while Ericsson and Simon adopt a cognitive approach.

(cf. III.3.10ff). Automatic processes are not open to conscious surveillance (III.1.21). The text producer might have an inaccurate impression, or want to make processing appear more orderly than it is (II.3.3). A logical analysis may miss the issues involved in an operational procedure (I.4.13). Producing the report itself adds another layer of organization to the experience (I.2.23.5). For all these reasons, self-commentaries can re-shape or distort the processes they recount.

1.3 How far the findings from the experiments surveyed in III.1.2.1-7 apply to natural discourse is the main question for future research. At least three prospects seem plausible. Laboratory experiments might be: (a) less complex than everyday actions, because the experimenter requires simple, context-free tasks; (b) more complex than everyday actions, because people don't have ready-made routines to apply; or (c) complex in a novel way not directly comparable to everyday actions.[5] For example, repeating sentences is highly controlled, but also highly unnatural because of excluding normal decision and selection. Key words and paraphrases allow more variation, but are used more often in real discourse, e.g., in discussions or explanations. Monologues and dialogues are quite natural, but also quite complicated, even if the interviewer intervenes. There may be a frustrating trade-off: the more controlled the experiment, the less its findings can be generalized to natural discourse. An experiment that focuses on the syntax of isolated sentences and discounts the meaning and purpose of real discourse is likely to indicate a far more detailed and thorough processing of syntax than is done in normal communication (Johnson-Laird & Stevenson, 1970; cf. II.3.7, 12.2; V.2.16)

1.4 A battery of physiological, psychological, and social evidence was gathered during (or soon before or after) the act of text production. *Physiological* measures included: blood pressure (Chappell, 1929; Innes, Millar, & Valentine, 1959); heartbeat (Kanfer, 1958); galvanic skin response (Chappell, 1929; Pope & Siegman, 1964);[6] palm sweat (Kasl & Mahl, 1965); eyeblink rate (Kanfer, 1960); pupil dilation (Bernick & Oberlander, 1968); sensory deprivation (denying stimulation of the senses) (Suedfeld, Grissom, & Vernon, 1964); room temperature (Suedfeld, Vernon, Stubbs, & Karlins, 1965); occurrence of noises (like 'uh') in one's speech (Mahl, 1956; cf. V.3.12); and age (Kowal, et al., 1975). *Psychological* measures included: the "emotional responsivity scale" (Cervin, 1957); the "self-consciousness scale" (Levin et al., 1960); the "children's test anxiety scale" (McCoy, 1965); and the "manifest anxiety scale" (Kasl & Mahl, 1965; Siegman & Pope,

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[5] Persons who act as experimental subjects may develop special skills for that purpose. Compare the differences in findings from psychology students vs. composition students on the same task in VI.1.29f.

[6] "Galvanic skin response," a measure of the fluctuation in the electric resistance of the skin, was used as an outward indicator of emotional events; like many such physiological measures (II.2.3ff), it doesn't specify the details of the cognitive processes involved.

1965). *Social* measures included: isolation from other people (Suedfeld et al., 1964); audience sensitivity (Reynolds & Paivio, 1968); high or low exhibitionism (Levin et al., 1960; Paivio, 1965); warmth (friendliness, receptiveness, responsiveness) of audience (Reece & Whitman, 1962; Drennen & Wiggins, 1964; Allen et al., 1965; Siegman, 1968); adjustment to other people's speech rhythms (Jaffee & Feldstein, 1970); deceitfulness (Mehrabian, 1971); and social class standing (Hawkins, 1973; Wodak, 1980).

1.5 Such a battery of measures may seem impracticable, time-consuming, and unnecessary. However, text production is a complex activity sensitive to (and interacting with) a great variety of circumstances. We can't tell a priori which physiological, psychological, or social factors might be relevant for literacy performance. These experiments suggest that students should write a more stressful, disrupted, brief, and error-prone text if: (a) they write in favor of views they don't believe in (I.3.16); (b) they are forced to work in isolation for a long time; (c) their teacher has a cold, unfriendly attitude; or (d) they come from working-class backgrounds. Further research on such questions is urgently needed.[7]

1.6 Because text production is so complex and context-sensitive, observed data are especially open to multiple interpretations (cf. I.1.5; Kowal et al., 1975; Flower & Hayes, 1981). Manifest events in spontaneous, natural text production are in principle hard to trace back to a single cause. The traditional solution was to "factor out" all causes but one or two and to assume that whatever happened was a simple result of manipulating "dependent variables" (in the sense of III.1.2). Even if justifiable, this view leads to a *fragmentation* of theory and research: a host of cause-effect chains whose mutual functions within the overall system remain unclear. We would do better to incorporate multiple causes into elaborated models that stipulate their interaction. The effects of manipulating any single cause document a *potential* causality in natural production, though the cause of real events may still be undecidable. The relative *probabilities* of such potential causalities would best indicate the correspondence between complex process models and real-life activities.

1.7 The DESIGN of process models is crucial precisely because of their intricate relationship to concrete events. This issue has not yet received the attention it merits. Much research uncritically accepted a model with an "encoder" sending a message to a "decoder." These notions from engineering and information theory suited the physicalist outlook and the search for well-structuredness. Yet taken strictly, a "code" is a fixed set of unambiguous, arbitrarily defined symbols; and "encoding" is a mechanical interchange of symbols from one such set to another (e.g., Morse code re-

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[7] In this perspective, Kerek, Daiker, and Morenberg's (1980) sentence-combining project can't be faulted for its thoroughness in controlling variables, even room temperature (cf. II.3.27).

placing letters with patterns of dots or dashes). No one has shown that the conceptual and planning systems in human communication qualify as "codes" in the same sense. Only the mapping between sounds and letters in spelling fits the definition (Gough & Hillinger, 1980: 184), and only in part (cf. V.1.31ff). The "encoding" model says nothing about the motives, decisions, and contexts of real communication (Shuy, 1981b).

1.8 Explicit DESIGN CRITERIA can help to classify, compare, or integrate possible models of communication and cognition. These criteria are to be operationally, not just logically, defined (I.4.13). UNIFORMITY vs. FREEDOM concerns the allowance a model makes for variations among individual people or processors. Processing can be well-structured without having to run the same way for everybody all the time. Since no one person possesses complete, infallible knowledge of a language, everybody builds a MODEL of it (III.1.18, 28). Different people's models agree enough for communication, and even for such tasks as revising someone else's text (cf. III.1.26; V.3.4.8); yet vary enough to allow different skills and styles in speaking and writing. Hence, a theory should not define the norm so narrowly that numerous events appear deviant (cf. II.3.14; VI.3.22), nor so elastically that events appear random. Some investigators have eschewed the study of processes in fear that freedom might preclude generalization (I.1.3) —that each event might, at some degree of detail, be unique. However, the processes themselves must constitute a systemic and strategic basis for the "virtually unlimited flexibility, capacity for nuance, and creativity with which novel but appropriate behavior occurs as a function of an infinite number of contexts" (Spiro, 1977: 162; cf. I.1.7; I.4.8).

1.9 REVERSIBILITY concerns whether the processes of production are the exact reverse (mirror images, so to speak) of those of reception (cf. II.2.22). This thesis would allow us to apply the more extensive research on reception to the less explored issues of production, e.g. reading vs. writing (Meyer, 1982; Shanklin, 1982) and spelling (V.1.30ff). Though logically plausible, reversibility is operationally doubtful. A receiver is partly *recording* and partly *re-enacting* the activities of the producer. The receiver can afford considerably more *approximation,* that is, can treat operations or materials in a provisional, fuzzy, or incomplete way, whereas the producer has to finalize things until the surface text can be executed. Production and reception approach the surface text from fundamentally different perspectives, each with its own implications for processing and decision-making. Hence, strictly reversible models are not likely to be confirmed by future research.

1.10 SCALE designates the size of elements, ranging from LOCAL to GLOBAL (I.4.5). An operating system can enter either a local MICRO-STATE or a global MACRO-STATE. A relation between micro-states yields a MICRO-STRUCTURE, and one between macro-states a MACRO-STRUCTURE (cf. van Dijk, 1979). Upon entering a macro-state, the pro-

cessor expects certain classes of micro-states; conversely, a micro-state can be a clue about the macro-state being traversed. For example, the subject of a sentence requests the syntactic macro-state "noun phrase"; the micro-state "definite article" is a clue that "noun-phrase" has been initiated (cf. demonstration in Beaugrande, 1980a: 44ff). On a larger scale, the noun phrase is a micro-state in the macro-state "sentence," and the latter in turn a micro-state in the macro-state "paragraph," and so on. As we see, a linguistic unit can be a micro-state for one process and a macro-state for another. The processor defines its scale by CHUNKING (treating several items as an operational unit, I.4.5), and thereby determines COMPLEXITY (the configuration of part-whole relations, III.3.2.7). How much complexity is actually experienced need not agree with the complexity uncovered by an abstract analysis of structures (cf. II.3.12.2; II.3.21ff, 37, 41). A skilled processor can use chunking to control and reduce complexity as needed (III.3.4.3).

1.11 POWER designates the extent to which a type or definition is GENERAL (based on similarities) vs. SPECIFIC (based on differentiations). The more general, the higher the power (cf. Minsky & Papert, 1974: 59). For example, "event" is a more powerful concept than "motion," and "object" more powerful than "part" (I.4.11.2). A processor can reduce its load by moving to higher power (III.3.4.4). Comprehension is eased by attending only to the overall gist of the text and discounting details (Kintsch, 1975; Schank, Liebowitz, & Birnbaum, 1978; Masson, 1979). Processing can be divided between ROUTINES applied to everyday requirements vs. SPECIALISTS that monitor and adapt on-line actions to fit unusual or variable conditions (cf. I.4.8; III.1.14, 27; VI.1.6).

1.12 Power should not be confused with scale. [8] Local elements can be defined at either low or high power. For example, a single word might be defined at higher power as "modifier" or at lower power as "adverbial past participle." If the surface text is damaged (garbled sounds, defaced print), the processor might assign only "word" and move on. Conversely, a global item like a book chapter might be labeled at high power: "Bloom goes home"; or at low power: "Bloom walks home through Dublin with Stephen Daedalus, climbs over the wall because the door key wasn't found, lets Stephen in, lights a fire, makes cocoa," etc.[9] Thus, scale and power are operationally distinct.

1.13 DEPTH designates the LEVEL (in the sense of I.4.2) on which processing is dominant (see III.2.5ff). A text can be processed on SHAL-

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[8] Units judged by their *size* ("ranks" in British research), e.g., word, sentence, and paragraph, have often been confusingly called "levels." As noted in I.4.14, a processing approach tends to cut the pie differently from abstract structural analysis.

[9] This chapter of Joyce's (1934: 650-721) *Ulysses* is in fact an experiment in the extremes of detail a narrative can attain, including a character's unspoken thoughts, unperformed actions, and so on.

LOW levels as a sequence of letters and words, e.g., by a young child; or on a DEEP LEVEL, e.g., as a hierarchy of ideas and goals. Deeper processing has more pronounced affects on memory and performance. Disambiguating words is deeper than checking their spelling (Bobrow & Bower, 1969). Finding anomalous meanings is deeper than watching for specified sounds or letters (Treisman & Tuxworth, 1974). Fitting words to context is deeper than finding rhymes for them (Craik & Tulving, 1975). Making follow-up sentences is deeper than judging the meaningfulness of a sentence as it stands (Mistler-Lachman, 1974). These findings can be correlated with the scheme of "levels" going from the surface (the text as an artifact) to the "deepest" levels of main ideas and goals (III.2.3ff). The results of text processing can vary according to the dominant levels of operation.

1.14 MEMORY CONTRIBUTIONS subsume whatever is put into the processing act from memory storage. A physicalist trend was to discount such contributions and depict processing as an ABSTRACTION OF TRACES from the input (the "stimulus") (cf. Gomulicki, 1956; Broadbent, 1958; J. Gibson, 1966; E. Gibson, 1971). More recently, a CONSTRUCTIVE memory actively supplying world-knowledge has been affirmed (e.g. Neisser, 1967; Bransford, Barclay, & Franks, 1972; Bransford & Johnson, 1973; Ortony & Anderson, 1975). More recently still, researchers favor a RECONSTRUCTIVE memory that contributes both to processing the original events and to remembering them later (e.g. Spiro, 1977; Loftus, 1980; Rumelhart, 1980; cf. III.3.9); stored knowledge continues to evolve in memory as the person learns new things.[10] Construction and reconstruction are supported by: communities of routines and specialists; defaults and preferences; frames and schemas; and so on (I.4.8, 11.2; III.1.11).

1.15 INHERITANCE is vital to a large system with a rich base of world-knowledge (cf. Hayes, 1977; Brachman, 1978; Fahlman, 1979). To save duplicating storage, a concept or operation INHERITS from a similar one by transferring specifications. An INSTANCE inherits from its CLASS (Walter Kintsch's now-famous example was that Napoleon, being an instance of the class 'people', must have had toes). Or, a SUBCLASS inherits shared features from its SUPERCLASS (e.g., Frenchmen, Corsicans, etc. have toes because they are subclasses of the superclass 'people'). CANCELLATION blocks inheritance by stipulating how a concept differs from its class or superclass (e.g., if we are told Admiral Nelson had only one eye). Inheritance can economize and raise power by replacing instances with classes, or classes with superclasses (e.g., by remembering 'flowers' after reading 'tulips') (cf. de Villiers, 1974; Frederiksen, 1975; Rumelhart, 1977a:

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[10] Evidence from word-association tests (cf. II.2.8) led to Tulving's "encoding specificity" hypothesis: a reminder works only if it was stored at the time of the original experience (cf. Tulving & Thomson, 1973). This view, often contested as unduly restricting the adaptability of memory and interpretation (cf. Reder, Anderson, & Bjork, 1974), may be an artifact of odd laboratory tasks (pairing up words for a test). Keele (1973) suggests that virtually unlimited traces of experience may contact memory.

234; Kintsch & van Dijk, 1978); details could be reconstructed if needed. ANALOGY permits inheritance among entities that are made comparable in special contexts (if we hear that Napoleon was a fox, we transfer traits like being quick and crafty); the interest and effectiveness of analogical language is shown by the enduring tradition of rhetorical "tropes" (metaphor, simile, metonymy, synecdoche). Inheritance probably allows more economy than memory actually possesses. Strategic, frequently needed configurations are likely to be standing entries even if they duplicate others (cf. Kintsch, 1977: 290f). The waste in storage is traded for saving the time and effort that would be needed to assemble knowledge on demand (cf. III.3.9).

1.16 DECOMPOSITION occurs when processing breaks elements down into components, i.e., lowers them in scale. The view that word meanings are made up of "minimal features" or "components" appeared variously in structuralism (Greimas, 1966), behaviorism (Osgood, 1963), mentalism (Katz & Fodor, 1963), and psycholinguistics (E. Clark, 1973; Gentner, 1978). "Each component," according to Clark and Clark (1977: 509), "can be regarded as a procedure called up whenever that component forms the meaning of a word" (for example, 'Napoleon' might be broken down into 'human', 'male', 'animate', and so on). There is little evidence that decomposition is routinely performed during comprehension (Kintsch, 1974: 242; J. Anderson, 1976: 74; Hayes-Roth & Hayes-Roth, 1977). It appears to be a special case when some feature becomes relevant in context (Deese, 1971: 168; cf. Bolinger, 1965). Certainly, context is more essentially an act of assembling than one of disassembling (III.3.14).[11]

1.17 RESOURCE ALLOTMENT occurs when a processor distributes its capacities, such as memory, attention, and motor control, among the various demands of a system in operation (cf. III.3.2). Resources are nearly always limited, so that a TRADE-OFF between competing demands is frequently called for. Resources may be increased by special efforts (e.g. concentration, strain) or decreased by low motivation (e.g. boredom, lack of interest). Each process draws a LOAD on resources and becomes steadily more DOMINANT as its load becomes greater. The system tends to be heavily loaded by such factors as haste, distraction, emotional tension, uncertainty, and conflict among alternatives (Lashley, 1951: 11); or decision-making, trouble-shooting, novelty, danger, technical difficulty, and conflict with previous habits (Norman & Shallice, 1980: 21f). When the draw on resources becomes too great, the system enters a state of OVERLOAD that requires compensation. Unless resources are increased, operations will be DEGRADED by a decrease in completeness, consistency, or accuracy.

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[11] Nearly all the "semantic feature" schemes look for them in an abstract catalog, like a dictionary run though an atom-smasher (cf. II[19]). This approach soon bogs down in the problem of how to invent and label the features. In a communicative context, there is no reason why a processor should be concerned with particular *labels* within a configuration whose meaning results from its *entirety*.

Skilled processing entails strategies to counteract overload and restrict degradation (III.3.4ff). For example, resources can be allotted to strategic CONTROL CENTERS within a configuration, and distributed from there (cf. III.2.14, 17; IV.2.6).

1.18 Whether there is just one main supply of resources for all processes, or specific supplies for the various domains of cognition and action, is unclear (cf. Neisser, 1967; Kahneman, 1973; Allport, 1980b). Norman and Bobrow (1975) contrast "resource limitations" due to the processor against "data limitations" due to the materials to be processed. Granted that any person has a model (not the entirety) of language (III.1.8, 28), your limitations depend on your model. Practice would bring improvement if the model is well-designed and just needs rehearsing; but not if the design itself is unproductive, or unfit for the task at hand. The written modality at first confronts young children with data limitations. Once the new modality is properly acquired, resource limitations appear: how to use writing once you know the system. Finally, proficient writers could optimize their models until data limitations return: you can only write so fast within the mechanics of print, longhand, or type (III.1.20; IV.1.12). Often, language development hits a BLOCK because one's model is not able to evolve into a better approximation (cf. I.2.22, 23.3; I.3.6). Learners with so-called "literacy problems" are apparently locked into unworkable models (cf. I.2.22ff). The rote drills for beginning writers and readers may reinforce such models, rather than bringing about their reorganization (III.1.28).

1.19 If processing has WEAK SPOTS (characteristically troublesome operations), BOTTLENECKS (points where the quantity of materials needed is greater than can be accessed, stored, or transferred), and BLOCKS (points where operations can't go on), the next question is where and why: in perceiving the world (Broadbent, 1958; Neisser, 1967); or in taking action upon what has been perceived and registered (Keele, 1973); and on so. Text production, especially writing, seems to operate near the threshold of overload (cf. Scardamalia, 1982), and to be beset by weak spots. In terms of problem-solving, (I.4.16), writing is hard when the problem space constantly shifts (Caccamise, 1981: 92), and the problem itself is uncertain, open only to "tentative solutions" (Odell, 1973: 42). Further obstacles include low knowledge about the topic domain (Voss, Vesonder, & Spilich, 1980; cf. I.2.8.8) and emotional stress (cf. Scardamalia, 1975). Revision can combat overload by focusing selectively on weak spots, and using resources from a longer time span (III.3.4.8f).

1.20 Some resources are drained away simply by the mechanics of uttering or inscribing the surface text (cf. III.2.31; IV.1.11; V.1.35). Allan Newell (1973, cited in McCorduck, 1979: 265) remarks:

> In spontaneous communication with speech, the human appears not to be speech-limited, but rather thought-limited, whereas with writing the opposite

> is true. That is, a person knows what he wants to communicate faster than he can write it, but not faster than he can say it. Even when saying predigested material, our speech apparatus is never used at close to capacity.

The differences in rate and timing may affect the transition from speaking to writing (cf. II.2.29; II.3.38; III.3.35; V.3.31). The inscription action brings cognitive processing to bear on the surface text at a slower rate than does an articulation action (cf. IV.2.22). Also, the redundancies that fill out speech might carry over into writing (cf. V.3.10, 35-40).

1.21 ATTENTIONAL processing conflicts with other operations at the same time, whereas AUTOMATIC processing does not (cf. Neisser, 1967; Kahneman, 1973; Keele, 1973; LaBerge & Samuels, 1974; Posner & Snyder, 1975; Schneider & Shiffrin, 1977; Shiffrin & Schneider, 1977; Allport, 1980b; Norman & Shallice, 1980).[12] Attentional actions tend to be serial, slow, easy to set up, alter, or suppress, and strongly sensitive to resource loads; automatic actions tend to be parallel, rapid, hard to set up, alter, or suppress, and insensitive to resource loads. Probably, expert performance relies on a strategic intersection and interaction of automatic processes, so that very complex activities can run without conscious supervision. On-line integration would constitute *chunking;* a stored package of such processes would constitute a *schema* (cf. Piaget, 1976; Norman & Shallice, 1980). Each mode of processing has its own dangers. Whereas attentional processes interfere with each other, automatic ones may cause trouble if they must be changed or prevented, or if their structures are similar enough to conflate (Norman, 1981). Moreover, a special processing obstacle (e.g., having to spell or pronounce a difficult word) could shift normally automatic processing to attentional, bringing a degradation in skill, fluency, or accuracy.

1.22 Wherever text production is so complex that its processes cannot be done with attention, automatization is needed. For example, beginning writers must expend attention on the motor activities needed for "mechanics" (e.g., letter formation, spelling, or typing). This load on the system causes a shortage of resources elsewhere: the slow, laborious search and organization of content, including irrelevant associations; the deceptively numerous errors and inconsistencies; and so on (cf. III.3.32; IV.2.30; V.1.35). Skilled writers handle mechanics automatically, keeping resources free for deeper, larger-scale concerns.

1.23 SCHEDULING designates the order in which operations are carried out. An operation that can't run without the results of another is CONTINGENT upon the latter, unless those results can be predicted. In

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[12] Shiffrin & Schneider (1977: 155) define an "automatic process" as "a sequence of nodes that nearly always becomes active in response to a particular input configuration" coming either from outside or from inside the processor; "the sequence is activated without the necessity of active control or attention by the subject."

SERIAL processing, one operation at a time runs to its conclusion; in PARALLEL processing, various operations run concurrently and consult each other's needs and outcomes. SCHEDULING ROUTINES would stipulate the usual order, while SCHEDULING SPECIALISTS would meet any special demands (cf. I.4.8; III.1.11, 27). Since an automatic process can run at the same time with others, the transition from attentional to automatic processing demands rescheduling. A new skill would start in a SUCCESSIVE mode (serial processing), and evolve to a SIMULTANEOUS mode (parallel processing) (cf. Das, Kirby, & Jarman, 1979; cf. III.3.4.9). Since a new skill is continually in a process of experimenting with possible schedules, it would be prone to entail a high error rate (cf. I.2.17, 23.8; I.3.8, 11, 22, 24; VI.3.13).

1.24 Several schemas could be active at once, if only one is *dominant* (III.1.17).[13] Increasing skills can "consolidate schemas" (Piaget, 1976: 66), respecting their mutual contingencies. "Packages" of "sub-routines" can be set up to watch for their triggering conditions (III.1.21; III.2.31; IV.2.30). Classic Gestalt theory stressed the "simultaneity of processing characterized by organizational laws stemming from the totality as such" (Piaget, 1976: 126ff). Luria's scheme is similar (Das, Kirby, & Jarman, 1975: 82):

> Simultaneous integration refers to the synthesis of separate elements into groups often taking on spatial overtones [. . .] any portion of the result is at once surveyable without dependence upon its position in the whole [. . .] Successive information processing [is] in a serial order [. . .] the system is not totally surveyable at any point in time. Rather, a system of cues consecutively activates the components.

Luria classifies complex intellectual processes, plus perception and trace-recovery of experience, as simultaneous; and syntax is taken to be successive. However, syntax is probably the outcome of transforming a simultaneous array into a linear sequence (II.3.16; IV.1.4, 7-9).

1.25 THRESHOLDS are the criteria that INITIATE or TERMINATE a process under appropriate conditions. PATTERN-MATCHING is used to detect when conditions should trigger a threshold (cf. Morton, 1970, 1980), with a GOODNESS OF FIT ranging from exact to fuzzy (III.3.2.5). For high-speed operations without conscious supervision ("closed skills," III.1.1), the setting of thresholds is the strongest means of control (Norman & Shallice, 1980).[14] The processor can consciously set an unusual value (e.g.,

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[13] Norman and Shallice (1980: 14) consider the selection of more than one "schema" (I.4.11.2) at a time "unlikely," but they leave open the possibility of combining "two action sequences concurrently" into "a single, higher-order" schema. Thus, the "schema" itself can be created in context, not just looked up from storage (cf. also Rumelhart, 1980; Rumelhart & McClelland, 1980).

[14] In fact, Norman and Shallice (1980: 13ff) suggest that selection of a schema can be influenced *only* by setting thresholds; once initiated, the schema must run its course. Presumably, they have "closed" skills in mind here. "Open" skills could, for example, have such adaptive mechanisms as forming new schemas on the spot (III[13]).

to suppress a habitual action by raising its threshold of initiation) that reverts to normal when supervision ceases (III.3.4.2). A strongly motivated writer, for example, sets high thresholds and requires exact matches, adapting as context evolves.

1.26 Writing is plainly an *open-ended* task with no fixed point of termination (III.1.1), even though concluding words are put on paper. The text could be always be reconsidered and revised (consolidated, developed, paraphrased, altered in voice, style, and register, etc.). The writer sets a threshold of termination that may be raised after the first draft is done, or may be attained only after several drafts. REVISION apparently entails a resetting of thresholds. A revisor who is not the original producer must reenact production closely enough to build a model of the intended purpose and meaning and thus infer a strategic threshold (III.1.8)—further evidence that processing is well-structured, not chaotic (I.4.8).

1.27 INTERACTIVE models have co-operating components, and MODULAR models have independent ones. The structuralist approach, with its isolated levels (II.1.15), and transformational grammar, with its groundings in axiomatic logic (II.3.12), favored modular theories in linguistics; more recently, interactive theories are gaining acceptance (III.2.1-5). However, this whole dichotomy fades if we postulate SPECIALIST COMMUNITIES that monitor ongoing processing and start or stop actions when their threshold conditions are met (cf. III.1.11, 25). Such communities are modules, yet interact wherever the system is motivated to use them (cf. Miller, Galanter, & Pribram, 1960; Newell & Simon, 1972; J. Anderson, 1976; Allport, 1980a). Past research tended to see *entire levels* as undifferentiated modules; and processing therefore appeared fragmented and diffuse (I.4.14; II.1.15). Power and efficiency would be much greater if similarly structured operations on various levels interact and merge (Woods, 1978), e.g. when word order conforms to the order of perception or memory retrieval (cf. II.2.23; III.3.19; IV.2.56). Appropriate specialists could be set to detect these similarities and consolidate operations immediately.

1.28 LEARNING occurs when a processor adapts and refines itself during either one operation or a series of operations (cf. II.2.6). Experiments often include "rehearsal" (intentional repetition to encourage learning, e.g., repeating a word to keep it in memory) (cf. Brown, 1958; Craik & Lockhart, 1972) and "distractors" (tasks that impede rehearsal or compete for resources) (cf. Peterson & Peterson, 1959). Whereas behaviorists believed that rehearsal alone causes learning by strengthening "stimulus-response" associations, it is now plain that the real benefits come from cognitive reorganization (Piaget, 1976, 1977; Greeno et al., 1978; Mandler, 1979). Apparently, one's process model is impelled to evolve to a more efficient or inclusive version, such that the desired tasks become easier and more compact (cf. I.2.22; III.1.8, 18). For example, feedback can be used more precisely (III.3.2.2); operations can be shifted from attentional to automatic (III.1.21f); and so on. Skills remain OPEN as long as the model is

evolving, and become CLOSED when the model becomes stable—thereafter, the rising curve of improvement levels out (becomes "asymptotic," I.4.15). Literacy education depends on finding tasks that motivate continual refinement of the learners' language models. Activities like proofreading and editing will be helpful only if learners can relate shallow-level decisions and discrepancies to deeper-level ideas and goals (cf. III.3.7, 37; V.3.20, 22).

1.29 A TYPOLOGY OF MATERIALS sorts out and classifies the artifacts upon which processing is carried out. For instance, reading and writing adapt to type of text involved. DESCRIPTION is centered on the properties and relationships of objects. NARRATION features temporal and causal sequences of events. EXPOSITION tells what something is or how it works. ARGUMENTATION tries to make an audience accept a thesis. SCIENTIFIC texts are intended to add to the general knowledge of a field; TECHNICAL texts present current knowledge to special audiences (e.g. technicians, operators, manufacturers); and DIDACTIC texts merely present it to an audience of basic learners. However, these types are only *dominances,* and actual samples are often complex mixtures of types (cf. Kinneavy, 1980). A typology of texts should be based on processes and contexts, not just on the features of artifacts (Gülich & Raible [Eds.], 1972; Meyer, 1975; Meyer, Rice, Knight, & Jensen, 1979; Beaugrande, 1981a, 1982d; Meyer & Freedle, in press).

1.30 SIMULATION is the programming of a theory or model to run on a computer in imitation of real human processing. Successful simulation at least forces the investigator to state assumptions in an operational synthesis, and proves that a model is workable in principle[15] — but not that humans act the same way. The human brain has large storage, but difficult access; the computer has instantaneous access, but limited storage (Loftus & Loftus, 1976: 128). The computer is also inept at recognizing useful, but approximative analogies and at commonsense reasoning in lack of knowledge (Collins & Quillian, 1972; Collins, 1978). Still, human brains and computers might ideally interact precisely where the one complements the other. As the state of the art advances in computer technology, this possibility becomes increasingly attractive.

1.31 The design criteria described in III.1.8-30 are shown in Table 1. These criteria can help to compare various researchers' approaches (Beaugrande, 1981a). Text production is so complex that the design of theoretical models is especially crucial. The latter in turn can provide the rationale for new methods in literacy education (cf. VI.3). Though we can't predict

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[15] The "systemic grammar" of Michael Halliday (1969; cf. Berry, 1977) proved better for simulation than transformational grammar (Winograd, 1972; Davey, 1978), because the latter was harder to formulate as decision-making procedures. According to William Mann (personal communication), a new computer implementation of Halliday's grammar is now advancing at the University of Southern California Information Sciences Institute.

Table 1. Design criteria for process models

REVERSIBILITY: PRODUCTION vs. RECEPTION
SCALE: LOCAL vs. GLOBAL
POWER: GENERAL vs. SPECIFIC
DEPTH: SHALLOW vs. DEEP LEVEL
MEMORY CONTRIBUTIONS: TRACE ABSTRACTION vs. CONSTRUCTION vs. RECONSTRUCTION
INHERITANCE: CLASS vs. INSTANCE; SUPERCLASS vs. SUBCLASS; ANALOGY
DECOMPOSITION
RESOURCE ALLOTMENT
ATTENTION vs. AUTOMATIZATION
SCHEDULING: SERIAL vs. PARALLEL; SUCCESSIVE vs. SIMULTANEOUS
THRESHOLDS of INITIATION and TERMINATION
INTERACTION vs. MODULARITY
LEARNING: OPEN vs. CLOSED
TYPOLOGY OF MATERIALS
SIMULATION

which models will gain acceptance, we can agree on some *evaluative* criteria that help to adjudicate the design of models, not just describe it. I suggest one set of evaluative criteria (listed in Table 2) by way of illustration (cf. Beaugrande, 1981b: 130f):

1.31.1 DIVERSIFICATION: A model should unify the domains relevant to a given human aspect. Diversification retests the model's plausibility with each added domain; supports clear antecedence relations among disciplines; keeps special cases from being mistaken for general ones; and combats reduction and fragmentation (cf. I.1.3, 12).

1.31.2 CONSENSUS: A model should promote agreement among researchers by providing a clearly defined and consistently applied set of terms and concepts. This consensus would assist both integration of new findings from various directions, and comparison among alternative models.

1.31.3 ECONOMY: A model should focus on those theoretical con-

Table 2. Evaluative criteria for process models

DIVERSIFICATION
CONSENSUS
ECONOMY
DYNAMICS
PLAUSIBILITY
COMPUTABILITY
INCREASING APPROXIMATION
ECOLOGICAL VALIDITY

structions relevant for processing, rather than on all categories and features that could be invented (cf. II.1.6; III.1.16).

1.31.4 DYNAMICS: A model should deal with processes and operations in natural contexts, not with static objects and artifacts in the abstract (I.1.3ff).

1.31.5 PLAUSIBILITY: A model should adduce realistic examples and respect the human resource limitations.

1.31.6 COMPUTABILITY: A model should allow the statement of discrete procedures and steps that enable simulation (III.1.30).

1.31.7 INCREASING APPROXIMATION: A model should be able to evolve toward a steadily more exact representation of the human aspects it addresses.

1.31.8 ECOLOGICAL VALIDITY: A model should be an "account of how people interact with the ordinary world"; this priority does not mean "an end to laboratory experiments, but a commitment to variables that are ecologically important rather than those that are easily manageable" (Neisser, 1976: 7; cf. I.1.15; VI.3.22).

1.32 These values did not always fare well in the three approaches reviewed in Chapter II. For example, diversification was done more through extrapolation than antecedence; consensus, economy, and dynamics were disregarded by structuralism and mentalism; and the other four standards fared badly in all three approaches. Today, research on cognition and communication is expanding so rapidly that it threatens to overwhelm the individual researcher. An open discussion of model designs and of the ways to evaluate them could prevent a loss of orientation by reminding us of the larger issues at each step, and consolidating our advances as they occur. We stand the best chance of discovering facts if we inspect and critique the ways in which the design of our models influences what counts as facts, and for what purpose (I.1.4, 7).

2. THE PHASES OF TEXT PRODUCTION

2.1 A model of text production should be situated within the general processing conditions outlined in III.1. Past research was simplified by relying on *serial, modular* models whose levels were processed one at a time (III.1.23). This scheme fit the analysis of linguistic artifacts into independent levels (II.1.15; II.3.7), as well as the design of psychological experiments measuring additive time (III.1.2; IV.1.8) (compare and contrast Chomsky, 1965; Lamb, 1966; Fromkin, 1971; Gibson, 1971; Shaffer, 1976; Jarvella, 1977). The popular, metaphoric "black box" model considered only the input and output of each stage, and disregarded internal operations, as illustrated in Figure 2. The impulse starts from "pragmatics" (purpose), passes through "semantics" (meaning), then "syntax" (phrasing),

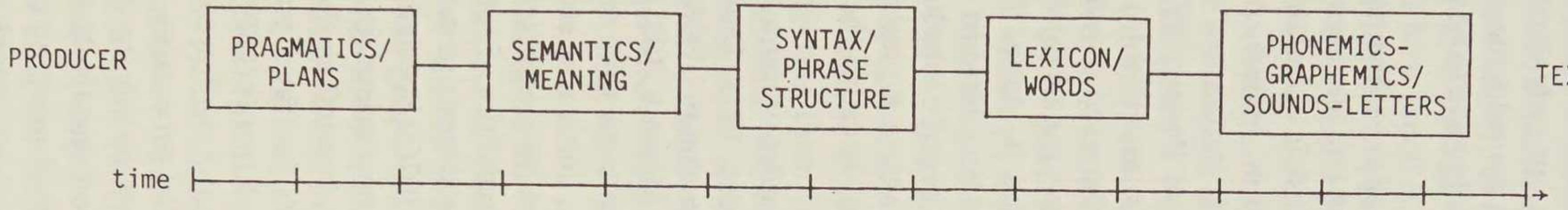


Figure 2. A typical sequential-stage relay model

and pops out as "phonemics" (sounds) or "graphemics" (letters). Each box, however it may be labeled, carries out *only* the operations on its own level, and sends on *final* results. No box consults the others during operations. If failure occurs, the whole series would have to be traversed again from left to right.

2.2 The conventional proofs of experimental psychology depend heavily upon the notion of *additive time* (cf. Sternberg, 1969)[16] in order to obtain *quantitative* results. The time on task is calculated to be the sum of the time spent on each component operation. Hence, proving a mental operation means triggering it with a suitable "stimulus" and showing a regular increase in performance time — what Posner (1978) calls "chronometric exploration of mind." This proof assumes that (a) every mental process takes up *real time* (clock time), as compared to *psychological time* (the complex of overlapping, interactive processes); and (b) the experimenter really triggers the postulated operation, and it alone. These two assumptions are themselves debatable, but they are very hard to prove within a method that incorporates them directly into its proof procedures. Natural processing undoubtedly involves some operations, e.g., automatic processes (III.1.21), that need not increase total time, because they run simultaneously with others.

2.3 Recent trends favor *parallel, interactive* models (e.g. Marslen-Wilson, 1975; Norman & Rumelhart, 1975; Danks, 1977; Levy, 1977; Rumelhart, 1977b, 1981; Woods & Brachman, 1978a, 1978b; Flower & Hayes, 1980, 1981; Gould, 1980; Flood & Menyuk, 1981). Here, processes are able—though not required—to run at the same time and consult each other freely. In such models, serial actions, e.g., linearizing sounds, letters, and words, are the outcome of complex, concurrent processes (cf. Ch. IV). Linearity reflects the organization of the language modalities of speech and writing, rather than one-by-one mental processes. An elaborate parallel system can mimic a serial one if so required (cf. Anderson, 1976). Specialist processes monitor current conditions and become active in appropriate contexts (III.1.27).

2.4 Interactive processing can streamline the reception and comprehension of texts on the way between the "surface" words or phrases to the "deeper" levels of main ideas and goals. Kintsch (1979: 326) points out that deeper processes can't afford to wait for the shallower ones to finish. Drewnowski and Healy (1977) opine that parallel processing allows shallower levels to be shut down as soon as deeper levels terminate. Marcel (1980) proposes that processing is automatically and non-selectively carried to the deepest available level of processing (e.g., a word's meaning could be recovered before its visual shape is fully identified). Such arguments should hold for text production as well: if reception is parallel, production could hardly be serial. But serial models are easy to design, whereas parallel, interactive models confront

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[16] On the controversial details of the "Sternberg paradigm," see IV.1.8f.

the practicing researcher with a host of difficult questions: (a) How are operations scheduled? (b) What is done simultaneously vs. successively? (c) Which operations are contingent upon others, and how strictly? (d) Which operations dominate others? (e) Which operations are, or can be, chunked? (f) How much is automatic, and how much is attentional? (g) How are thresholds of initiation and termination set or reset? (h) How are special problems resolved? (i) How many skills are open, and how many are closed? (j) How are limited resources allotted? (k) Where are the main control points in text production? (l) What factors contribute to overloading? (m) Does the production process have inherent weak spots or bottlenecks? (n) To what extent must processing adapt to each specific occasion? (o) How are processing strategies acquired, and how do they evolve? (p) What counts as a successful or satisfactory text? (q) How do skilled text producers revise? (r) How can text production be improved by educational training?

2.5 In a parallel, interactive model, the language levels are processed in *concurrent phases* defined by their *operations*. These phases come and go as their *thresholds of initiation* and *termination* are met (III.1.25). Probably, the phases constitute *functional* units rather than *temporal* ones: the set of operations in a given phase would be done not all at once, but whenever conditions were right for triggering them (cf.III.2.25, 30, 32; III.3.9). *Resource limitations* should make it natural that *processing dominance* would be given to just one phase at a time, or to a few at most (III.1.17). Figure 3 illustrates the basic model, with the *shallowest* phase on top, and the *deepest* on the bottom.[17] The zig-zagged arrow suggests a gradual migration of dominance from deep to shallow during text production, yet with considerable freedom for shifting up or down.

2.6 The notion of "processing depth" was originally advanced to account for differences in the impact of processing on memory and action (III.1.13). GOAL-PLANNING should thus be the deepest phase in the model because of its close ties to goals, desires, and emotions—states that are well remembered and strongly acted upon by most people (cf. Schweller, Brewer, & Dahl, 1977; D'Andrade, 1980). Goal-planning sets up the DISCOURSE GOAL (a future state of the world intended to be brought about via the discourse) plus the PLAN (the set of steps intended to lead to the goal) (I.4.11.3; cf. Larson, 1971). Multiple goals are ranked on a GOAL STACK and wait to assert themselves when conditions are right (cf. Rieger & London, 1977). Multiple plans can be held in reserve in case the first one fails (cf. Beaugrande, 1979d, 1980b, and references there). The participants MONITOR the progress of the discourse to update the status of their goals, and try to MANAGE it so as to attain the latter (I.4.11.5; II.2.10).

2.7 Membership in a culture entails approximative consensus about

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[17] The "deep/shallow" dimension must not be confused with alternative models on a "high/low" dimension: their "high" end is equivalent to the "deep" end here.

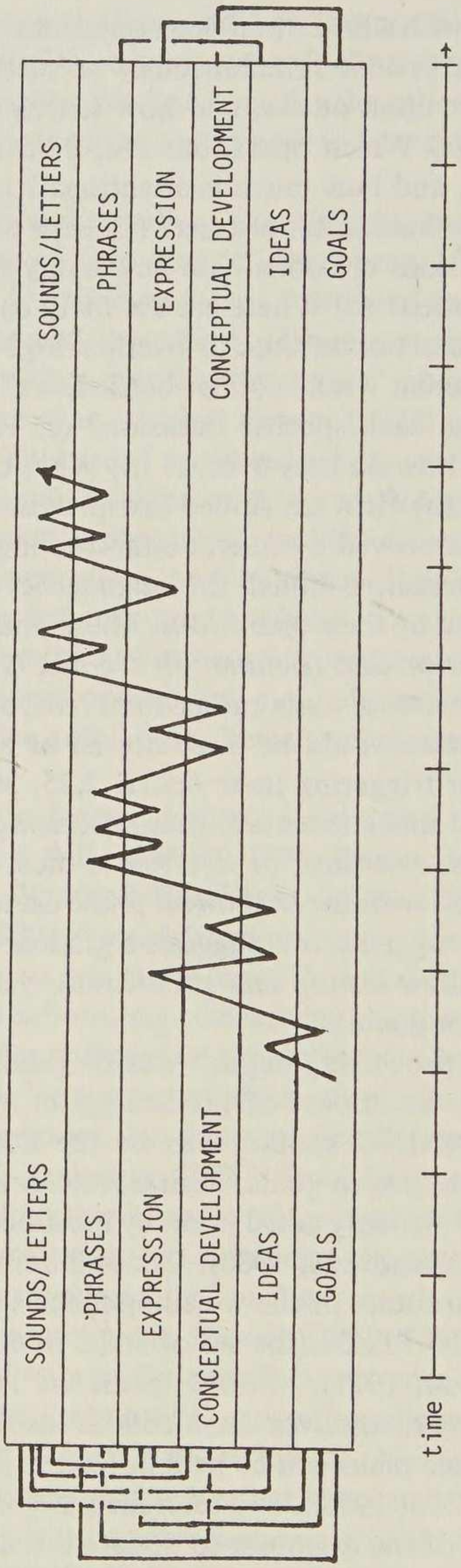


Figure 3. A parallel-stage interaction model

what goals are *desirable* because they affect one's well-being (cf. classification in Beaugrande, 1980a: 181). These desires may be *physiological* (e.g., health vs. illness, or satisfaction vs. deprivation); *emotional* (e.g., happiness vs. unhappiness, enjoyment vs. suffering, or stimulation vs. depression); *social* (e.g., acceptance vs. rejection, respect vs. disregard, or solidarity vs. confrontation); *character-based* (e.g., kindness vs. unkindness, modesty vs. vanity, or honesty vs. dishonesty); and so on. The usual desires are the basis for predicting or inferring other people's goals from their texts and actions (cf. Schank & Abelson, 1977; Allen, 1979; Wilensky, 1980; Black, Wilkes-Gibbs, & Gibbs, 1982). A common default strategy is *self-projection:* assume other people have the same desires as you unless there is evidence to the contrary. Though an individual's desires may deviate from those agreed upon by the society, the norm remains in force at least as a framework that makes us recognize such cases as deviant.

2.8 The content (meaning) of discourse frequently depends on the presumed goals of the participants. This factor was treated in the literature on "speech acts" (cf. Austin, 1962; Searle, 1969, 1975; Cohen, 1978; Mann, 1980; Steinmann, 1982); and on "conversational implicatures" (Grice, 1975, 1978). Speech-act theory tends to treat language as *sentences* (Kinneavy, 1979a), due to the prevailing concerns of linguistics (cf. II.1.12; II.3.5, 13). Moreover, well-structured special cases with stable definitions (promising, threatening, thanking, greeting, etc.) have been favored over more common, but diffuse goals (pursuing social solidarity, making a good impression, demonstrating interest, passing the time of day, etc.). *Politics* could be defined as the domain in which communication and action are dominated by participants' goals, if necessary at the expense of conventions such as conceptual meaning and consistency, factual truth, stable personal roles, and so on (cf. I.1.2; III.3.15, 30; VI.1.26). Discourse is often "political" in this sense.

2.9 A broad theory of DISCOURSE ACTIONS should incorporate speech-act theory along with general aspects of goal-planning in discourse. An ACTION can be defined as an event brought about by an agent to change a situation in a way that wouldn't have happened by itself (I.4.11.5), and a BLOCK as a state or event which impedes an action (III.1.20). Whatever bears on the action is termed RELEVANT. A DISCOURSE ACTION would be a discourse event performed to change a situation, and may be impeded by a DISCOURSE BLOCK, the best known type being WRITER'S BLOCK (III.2.17, 20f; III.3.4; IV.2.50). The changed situation may contain the text producer's GOAL STATE; or may be only one step on the way; or may prove irrelevant altogether. An INEFFECTIVE discourse action fails to bring the goal nearer. An INEFFICIENT discourse action wastes time and effort, e.g., in trial-and-error applied when goals and strategies are indistinct (cf. Kintsch, 1977: 441; II.2.6, 9, 11). An INAPPROPRIATE discourse action is considered unfitting, whether or not it is

efficient or effective (e.g., a rude request is quick and gets results in some settings). The text producer can evoke cultural consensus to make the goal look worthwhile, e.g., politicians advertising their own goals as the ones any rational, forthright person should want.

2.10 The goal-planning phase fits the text to the situation in several ways. First, the producer projects a ROLE, i.e. a pattern of actions and discourse expected from a participant. In "political" discourse, this role is carefully adjusted to encourage each audience to support one's goals. Though consistency within a single situation and within all situations a person enters is considered normal, it is frequently subordinated to immediate goal-attainment. Second, the producer selects a TEXT TYPE that may be predominantly descriptive, narrative, expository, argumentative, and so on (III.1.29). Complex goals may call for a mixture of these types in a single discourse. Third, the PREPAREDNESS of the producer varies according to whether the discourse is important and anticipated. Everyday communication is often *spontaneous* (reacting to ongoing context) and *extemporaneous* (improvised) (III.1.1); these two conditions often coincide, but not always. (A practised orator who has a speech ready-made for the occasion speaks spontaneously, but not extemporaneously. A soap-box prophet of doom in a public park may speak extemporaneously, but, having no relevance to the real situation, not spontaneously.) Fourth, INFORMATIVITY varies between the discourse actions of INVOKING predominantly known content vs. INFORMING people of predominantly unknown or newly assembled content (I.4.11.7).

2.11 Role, text type, preparedness, and informativity influence the producer's choice of STYLE, operationally defined as a set of parameters that guide the selection among language alternatives (cf. VI.1.6). Audiences use stylistic "markers" (conspicuous choices, VI.1.4, 7) to classify roles and text types. The skilled producer has *processing specialists* for relating a variety of roles or types to appropriate styles (I.4.8; VI.1.6). Writing offers the advantage over speaking that a spontaneously produced original can be revised to contain consistent, appropriate style markers.

2.12 The composition class is a special situation with elaborate presuppositions about purposes and goals. Writing (particularly in class) is mainly spontaneous, but not in the same sense as real-life discourse. Normally, the teacher is the audience, regardless of the intended addressee (cf. I.4.11.6). The main goal is to demonstrate text production itself, rather than to convey a relevant message (Applebee, 1982: 377; I.2.13, 17). Since indistinct or unusual goals encourage wasteful trial-and-error, text production is likely to be inefficient and ineffective:

> The freshman English theme [. . .] is most frequently written without an explicit aim, takes no particular view of its subject matter, is oriented to no particular medium, and is preferably done with no serious thought prepara-

> tion. In other words, it is aimless, modeless, mediumless, and unprepared. No serious professional writer would dream of producing a text under any of these conditions. (Kinneavy, 1979a: 13)

Larson (1971: 145) concurs that "students are insensitive to plans" and "unfamiliar with the notion of 'purpose' in writing"; they exhibit "abrupt changes in point of view, sudden changes in tone of voice, loss of direction midway through an essay, lack of transitions," and "absence of convincing conclusions"—common symptoms of trial-and-error. Students must perform under "unmotivating conditions — messages that the writer has no impulse to send and that the reader (teacher) probably would not choose to read" without "being paid to be an examiner"; hence "inexperienced writers" will "think of purpose as what someone else wants of them" and will be "cut off from the impulse to say something, or from the sense that anything they might say is important to anyone else" in a "truly communicative situation" (Shaughnessy, 1977: 86). "Novice writers" "display an innocent lack of consideration for what their readers know and do not know, and for what they are or are not interested in" (Maimon, 1979: 364).

2.13 This deep-level impasse can be resolved only by situating composition instruction in its broader social and psychological context. The sensitivity of text production to audience approval (III.1.4f) indicates that students' texts will be non-fluent and error-prone if the teacher acts as an unfriendly, negative audience. Learners even imagine such an attitude without valid evidence. Amerindian children (Mesquaki Fox, an Algonquin people) construed the normal intonation of English teachers as "being mean" and "getting mad" (Coulthard, 1977: 49). Errors will increase if teachers are intransigent toward them, and decrease if discourse goals are realistic and clearly defined (cf. Williams, 1979a: 31)—not just to "inform," "persuade," and so on (McCrimmon, 1976: 8). Students can gain some audience sensitivity and purpose by reading papers aloud to the class (Elbow, 1981: 96). By negotiating their own topics, students can assume a role as experts on matters about which they are knowledgeable (cf. I.3.24; III.2.19; VI.2.27).

2.14 IDEATION is the next-deepest phase of text production and subsumes all activities that create an IDEA: a configuration of conceptual content that acts as a *control center* for building the *text-world model* (the total configuration of knowledge activated for processing the text, I.4.11.2). A framework that regularly guides a person's ideation can be termed an IDEOLOGY (I.3.16). Thus, "idea" and "ideology" are operationally defined as whatever assumes these control functions in context, rather than logically defined by degrees of abstraction. Wundt (1970 [1900]) suggested that the components of an idea exist simultaneously (II.3.16) — a view compatible with Gestalt theory (III.1.24). Or, the components of an idea might be successively assembled so rapidly and automatically that they seem to be simul-

taneously present. According to Kintsch (1982: msp. 14f), memory search creates "ideas" for text production by setting up a "cue" that automatically fetches associated materials from memory storage—a case of *spreading activation* (I.4.11.2; III.2.20). Since automatic processing is not consciously supervised (III.1.21), this search can bring back irrevelant materials the writer should set aside or ignore (VI.2.26).[18] Selecting what you want to say from among all the materials activated by memory search can be an imposing task, the more so if the text topic is vaguely specified (III.2.18ff).

2.15 Patterns of prior knowledge participate in ideation. A *frame* is an array of knowledge components generally associated in world knowledge; a *schema* is a progression of sequentially ordered components (I.4.11.2). However, these patterns would not normally be transferred intact over into text content, aside from the rare situation of saying or writing everything you can think of about a topic (cf. Charniak, 1972). Once automatic search has activated the whole pattern, the *relevance* of content must be judged (III.2.9; VI.2.2,11, 32). Often, the text producer has to search out and combine elements from several stored patterns and make a new unit. The proportion of this recombining determines the *creativity* of ideation (cf. I.3.7ff). On the audience's side, the same proportion decides if the discourse action counts as *invoking* or as *informing* (cf. III.2.10).

2.16 An idea might remain *implicit,* i.e., not be expressed (I.4.11.2; III.2.25, 35; V.3.28); more often, it is made *explicit* (I.4.9) and thus becomes a TOPIC in the text. In a paragraph, a TOPIC SENTENCE can assume this function (IV.2.8; VI.2.14f, 17, 28). A topic which takes a stand on a problematic issue can be called a THESIS (VI.2.1). In a series of texts within a discourse (e.g., a conversation or exchange of letters), a recurring topic would be the THEME. Making the idea the topic helps the audience re-enact the organization of content along the same lines used in production (cf. III.1.9). It helps to state the topic or thesis early in the text—the so-called "pyramid format" (Collins & Gentner, 1980: 61; cf. VI.1.15). The audience then has a clear control center for comprehension (compare Bransford & Johnson, 1973; Norman, 1973; Collins, Warnock, & Passafiume, 1974). Or, the producer may postpone the topic statement and invite the audience to infer it provisionally (VI.2.15). An idea that might seem unacceptable or incomprehensible to the audience could be saved until enough details have been presented to make it look reasonable and understandable (cf. VI.2.9f, 24).

2.17 How ideation is organized and sequenced is thus a strategic issue for producer and audience alike. Both sides would fare best if the main idea came first, followed by the details of content (VI.2.1f, 7, 22). Processing would be roughly comparable on both sides—point of orientation first,

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[18] The findings of experiments on shadowing (III.1.2.1) that even conscious effort does not always enable people to ignore a message (Treisman, 1964) is probably an effect of automatic processing (cf. Posner, 1978: 96).

then elaboration or support—so that comprehension and learning would be efficient (cf. Horowitz & Newman, 1964; Meyer, Brandt, & Bluth, 1980). Starting content organization with the ideation phase is normal (cf. Grady, 1971: 348), but not compulsory. A producer might start with a flurry of details that only gradually coalesce into an idea. As long as no idea is acting as a control center, such discovery procedures would lack order and direction; *writer's block* (III.2.9) could result either from not defining the idea (and bogging down in incoherent details) or else from not recovering relevant materials to develop the idea. Also, text production might be so complex the eventual topic is not the idea the producer started from; or, the latter may want to leave the idea implicit in order to conceal it. The audience may in turn *infer* an idea which is not the topic (cf. I.4.11.2), but which functions as a good control center for processing. Apparently, audiences are readily convinced by ideas they build themselves (cf. illustrations in Beaugrande & Dressler, 1981: 8, 154, 160, 176).

2.18 Ideas can vary in *scale* and *power* (III.1.10ff). On the scale dimension, Caccamise (1981: 36ff) found evidence of large "clusters" composed of overlapping "chunks" that in turn subsume groups of "idea units." This hierarchy revealed how ideation differs according to specificity, familiarity, and writer's age. On the power dimension, Christensen (1963, 1965) suggested that texts are organized in a hierarchy of generality via "co-ordination" vs. "subordination (compare also Pitkin, 1969, 1977; Winterowd, 1970; Grady, 1971; D'Angelo, 1974; Nold & Davis, 1980; cf. I.3.18; VI.2.22).

2.19 Like goal-planning, ideation occurs under atypical conditions in the composition class (cf. I.3.18; III.2.12f). In Kinneavy's (1979a: 13) opinion, many students adopt "no particular view on the subject matter" and perform "no serious thought preparation." They assume that their own views are not "possible content for academic statements" (Shaughnessy, 1977: 80). Applebee's (1982: 375f) survey found most school writing to be simply an explicit rehearsal of materials not selected by the writer:

> In the typical school situation the student's body of relevant knowledge is *completely circumscribed* by the teacher's knowledge of the subject area [. . .] Marking practices tend to stress the accuracy of information presented, rather than the arguments that can be built up using that information [cf. I.3.18] [. . .] We found many examples of essays that were little more than catalogs of "important facts," related to one another primarily in the teacher's vision.

Truncating the natural ideation phase leaves students ill-equipped to devise their own topics. They are unable to "gain access habitually to their own responses, their own thoughts" (Shaughnessy, 1977: 81). They may also fear their ideology could antagonize a teacher (I.3.16). The solution is often to select topics so banal they could offend no one — and interest no one.

Macrorie's (1970: 12) "Engfish" markedly demonstrates the wishy-washiness that students assume as protective covering against the risks of controversy, individualism, and innovation (cf. I.3.10; III.3.30f), e.g.:

> (28) I went downtown today for the first time. When I got there I was completely astonished by the hustle and bustle that was going on.
> (29) It is hard to realize just how much you miss someone until you are away from this person. It seems that the time spent away from this person is wasted. You seem to wait and wait until you can see this person again.

Personal experience is either watered down (28), or hidden behind the impersonal (29).

2.20 CONCEPTUAL DEVELOPMENT is the phase in which ideas are enriched, elaborated, and integrated until the detailed *text-world model* (III.2.14) emerges. Here also, *relevance* screens out what is used from among what is available (cf. III.2.9, 15). And again, a writer can select either ready-made configurations, so that text figures in an *invoking action;* or creative, newly-built configurations, enabling an *informing action* (II.2.10, 15). The mechanics of spreading activation (I.4.11.2) recover much trivial commonsense material even devotees of "Engfish" would find too trite to express. No freshman would venture to write (except in defiance):

> (30) "Downtown" isn't really "down." It's the center of town, as I learned when I went there today for the first time. It is made mostly of streets and sidewalks that help people get to stores, where they can buy the items they need to make their way through life from day to day.

because every possible audience knows all this already. Development must continue until less trivial content is recovered (VI.2.26ff, 32). Unfortunately, early results may promote *writer's block* (cf. III.2.9, 17) by misleading inexperienced student writers to assume that all their content will be as trivial as the first things coming to mind. Teachers who assign a worn-out topic encourage this trap.

2.21 Writer's block also comes from DAYDREAMING: following up chains of association irrelevant to the task at hand. Spreading activation is largely automatic and runs without effort or control (III.2.14, 20; IV.2.30). Writing places a heavy load on processing (III.1.19f). Therefore, when the writer encounters overload, conceptual development tends to be dominated by spreading activation, and daydreaming ensues. The daydream provides a release valve for overload and degrades conceptual development by disregarding relevance (cf. III.2.15, 20). The content of a daydream usually comes from the associations which are best rehearsed or most salient to the writer at the time, e.g., recent experiences, personal well-being, desired goals, and so on. One of the *trade-offs* in text processing (cf. I.4.15) is between writing too slow vs. too fast. Slowing down may increase the danger of daydreaming; speeding up, as in "free writing" (VI.3.12), leaves little

time to develop content and screen for relevance. Thus, writing must be carefully *scheduled* (III.1.23), so that content is found and used without allowing the train of thought to wander off too far.

2.22 The content of discourse is related to its REFERENCE in complex ways. Traditional treatments of reference are fond of using words or statements that match immediately visible objects (cf. II.2.5, 9, 11, 17; III.1.2.5; IV.2.56). However, discourse content typically invokes events and situations which are not immediately perceptible to the participants. What is referred to is decided by context: the text-world model is a system of relationships analogous (but not identical) to perceivable states of the experienced world (cf. II.2.18, 23f)— i.e., organized in terms of time, space, causality, etc. Normally, processing terminates the regress to reality without going to verify the content of every text; situations calling for eyewitness evidence are comparatively rare. Thus, the issue of reference can't be solved via philosophical speculation, but only by psychological discovery of how far people relate discourse content to real or imagined worlds in order to carry on satisfactory communication.

2.23 Ideation and conceptual development have figured in composition courses as INVENTION (cf. VI.2.26, 32, 37). In the vitalistic, romantic outlook (I.2.23.7), invention seemed a miraculous, irrational inspiration from a muse; and composition teachers aren't well armed to perform miracles (though often expected to). In fact, the semblance of irrationality was simply evoked by the recombining of old knowledge into new patterns (I.2.23.7; III.3.15); true irrationality does not engender new order. Recently, the belief of classical rhetoricians that invention is teachable has been reaffirmed (e.g., Ohmann, 1964a; Gorrell, 1965; Rohman, 1965; Young, Becker, & Pike, 1970; Corbett, 1971; Larson, 1971; S. Miller, 1976; Young, 1976; D'Angelo, 1979a, 1979b; Kinneavy, 1980; Flower, 1981). Skilled text producers doubtless have acquired powerful strategies for discovering and organizing content across a wide range of knowledge domains— "prototypical thought patterns that transcend even the intellectual classifications of specific disciplines" (Shaughnessy, 1977: 257). Aristotle recommended using contrasts, conditionals, gradations, definitions, divisions, inductions, consequences, and so on (Cooper, 1932: 159ff). We need to explore and define invention precisely enough to be usable among contemporary students (cf. VI.2.6-37).

2.24 Presumably, invention procedures guide MEMORY SEARCH. The strategies proposed by Young, Becker and Pike (1970), for instance, center on basic conceptual relationships: object/attribute, part/whole, class/instance, superclass/subclass, cause/effect, problem/solution, temporal sequence, and so on (cf. I.4.11.2; VI.2.19-25). Students are encouraged to inquire how an object or event of the topic enters into these relations, e.g., what caused it and what results it will bring. Similarly, Burke's "pentad" advises specifying "act," "agent," "agency," "scene,"

and "purpose." Such schemes should not overlook the danger that associative reasoning may be irrelevant or trivial in context (III.2.19ff; VI.2.26). Text producers should screen their materials to find what would excite INTEREST by being *problematic, uncertain,* or *variable* (cf. IV.2.11, 49; VI.2.8f, 32). Like goal-planning, ideation and conceptual development are instances of PROBLEM-SOLVING (cf. I.4.16). The text producer finds and assembles content into an interesting configuration for the audience to re-assemble. Trivial content makes for trivial problems and elicits boredom; outlandish content, on the other hand, may make the audience's problems too hard and elicit confusion (I.4.15).

2.25 The EXPRESSION phase subsumes all the operations that map the conceptual configuration of underlying content onto language expressions (words, unitary phrases, etc.). Merely thinking of a concept might bring to mind one or more typical expressions for it (another instance of "spreading activation"). But the expression phase has to make all selections and close all remaining gaps not resolved this way. Hence, this phase is likely to be a distinct unit only in its *functions:* its component operations may run at diverse times. Some choices among alternatives may be quick and easy, and others protracted and difficult. A processor may have a mental image whose parts are not all equally easy to map onto language.[19] The continuity of experience and sensory impressions may be hard to render in discrete language expressions (cf. III.3.19).

2.26 Theories of language have long been troubled by the controversy over whether content ("thought") and expression are *identical* or *independent*. To argue for total identity is to deny the possibility of full synonymity and translation. To argue for total independence is to ignore the speed and ease with which concepts activate expressions and vice-versa. My solution is to regard an expression as a item that activates an ordered set of hypotheses about processing actions on conceptual content in memory (cf. I.4.6). There is a straightforward distinction between instructions (the expression) and the processes and materials involved in carrying out the instructions (content as a cognitive event). We easily confuse things because we carry out the instructions so readily and rapidly that we are not aware of doing anything at all.

2.27 It is striking that, according to my experiments, writers who *vocalize* (talk out what they are writing) often utter something other than what they are putting on paper. Apparently, decision and revision during the expression phase are complicated by having many different ways to express the same content. Two such factors are ASYMMETRY: one expression corresponding to several concepts, or one concept to several expressions; and

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[19] Apparently, mental imagery is correlated with language, but has its own processing conditions (Paivio 1975, 1978). The visual images of words would be an intermediate domain (cf. Titchener, 1909; V.1.19f, 26, 33, 37, 48).

REDUNDANCY: several expressions in the surface text to represent one concept.[20] A writer can control memory search with thresholds to watch over STYLE, e.g., by rejecting the initially found trite expressions and waiting for more creative or precise ones; or by adjusting redundancy to fit the audience; and so forth.

2.28 PHRASE LINEARIZATION is the phase that arranges expressions in the sequence required by the modalities of speech and writing. The operational role of *syntax* is to provide regular formats (slots and possible fillers, cf. II.1.12, 14), and to constrain processing without uniquely determining it. The neutral term STRETCH OF TEXT can apply to any sequence or format. *Syntax-based* formats include: the PHRASE (a head with at least one dependent element); the CLAUSE (a sequence with at least one subject-verb dependency); and the SENTENCE (a sequence with at least one independent subject-verb dependency). *Action-based* formats include: the TONE GROUP (a spoken sequence with a recognizable intonation contour and bounded by pauses); the UTTERANCE (a spoken sequence constituting one unit of action); the STATEMENT (the presentation of a conceptual configuration to be considered); the EXCLAMATION (an emphatic or assertive statement); the QUESTION (a request for confirmation or action); and the COMMAND (a direct assignment of an action). The PARAGRAPH is a hybrid between syntax and action (at least in English): a designated stretch of text containing as many statements or sentences as befits the "heaviness" of the materials (cf. IV.2.60; IV.3.17; VI.2.12-25). English recognizes only written paragraphs, marked by indentations; in some languages, spoken signals have a comparable function (Longacre, 1970; Howard, 1978; Hunt, 1978; Strahm, 1978; cf. VI.2.12).

2.29 Though linearization executes words one at a time, it probably loads a whole stretch into a BUFFER: a transitory store for items one expects to use (cf. III.3.5.4; IV.2.13; V.1.34f, 42). The buffer has a *representation* of the materials, plus a set of *execution programs* for doing things, such as writing down letters and words in order (cf. Shaffer, 1976). The representation could designate a syntactic *macro-state* such as a clause or sentence, with *micro-states* being words or word-parts (cf. I.4.5). Some monitoring is needed to keep track of the various entries in the representation while they are being processed and executed. The execution programs may confuse items within the representation, or bring them out too soon or too late (cf. III.3.32ff; IV.2.45ff; V.2.34).[21] The resulting inconsistent or in-

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[20] The definition of redundancy as the ratio of words vs. different words ("token/type" ratio) is easy to compute, but ignores the context of expectations among participants, and the potential of self-paraphrase (cf. IV.1.2; IV.2.39; V.3.32).

[21] The "push-down stack" with words all set to go in the proper order (cf. Beaugrande, 1980a: 44) is certainly not the only way the buffer can be organized. The ordering errors discussed later on (III.3.32f; IV.2.45, 47; V.1.44f; V.3.30f) suggest rather that the buffer contains more or less simultaneous arrays, plus ordering instructions that sometimes get lost or confused (cf. Shaffer, 1976; Rumelhart & Norman, 1981).

complete sequences (e.g., displacements, shifts, incoherences) are more readily tolerated in speech than in writing (cf. V.3.20ff).

2.30 Like expression, phrase linearization is probably unified in its function, but dispersed in time (cf. III.2.25). On occasion, phrasings are apparently selected before all the words are available to fill them (cf. Carroll, 1953; Goldman-Eisler 1958b; Chomsky, 1959; Maclay & Osgood, 1959; Boomer, 1965; Johnson, 1966; Nooteboom, 1969). Other times, the reverse seems to happen: words are selected first and only then placed inside phrases (cf. Kowal, O'Connell, & Sabin, 1975; Clark & Clark, 1977). The former findings support syntax-centered approaches and the latter support key-word approaches (cf. II.2.14). The conflict of evidence strongly implies that both procedures are possible (cf. Goldman-Eisler, 1968; Perfetti, 1969; Martin, 1971; Lindsley, 1975). The phases of expression and phrase linearization run in parallel; the processor does word-selection or phrasing depending on when the materials are found, placed in the buffer, and made ready for execution. *Pre-activation* and *post-activation* occur when a word or word-part is executed soon or too late for its proper slot in a phrase (III.3.32; IV.2.47; V.2.34; V.3.30f). *Fuzzy phrasing,* which strings words along in approximative or undecided patterns, is found in casual speech (31), unskilled slips (32), or language dysfunctions (33):[22]

(31) they brought a big plate of grapes / these big purple /

(32) I got a Go Gator, it is funny to me. It was a thing at go up and down, but with I pull the lever, half a water.

(33) she also took a carton of milk / but is also noticed she the young lady who works as the cou- coun- the lunchroom / had to bring in / more / cartons to milk / return to more / milk for sale / to the children /

2.31 SOUND/LETTER LINEARIZATION is the phase that executes the acoustic or visual materials of the actual surface text (cf. IV.1.5; IV.2.1, 6; V.1.35). Logically, processing an expression includes processing the sounds and letters that constitute it. But operationally, executing the sounds or letters demands an UTTERANCE ACTION or INSCRIPTION ACTION, a complex of articulatory, scribal, acoustic, and visual acts (cf. Horowitz & Berkowitz, 1964; MacNeilage, 1964, 1970; Fromkin, 1971; Sussman, 1972; Blass & Siegman, 1975; Gould, 1979; Frith [Ed.], 1980; I.4.11.6; III.1.20; IV.1.11f). These acts are supported by "subroutines" often called MOTOR PROGRAMS: sequences of stored commands "structured before the movement begins, allowing the entire sequence to be carried out uninfluenced by peripheral feedback" (Keele, 1968: 387). The existence of such programs is indicated by their feedback: responses (e.g. error correction) are more delayed at the beginning and end of an action

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[22] Sample (32) was collected by Gerald Langford (cf. I.2.7). I am indebted to Leila Hartley for sample (33) from a patient at the University of Florida clinic. The "/" marks a pause (cf. IV.2.25).

than during it (cf. Posner & Keele, 1968; Ells, 1973; Schmidt, 1975; Norman & Shallice, 1980). The programs are automatic and efficient, but hard to influence as they run. They are less oriented toward a specific physical result than toward a target action defined within a relational system of sounds and letters (cf IV.1.11f). Therefore, the motor programs need a *spatial* dimension for the movements of the jaw or hand, and a *temporal* one for the order of these movements in real time (MacNeilage, 1964, 1970; Sussman, 1972; cf. IV.1.6ff). Some people can adjust these dimensions to produce a new voice-sound or handwriting consistently and intelligibly. Both dimensions are susceptible to errors: confusions either about similarly articulated or inscribed units (spatial), or else about the correct order of units (temporal) (cf. III.3.32ff; IV.2.47; V.1.14ff, 17, 34ff, 42ff).

2.32 The survey of the phases of text production in III.2.5-31 should clarify the scheme in Figure 3. The levels are not meant to be separated or fixed with respect to each other. A production act need not work through all the levels, nor follow a set order (cf. III.3.8). Context decides how deep or shallow processing needs to be (cf. III.1.13; III.2.5). The identity and unity of the levels are based on their function, i.e., their contribution to the text processing (cf. III.2.5, 25, 30). If we admit that levels and phases interact under natural conditions, our next theoretical step is to DISSOCIATE them (cf. Shallice, 1979; Allport, 1980a). Two processes are shown to be separate if their combination is more than, or different than, either of them taken by itself. For example, one event or task could affect only one of the two, while another event or task could affect only the other.

2.33 The dissociation of the goal-planning phase from the others is relatively straightforward. The purpose and goals of discourse frequently decide what content and surface structures are intended. Speech-act theory recognizes the separation between the content ("propositional" aspect) of a text, vs. the producer's intention ("illocutionary" aspect) and the situational consequences ("perlocutionary" aspect) (Searle, 1969). These last two aspects may be recalled after the first is forgotten (Schweller, Brewer, & Dahl, 1976). Reasoning about goals supplies discourse content left implicit by the text producer, as in the "conversational implicatures" explored by Grice (1975, 1978; cf. M. Cooper, 1982); and alters text content in memory storage as time goes by (Spiro, 1977). Such findings, though still sparse, enable us to single out goal-planning as a very deep level in processing (III.2.6).

2.34 The ideation phase can be dissociated from that of conceptual development in two ways. First, text reception studies prove that main ideas persist in memory much better than detailed configurations of concepts (Kintsch, 1974; Meyer, 1975). As time passes, this effect increases (Kintsch & van Dijk, 1978). If two texts have the same number of concepts, the one organized around fewer main ideas is read faster (Kintsch, Kozminsky, Streby, McKoon, & Keenan, 1975). Second, main ideas can be differently affected by aphasia than conceptual details. Luria (1979: 284-287) tested

two aphasics, one who recalled the main ideas of a story but lost its detailed concepts, and one who did just the opposite.

2.35 The dissociation of concepts from expressions can also be done with findings on memory. Reading time varies according to the number of concepts and relations underlying a text, rather than the number of expressions in the text (Kintsch & Keenan, 1975). Comprehension and recall include conceptual materials not activated by expressions, but supplied by spreading activation, inferencing, and updating (Stein & Glenn, 1979; Warren, Nicholas, & Trabasso, 1979; Beaugrande & Miller, 1980). At most, expressions are operationally very close to concepts: the former are the instructions, and the latter the processes and materials involved in following the instructions (III.2.26).

2.36 The dissociation of conceptual development from phrase linearization is well documented. Conceptually coherent phrasings like (34) were better perceived through noise (Miller & Isard, 1963) and learned with fewer errors (Marks & Miller, 1964) than incoherent ones like (35):

(34) Pink bouquets emit fragrant odors.
(35) Pink accidents cause sleeping storms.

Text receivers noticed changes in conceptual content much better than changes in phrasing (Sachs, 1967; Bransford, Barclay, & Franks, 1972). Ability to recognize exact phrasing was unrelated to ability to recognize conceptual content (Begg, 1971). Memory for phrasing decayed 50% faster than memory for content (Begg & Wickelgren, 1974). Aphasics with short-term memory deficits gave conceptual equivalents for sentences whose phrasing they couldn't repeat (Saffran & Marin, 1975).

2.37 To dissociate the expression phase from the phrasing phase, we need to show that the position of an expression in a phrase affects its processing. Expressions appearing in the most recent clause or sentence were favored over earlier ones, both in recall (Jarvella, 1970, 1971) and recognition (Caplan, 1972). More expressions were recalled from sentences than from mere lists (Marks & Miller, 1964). Paired-associate learning (in the sense of II.2.8) was superior for pairs of expressions that had appeared together in a phrase (Ammon, 1968). Expressions were better perceived and learned if presented in normally ordered phrasing like (36) than in disordered ones like (37), both in speech (Marks & Miller, 1964) and in writing (Tulving, Mandler, & Baumal, 1964):

(36) Pink bouquets emit fragrant odors.
(37) Bouquets pink odors fragrant emit.

Words in sentences were produced faster and more accurately than words in lists (Lackner & Levine, 1975).

2.38 Finally, expression can be dissociated from sound/letter linearization by showing that knowledge in the two phases is not always in align-

ment. Confusion or misplacement of a sound or letter inside a word is a common error (III.2.31; V.1.17, 35f, 42-47). Word knowledge supported the processing of sounds and letters, e.g., by overcoming such disturbances as missing sounds (Warren, 1970) or mispronunciations (Marslen-Wilson & Welsh, 1978). The larger the context, the easier sounds were to perceive (Pollack & Pickett, 1964; Woods & Makhoul, 1973). In exchange, context can lead hearers to misperceive what was actually said (Bond & Garnes, 1980). In writing, letters inside words were better perceived (Miller, Bruner, & Postman, 1954) and recognized (Reicher, 1969) than letters in non-word arrays.[23] Word knowledge helped for recognizing the letter in a specific position inside an array (cf. Johnston & McClelland, 1973; Rumelhart & Siple, 1974; Estes, 1975), especially if a *mask* (a distractor array shown immediately after the target array) was presented (McClelland, 1976). Since the mask keeps people from consulting a short-term sensory copy of the presentation (III.3.8), word shapes become important memory aids. Extreme time pressure seemed to cancel this advantage by making people switch to very shallow processing where isolated letters were identified better than those in words (Polf, 1976).

2.39 It is unclear whether sounds and letters belong on one level or two. Evidence reviewed in V.1.31-37 indicates that spellers and readers can extract different data from these two modalities, though they don't have to (cf. Posner, 1978); some people rely more heavily on visual materials, and others on acoustic. The question is whether either sounds or letters, taken separately, suffice to constitute a workable level or phase of processing, in view of their constant interaction. Recognition and recall of words doesn't seem to hinge upon whether they were presented visually or acoustically (Bray & Batchelder, 1972; Hintzman, Block, & Inskeep, 1972; Kintsch et al., 1975). Pending further evidence, we are fairly safe in treating sounds and letters as one composite level.

2.40 In III.2.33-39, I reviewed some experimental evidence that the processing phases correspond to individually identifiable levels. In these experiments, specialized tasks and settings detected distinctions that are less clear and controlled in natural communication. Since processing depth was originally defined in terms of memory and performance (III.1.13) (quantity, accuracy, speed, etc.), the same standards should serve to delimit their contributions to communication—once more, an operational, not a logical approach (cf. I.4.13). Communicative experiments can direct *processing dominance* to a level, making its processes more *elaborated* and hence more suited for memory (cf. Kintsch, 1977: 233); and more prominent than would be the case in natural communication (cf. III.1.3). In the latter, such

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[23] Indeed, Reicher's tests indicate that the perception of a word leaves a better trace of all its letters than the trace left by the perception of one isolated letter.

unusual dominance would occur only for some strong motivation (e.g.,trying to make a good impression with neat handwriting or precise articulation). Hence, literacy education requires both availability of skills plus a realistic motivation to use them for relevant purposes, not just in classroom demonstrations (cf. Sinclair & Coulthard, 1975). Again, we see that teaching can be one vital means of language research (I.4.17; VI.3.25), as well as a means of improving everyday abilities.

3. THE RESOURCES OF TEXT PROCESSING

3.1 PROCESSING RESOURCES include whatever capacities the cognitive and physiological constitution of human beings offers: memory, attention, motor control, feedback, and so on (cf. III.1.17ff). The limitations on these resources are well documented (though not well explained), but can often be eased if processing can re-design itself, or be re-designed via training. The vast potential of human beings in comparison to their performance indicates how unfitting it is to treat the measurement gained on brief, high-pressure tests as an indication of people's lifetime abilities (I.3.1ff). Many ostensible "findings" of "low intelligence" and "poor aptitude" result from temporary bottlenecks of resources on specific, irrelevant tasks invented by testing services at a time when the nature of intelligence is not even explained by the leading experts. Until such an explanation is forthcoming, there is no evidence to disprove the view that (barring brain damage) every child can learn well enough to succeed in the concerns of personal and professional life (cf. Bruner, 1966; I.2.1). What is clear so far is that contexts have a huge affect on whether performance represents actual knowledge and ability (cf. I.2.8.2; I.3.3, 22, 25; II.2.27; III.1.19; III.3.2.2; IV.1.12; V.1.14f, 36, 42ff, 48: V.2.16; VI.3.3, 22); and that creative achievement, by its very nature, eludes standardized criteria (I.2.23.7; I.3.7, 22; III.2.15, 20; III.3.10; IV.3.27; V.2.32; VI.1.9).

3.2 Each person's resources constitute a *working system* whose factors interact in context. Operationally, limitations usually emerge in a TRADE-OFF: focusing heavily on one factor tends to weaken or restrict other factors (cf. I.4.15; III.1.3, 15; III.3.16, 42; V.2.27; compare survey in Kerr, 1973). Learners who perform well on tests have devised special strategies to trade off competing factors and minimize DEGRADATIONS (cf. I.3.3, III.1.17, 21; III.2.21). Other learners have not yet evolved to this stage; they try to save resources non-strategically, e.g., by imposing premature thresholds of termination and accepting incomplete, approximative, or trivial results as final ones (cf. III.1.25; III.3.17). Hence, we can start by defining a set of RESOURCE GRADIENTS that collectively determine the loading of the human processing system:

3.2.1 MOTOR CONTROL is the extent to which the processor keeps

tabs on the formation of sensory traces (e.g. visual patterns) and the execution of motor commands (e.g. formation of letters). Skilled actions are usually supported by largely automatic MOTOR PROGRAMS set up to run without supervision (III.2.31). However, these programs are prone to errors if the task is technically demanding, or if its context is variable (cf. Schmidt, 1975; Norman & Shallice, 1980; Norman, 1981).

3.2.2 FEEDBACK is the processor's reacting to what it registers as its own actions. ALERTNESS designates one's determination to use feedback as efficiently as possible. FEEDBACK LOOPS (i.e., the cycles that report back the results) are OPEN if the processor can intervene in the action, and CLOSED if the processor cannot (cf. MacNeilage, 1980). With closed-loop feedback, errors can be noticed and corrected only after the fact (cf. Schmidt, 1975), so that initial performance may misrepresent one's potential skills and knowledge (cf. III.3.1). Writing errors suggest some closed-loop actions in both handwriting (Smith, McCrary & Smith, 1960) and typing (MacNeilage, 1964; Rumelhart & Norman, 1981).

3.2.3 ATTENTION has been defined as the resource expenditure that *interferes* with (i.e. degrades) another task at the same time; AUTOMATIC processing does not create this effect (III.1.21f). *Retroactive interference* affects an earlier task, and *proactive interference* affects a later one (cf. survey in Kintsch, 1977: 98-116). In the experimental literature, though, "attention" usually concerns interference between simultaneous tasks. So far, attention has been mainly viewed as one unitary factor; but it may instead be the interaction among motor control, feedback, and the storage and access of memory.

3.2.4 NOISE comprises the extraneous, competing events not related to the task. Originally, the term was a designation for unwanted signals in electronic communication, and for sounds used as distractors in laboratory tests. Intriguingly, the latter kind of noise was actually found to improve performance up to a certain threshold where degradation sets in: people apparently compensate by increasing their concentration and alertness (cf. Wilkinson, 1963). Many college students have no trouble composing a paper in a dorm where a party or a football telecast is in progress.

3.2.5 GOODNESS OF FIT is the degree to which occurrences or data must match the processor's specifications, and ranges from very strict to very relaxed. An ACTION must match the corresponding INTENTION to a satisfactory extent, though not perfectly. For example, a writer must decide if a word, phrase, text, etc. conveys the intended content, statement, and purpose.

3.2.6 THRESHOLDS of INITIATION and TERMINATION are the stipulations that must be met for any process to be started or stopped (cf. III.1.25; III.2.5, 27; IV.2.31; IV.3.12). High thresholds are more taxing than low ones. Thresholds are typically raised if a process is considered crucial, precise, risky, unusual, contrary to habits, and so on (cf. III.1.17).

3.2.7 COMPLEXITY is the organization of a task or configuration in terms of part/whole relationships (cf. II.3.12f, 21ff, 36f, 46; III.1.3, 10; III.3.4.3; IV.2.6, 16, 53; IV.3.17, 43; V.2.35, 41; V.3.37; VI.2.27). The more parts within parts within parts etc. an element contains, or the more diverse the parts are among themselves, the greater the complexity. Whereas *descriptive* complexity is defined by structural (e.g. grammatical) analysis, *experiential* complexity is defined by operational actions such as chunking (I.4.5; II.3.37; III.3.4.3).

3.2.8 FAMILIARITY is the extent to which a task or configuration has already been encountered by the processor. The more numerous the encounters, the greater the familiarity, though it becomes steadily harder to preserve a distinct trace of each occasion.

3.2.9 INFORMATIONALITY is the extent to which one part of a task or configuration differs from the other parts. Thus, informationality is *internal* (inside the task or configuration), whereas familiarity is *external* (from previous tasks) (I.4.11.7). Informationality entails a trade-off: being high enough to maintain INTEREST, yet without causing overload (cf. III.2.24; VI.2.32).

3.2.10 PERCEPTUAL IMMEDIACY is the extent to which operations are more or less directly attuned to input via the sensory organs, e.g., vision, hearing, and touch. PERCEPTUAL SPACE is the totality of things available to be perceived in the situation (cf. III.3.19; IV.2.56). There is usually some MEDIATION of perceptual input: imposition of the processor's interpretation and organization (cf. I.4.7; I.4.11.5f; II.2.10, 20ff)—at least enough to render the input comprehensible and accountable. More extensive mediation is needed for tasks like envisioning a remote audience, invoking a rich cultural tradition, describing an imaginary scene, and so forth.

3.2.11 MOTIVATION includes all the reasons why a task is being done, e.g., personal commitment, possible rewards/punishments, enactment of one's social role, preservation of well-being, desired goals, and so on (cf. III.2.6ff).

3.2.12 TIME ALLOTMENT is simply how long the processor has (or believes it has) to get through the task. An OPEN-ENDED task like writing has no obvious moment of completion, and is terminated by the processor's decision (cf. I.3.28; III.1.1, 26). In test situations, on the other hand, time allotment is arbitrarily fixed, and tasks are closed-ended. There is no proof that one's performance on closed-ended tasks defines one's potential for excellence on open-ended ones (cf. I.3.8).

3.3 These twelve gradients are arranged in the scheme in Figure 4. The horizontal left-to-right arrow represents the progress of an operation, while the vertical arrows represent the resource gradients. CONCENTRATION designates one's conscious effort to keep total resources as high as possible. A rise on any gradient makes the operation more difficult, but may be neutral-

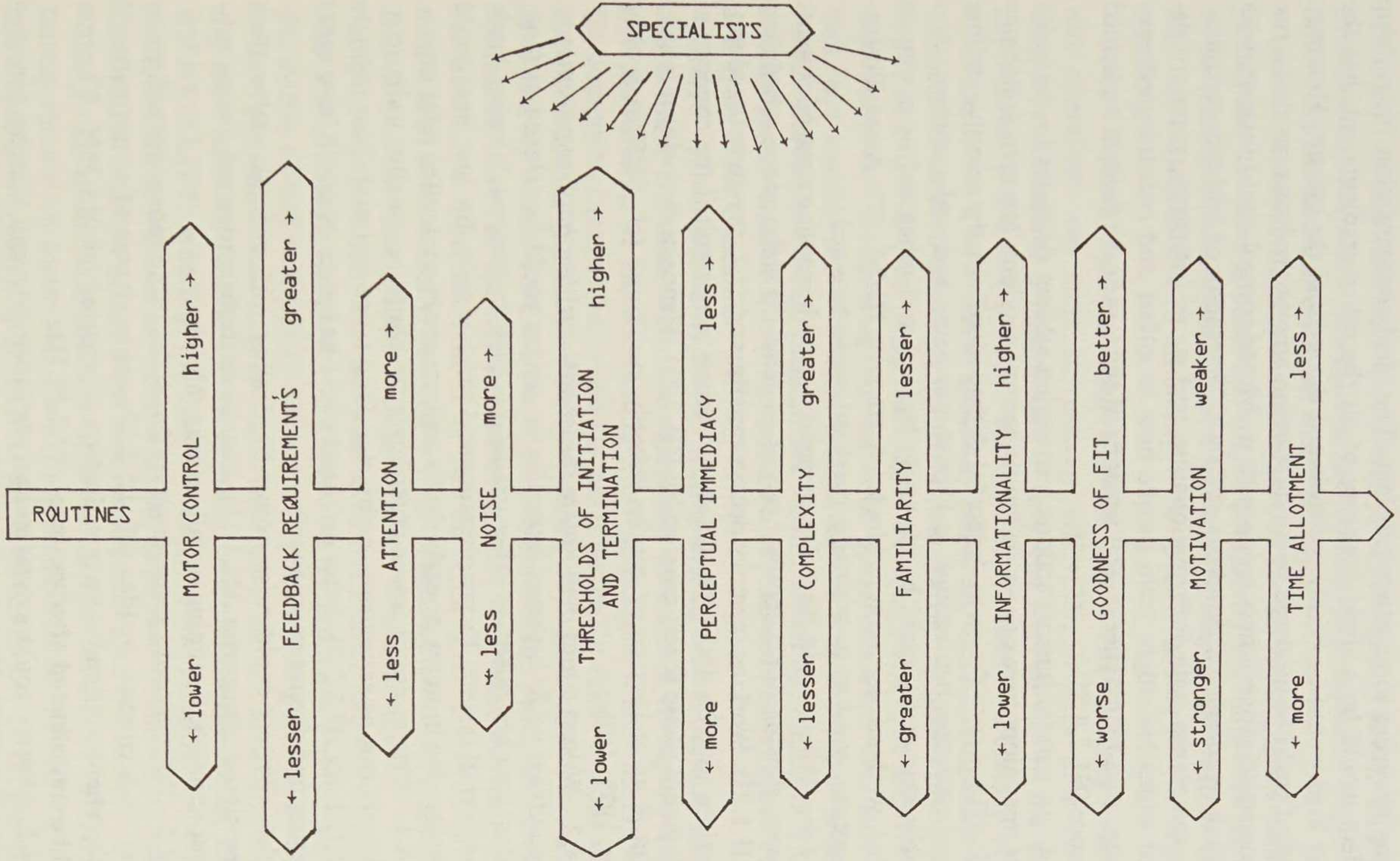


Figure 4. Processing variables in task operation

ized by lowering some other gradient. The ideal compensation for a rising gradient would be a slight lowering of all the other gradients, so that the higher load would be evenly redistributed throughout the system. However, this ideal could be hindered by an interaction among gradients, so that a rise on one could move others along with it. Motor control could interact with feedback requirements; goodness of fit with thresholds of initiation/termination; complexity with informationality; and so on. Perhaps, properly designed education might train people how to offset and redistribute heavy loading, e.g., by making several versions of the task to be done in a planned sequence (III.3.4.8f).

3.4 In natural human actions, processing seldom degrades to the point where operations break down or results become random. Norman & Bobrow (1975: 45) propose the term "graceful degradation" for the selective pulling back of resources just enough to keep things going and under control. Presumably, this tactic could be expressly learned and rehearsed as a way to combat overload, e.g. writer's block (cf. III.1.19; III.2.9, 17). As an illustration, we can consider how writing overload might be eased:

3.4.1 Writers could *slow down* operations by increasing time allotment. However, slowing down complex processes demands elaborate re-scheduling (cf. III.1.23). Working memory decays rapidly, and fast, precisely timed motor actions may be disrupted. Or, daydreaming may result if the conceptual development phase is left unattended (III.2.21). Hence, a slow-down is only helpful if its consequences can be suitably monitored (cf. Shiffrin & Schneider, 1977: 167).

3.4.2 Writers could *manipulate thresholds and feedback requirements.* The *goodness of fit* between intention vs. action could be relaxed at first, and then steadily raised as other gradients cease to draw such heavy loads on the overall system. Fuzzy phrasing and careless style, for instance, could be disregarded in notes or early drafts and earnestly controlled later on.

3.4.3 Writers could *lower complexity* by choosing smaller units (e.g. shorter clauses or sentences), or by chunking more materials into a single unit (III.1.10; III.3.2.7). Later on, units could be longer or could have more numerous and diverse components.

3.4.4 Writers could *raise power* by dealing with general, rather than differentiated, categories (III.1.11). Details could be addressed during subsequent revision. Outlining usually works this way.

3.4.5 Writers could *increase redundancy* by using more expressions to convey each concept or idea (cf. III.2.27), as is typical of conversational speech, where continuous text production is expected (cf. V.3.35ff). The text could be consolidated afterwards (cf. VI.2.28,31).

3.4.6 Writers could *extend automatic processing* and thereby conserve attention (III.1.21). However, we don't yet know what kind of intense practice actually attains this result.

3.4.7 Writers could *increase concentration* by trying consciously to fo-

cus attention and resources on writing (cf. Kahneman, 1973). This tactic presupposes that one's strategies aren't counter-productive to begin with; otherwise, the added investment won't pay off.

3.4.8 Writers could *repeat* some part of the task, using prior results as guidelines. Revision apparently reduces complexity and improves feedback by increasing familiarity and time allotment. Editing could be done in several sub-tasks, each one attending to a specific aspect of the text (cf. V.3.39ff).

3.4.9 Writers could *reschedule operations* such that normally *simultaneous* operations are done *successively* (III.1.23). Longer time on task would be traded for a lighter load at any one moment, as in the editing depicted in III.3.4.8. This tactic may well be the key to successful learning of all kinds. As a new skill is gradually acquired, successive operations are rescheduled as simultaneous ones. Non-strategic or haphazard rescheduling might endanger or even block learning at a crucial point. The decisive solution would be rescheduling simultaneous operations back into successive ones, and working out a different system. Just as a task becomes possible if we can decompose it into enough sub-tasks (Newell & Simon, 1972), processing might improve if it is dismantled and reassembled (compare Flower & Hayes, 1980; Caccamise, 1981: 85).

3.4.10 A variant of III.3.4.6-9 is *time-sharing:* the processor shifts resources and attention from one operation to another so rapidly that all operations seem to receive simultaneous allotments. Time-sharing works for computers because they need far less time than it takes any one user to state commands (an idea of John McCarthy's). In cognitive processing, time-sharing would work if slow, attention-consuming processes can set up operations that run quickly and automatically—a reasonable supposition for writing (cf. Bereiter, 1980: 80). The fact that ignored input (e.g. one's own name) does affect processing on the "shadowing" tasks described in III.1.2.1 offers some evidence for involuntary time-sharing.

3.5 Nearly all resources are related to MEMORY: the store of knowledge and procedures. Operations depend on the processor's ability to relate the events of any moment to known and recoverable patterns of action. Several parameters can help to classify memory: SPAN: how long a memory store persists; CAPACITY: how much material a store holds; EXPERIENTIALITY: whether the record comes from personal experience; ACTIVATION: whether contents are active, passive or dormant; and DIRECTION: whether access is current, retrospective, or predictive.

3.5.1 Span distinguishes (a) SHORT-TERM SENSORY STORAGE, lasting for only a second or two; (b) SHORT-TERM MEMORY, lasting some twenty seconds; and (c) LONG-TERM MEMORY, of apparently unlimited duration (compare Waugh & Norman, 1965; Atkinson & Shiffrin, 1968; Loftus & Loftus, 1976; Kintsch, 1977; Loftus, 1980). The shorter spans can be extended by REHEARSAL (III.1.28).

3.5.2 The *capacities* of these three memory stores correlate roughly with their spans. Short-term memory holds more than short-term sensory storage, but is still limited; long-term memory seems to have endless capacity. This correlation is not logically necessary, but is probably an operational consequence of the longer-span stores having more time for CHUNKING (cf. I.4.5; III.1.10).

3.5.3 *Experientiality* differentiates EPISODIC MEMORY: a record of what you have personally experienced (cf. Tulving, 1972; Ortony, 1975; Schank & Abelson, 1977; Selfridge, 1980), from CONCEPTUAL MEMORY: what is known about the world at large (cf. Norman & Rumelhart, 1975; & Rumelhart, 1977a; Kintsch, 1981).[24] Of course, personal experiences constantly influence one's belief system about the world at large (cf. III.3.18); and the border between what was really experienced vs. what memory supplies is often fuzzy (Loftus, 1980).

3.5.4 *Activation* is the process of accessing stored materials and placing them in BUFFERS (brief, transitory stores, cf. III.2.29). These buffers form a functional (though not necessarily organic) unit we can call WORKING MEMORY — defined neither by span nor capacity, but by this function. ACTIVE working memory is consciously deployed, while PASSIVE serves only for unconscious identification or recognition (cf. I.2.8.2). The opposite of working memory could be called DORMANT memory, not available to be used. Passive use suffices for RECOGNITION, while active use is for RECALL (cf. J. Brown [Ed.], 1976). In CUED RECALL, people are given some bits and traces to utilize as active control centers; in FREE RECALL, people have to remember whatever they can without reminders. Miller (1956) found active working memory to hold about seven chunks; Kintsch and Polson (1979) suggest that this capacity may be larger at the start of a task than it is later on; if so, working memory evidently competes with other loads on the system. Conflicts or hybrids in between active and passive activation may be the cause of the "Stroop" effect (III.3.6) (where memory supplies too much) and the "tip-of-the-tongue" effect (III.3.12) (where memory supplies too little).

3.5.5 *Direction* of memory may be CURRENT for the immediate events; RETROSPECTIVE for past events; or PREDICTIVE for future events. Retrospection is the best-known direction in memory research. But cognitive psychology has recently turned to the role of memory in prediction as well (cf. Bobrow & Norman, 1975; Norman & Bobrow, 1975; Norman & Rumelhart, 1975; Stevens & Rumelhart, 1975; Kintsch, 1977; Rumelhart, 1977b, 1980; Rumelhart & McClelland, 1980). Long-term memory supplies most of the content for text production, according to Kintsch (1982: msp. 33), though the shorter spans are involved in the detailed execution of the text itself (III.3.6ff). Provisionally, I assume that

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[24] On the related idea of "semantic" memory and its drawbacks, see Kintsch (1981).

predictive memory mirrors the organization of retrospective: the deeper the level, the further one can look either back or ahead. It is plausible that goals and main ideas can be anticipated far in advance; detailed concepts, expressions, and phrasings a little ahead of time; and sounds or letters only an instant before their production.[25] But clear evidence of predictive memory is sparse and may be hard to gather within the usual research paradigms for retrospective memory (where the experimenter can better control what people have in mind).

3.6 Some early research suggested a division of memory matching the division of language levels in linguistics. Short-term sensory storage would be devoted to sounds (Crowder & Morton, 1969) and letters (Sperling, 1960; Eriksen & Collins, 1967). Short-term memory would be for syntax, and long-term memory for conceptual content (compare the findings by Sachs, 1967; Johnson-Laird & Stevenson, 1970; Garrod & Trabasso, 1973; Anderson, 1974; Begg & Wickelgren, 1974). But the correlation between memory organization and language levels could be a side-effect of quality, scale, and power of the elements and processes involved. Each span is probably *specialized* for certain processes which dominate given levels, but which can draw on other levels as seems opportune (III.1.27). Long-term memory receives some traces of the surface text, e.g., verbatim recall of a passage (Kintsch, 1974: 257ff); or a record of whether an item was presented visually or acoustically (cf. Bray & Batchelder, 1972; Hintzman, Block, & Inskeep, 1972). Conversely, immediate perception does have some limited access to the deeper levels of content (cf. Raser, 1972; Shulman, 1972; Meyer, Schvaneveldt, & Ruddy, 1974) and goals (Erdelyi, 1974); and working memory has access to main ideas (Spilich, Vesonder, Chiesi, & Voss, 1978). The simple recognition and reading of words already seems to be affected by an instantaneous knowledge of what they mean (cf. Marcel, 1980). For instance, dyslexics have more trouble reading abstract words than concrete words, independent of word frequency (Marshall & Newcombe, 1973; Shallice & Warrington, 1975). In the "Stroop" effect, reading a color name is confounded if the word is printed in another color (Stroop, 1935; Dyer, 1973). Such immediate contact between shallow levels and deep ones makes it unlikely that text processing always works through the whole set of levels in a fixed order (cf. Craik & Lockhart, 1972; III.2.32); at most, a steady trend from deeper to shallower in production, and from shallower to deeper in reception, is presumably normal (cf. III.2.5). The processor consults, selects, or combines levels to keep things going in the current context (cf. III.1.11; III.2.4).

3.7 Direction of memory determines how any stretch of text is accessed: (a) as the RETROSPECTIVE REPRESENTATION of PRIOR

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[25] Look-ahead also seems to be more sensitive to overload than look-back (cf. IV.2.47, 50f). Thus, the forward spans may all be shorter than their backward counterparts.

TEXT; (b) as the PERCEPTION of CURRENT TEXT; or (c) as the PREDICTIVE REPRESENTATION of SUBSEQUENT TEXT. Figure 5 suggests the time line, with the actual instant (zero) in the middle. The dominant memory spans are shown beneath, and working memory (center) has open ends allowed by its chunking potential. The perception of current text would be limited to the span of short-term sensory storage that holds a sensory copy of the surface text, either acoustic or visual (III.3.6), for about two seconds before and after the instant of production. Hence, the text producer makes only fleeting contact with the surface text, and carries out most activities upon a mental representation. The latter's format differs from that of the surface text in important ways: being not just linear, but also hierarchical (cf. I.3.18; III.2.18; IV.2.1, 41, 46; V.3.10, 40; VI.2.22f); including materials not expressed in the text (cf. I.4.9, 11.2; III.2.16, 25, 35; III.3.25ff); and containing concepts and goals whose mapping onto expressions and phrasings is often complex and mediated (III.2.5-27). The short-lived direct access to the surface text may cause subtle discrepancies between the text (as a discourse action) and the writer's intention. The same effect may explain why proofreading, editing, and revising overlook problems and details (cf. III.1.26; III.3.33; V.1.22; V.3.21, 24).

3.8 Figure 6 shows the scheme of levels and phases from Figure 4 (III.2.5) combined with the scheme of directions from Figure 5. The figure is squeezed toward the center to represent differences in capacity (III.3.5.2). Dot shadings indicate which of the span-based stores are specialized toward which levels/phases: short-term sensory storage toward sound/letter linearization; short-term memory toward phrase linearization, expressions, and conceptual development; and long-term memory toward ideation and goal-

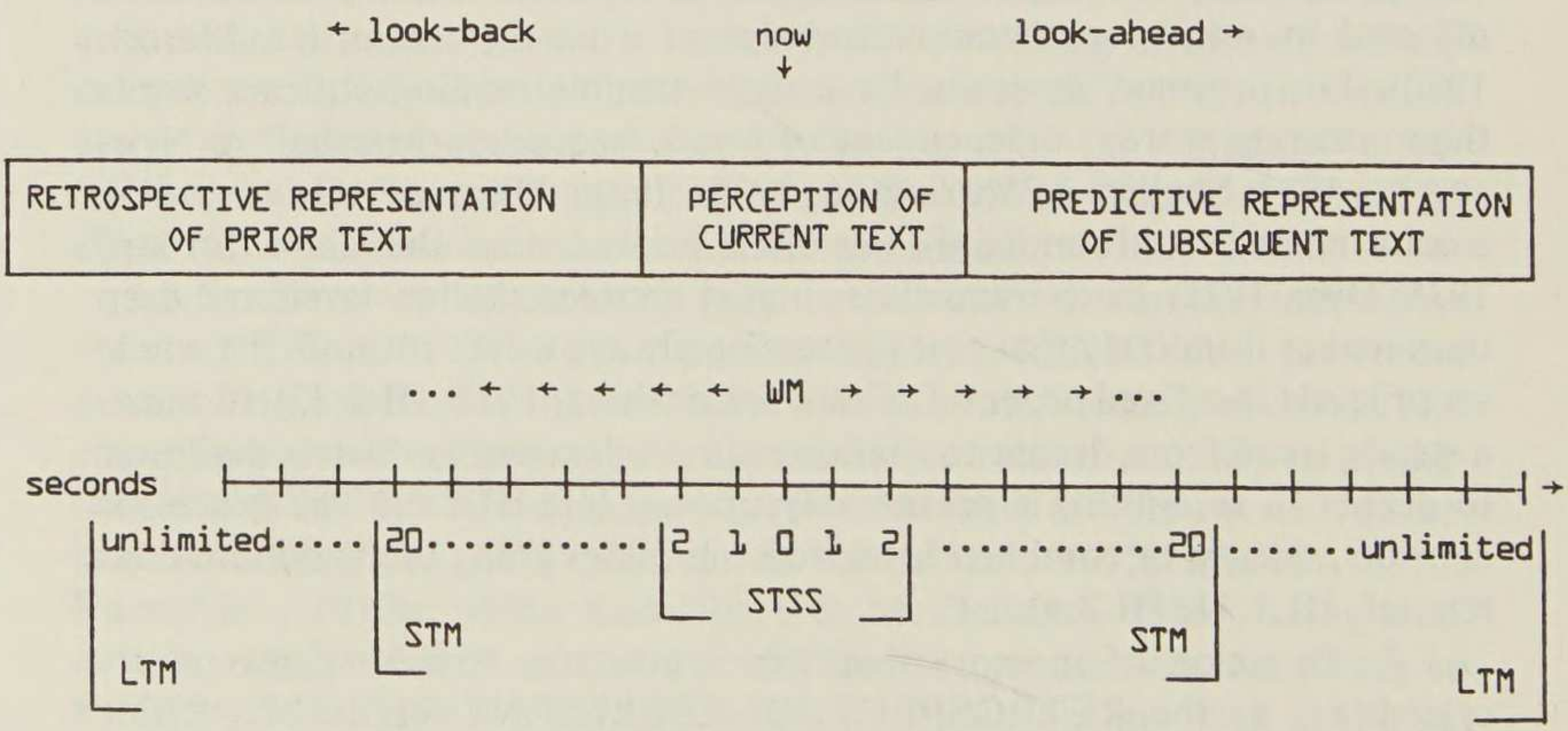


Figure 5. LTM: long-term memory; STM: short-term memory; STSS: short-term sensory storage; WM: working memory

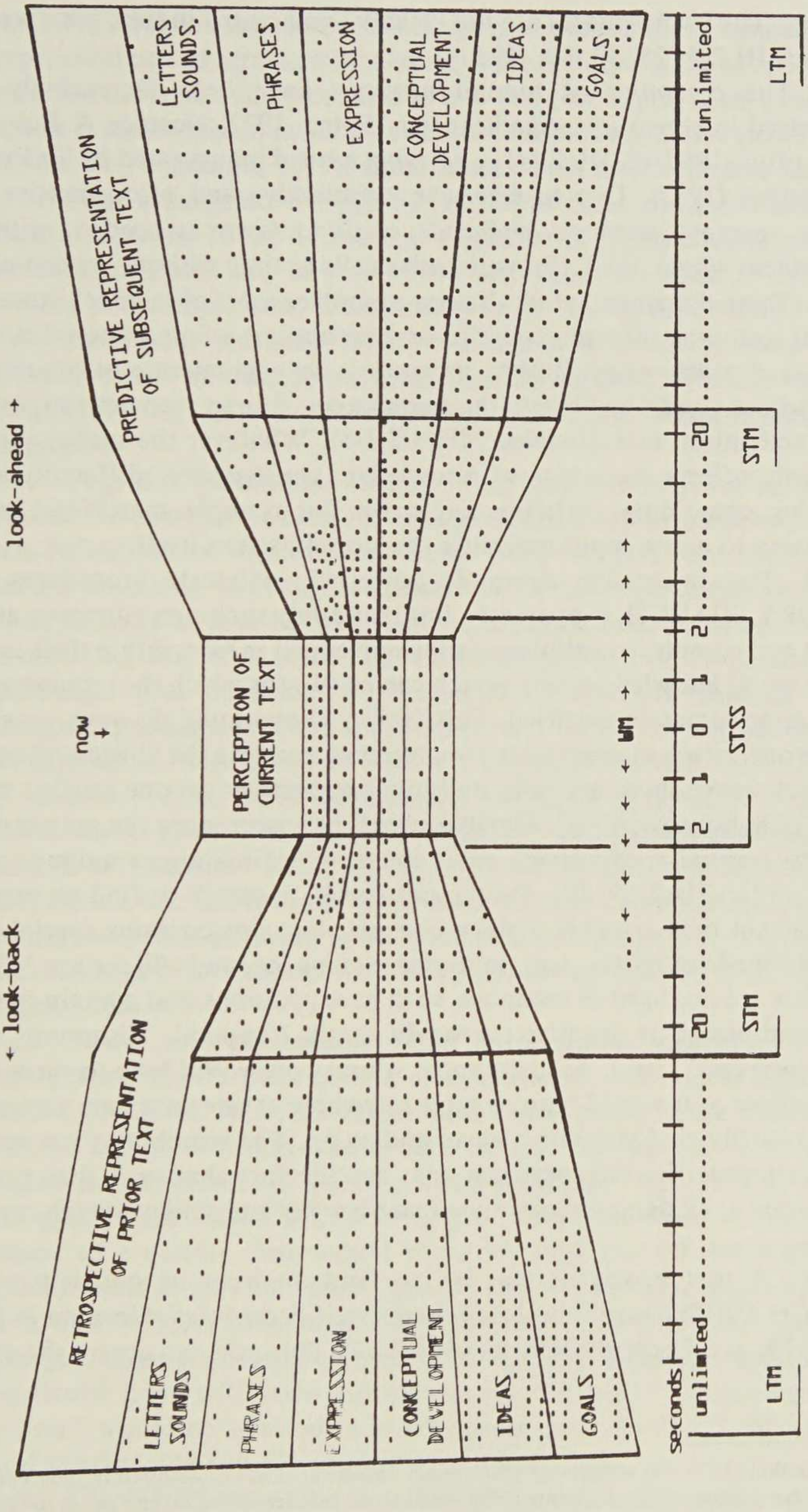


Figure 6. LTM: long-term memory; STM: short-term memory; STSS: short-term sensory storage; WM: working memory

planning. The levels/phases are not cleanly demarcated in time nor fixed in order (cf. III.2.5, 25, 30, 32; III.3.6).

3.9 The *dynamics* of human memory have been increasingly acknowledged in recent investigations (e.g. Spiro, 1977; Norman & Bobrow, 1979; Loftus, 1980; cf. III.1.14) — reviving a trend inaugurated by Sir Frederick Bartlett (1932). Due to extensive constructive and reconstructive capacities, memory produces elaborate configurations as needed, without storing them whole (III.1.15); and evolves all the time without express commands. These dynamics refute the commonplace view of memory stores as physical locations (like pigeonholes or warehouses) where material is sent and packed neatly away. Rather, memory is an agglomerate of processing events whose conditions create the parameters of span, capacity, experientiality, activation, and direction (III.3.5.1-5). Whatever the memory does necessarily affects the status of knowledge: constructing, differentiating, specifying, combining, updating, and so on. For example, matching a memory pattern to a new input may alter the stored pattern itself.

3.10 Text processing demands powerful, elaborate procedures for MEMORY SEARCH. Apparently, humans apply such procedures to a single vast and complex vocabulary listing embedded in turn within their memory for world knowledge. Any search can be run for which the requirements can be approximately specified. This facility allows multiple ways to access and use one's store of expressions or concepts, creating the illusion of multiple *stores* where there are only multiple *perspectives* on one unified store (Norman & Bobrow, 1979). Flexible search procedures are the mainstay of *discourse creativity:* expressing novel concepts, maintaining a unique voice, and so on (cf. III.2.15, 20). People can specify a search to find an expression that not only conveys a given concept, but also contains special patterns of sounds or letters, e.g., in rhyme, assonance, and alliteration.[26] Even novel lists are not hard to compose, such as expressions that contain the /s/ sound and designate negative personality traits ('sneaky', 'dishonest', 'slipery', 'perverse', etc.); acquaintances whom you would hate to meet in a bar vs. those you would hate to meet anywhere except in a bar; surnames you're heartily glad you don't have; and so on. The search may not return every item that fits the specifications; but the fact that such lists can be constructed at all demonstrates the great diversity and skill of search capacities.

3.11 A text producer can try to find an item by constructing a SEARCH GRID describing the desired specifications (cf. Norman & Bobrow, 1979; and Osgood's scheme in II.2.22). This grid can accept the stipu-

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[26] Fromkin (1971: 48) speculated that mental vocabularies are cross-listed in their entirety. It seems more economical to assume one general store, and searches that can be set to look for variable numbers of features (cf. Treisman & Gelade, 1980).

lations of several concurrent processing phases as suits the occasion, so that an expression can be returned that conveys the concept, is the proper part of speech, fits the style and voice, and so on. The search grid causes partial or complete matches within memory to become somewhat active (to "stand at attention," cf. Fahlman, 1979). Candidates which match most or all of the specifications accumulate enough activation to enter conscious awareness (compare Morton, 1970). If the text producer is highly motivated, these conscious candidates may be held in the buffer and subjected to considerable review and comparison; if not, one may be readily selected and executed. The candidates normally come from *active* vocabulary, while *passive* vocabulary needs an outside cue (e.g., consulting another writer or a thesaurus). However, context can make items active that would otherwise remain passive.

3.12 A grid of parameters seems a more plausible basis for search than a request for complete words. Meanings constructed in context need not match definitions of any known words. Once the grids are composed, a matching word may be available at once; or an elaborate circumlocution or explanation may have to be used. Competing candidates could contaminate each other, e.g., in word blends like Hotopf's (1980: 294) 'in particuly' for 'in particular' plus 'particularly' (cf. also III.3.32ff). In the famous "tip-of-the-tongue" phenomenon, the speaker recovers only some sounds or letters of an expression, not the whole item (cf. Brown & McNeill, 1966; Yarmey, 1973; Rubin, 1975). Such occurrences are natural enough if memory searches run on grids. The "semantic features" and the scales measured by "semantic differential" (II.2.22; III.1.16) are possible specifications for memory grids, but not the only ones. Most feature-based schemes were not offered as accounts of meaning being constituted in dynamic contexts, but as static listings in an abstract dictionary (cf. I.4.6; III.1.16; and critique in Bolinger, 1965).

3.13 Words and expressions might be classified according to which search actions recover them (again, an operational, not logical method, cf. I.4.13). CONTENT WORDS would have conceptually dense search grids, and FUNCTION WORDS would have conceptually sparse ones typically activated as side-effects of content-word grids (cf. IV.2.27). The sensory specifications for CONCRETE WORDS would be more stable among members of a culture than would those for ABSTRACT WORDS (e.g., people's mental images of "tennis court" agree better than those of "freedom"). CONNOTATIONS would be automatic contextual associations on the peripheries of conceptual patterns. STYLISTIC indicators would match up particular items with style parameters, e.g. "formal." Items with special "markers" would be selected only if appropriate (cf. VI.1.4, 6f, 9, 31ff); neutral items would suit almost any style (cf. I.2.8.5).

3.14 CONTEXT would be the result of the interaction and intersection of memory search grids as discourse is processed by its participants (cf.

III.3.11).[27] As each memory entry (concept or expression) is activated, those closely associated with it in a frame or schema are also slightly activated, producing the effect of a coherent context for whatever is being talked about, even after just a few words have been presented. If context changes, this activation fades away unless the entries are reinstated (Kintsch & Vipond, 1979: 348). The continual dynamics of context select the relevant word-meanings from among the total meanings you would find listed in dictionaries. In this way, context engenders transitory *preferences* for certain processing actions, and places one's hypotheses and expectations in a plausible *order,* so that the limited buffer space of working memory is not cluttered with irrelevant entries (cf. I.4.6ff; II.2.21ff).

3.15 Communication succeeds to the extent that its participants attain comparable results from the processing of contexts (cf. I.1.7; I.4.8). People use their social experience to construct a MODEL OF THE WORLD. This model is the basis for their BELIEF SYSTEM: a set of views about what is true of the world. When IDEATION takes place in text processing, this belief system supplies an active IDEOLOGY (III.2.14). Communication may be intended to either confirm or modify the audience's belief system (cf. Hovland & Janis, [Eds.], 1959; Hovland [Ed.], 1960; Rosenberg et al. [Eds.], 1960; Abelson et al. [Eds.], 1968; Himmelfarb & Eagly [Eds.], 1974; VI.2.1.). An ATTITUDE can be defined as a predisposition to preserve or change a belief (or belief system). Single beliefs are much easier to modify than whole systems (cf. McGuire, 1968; Rosen & Wyer, 1972; Wyer, 1974). The audience may record a statement, but ignore its conflict with their prior beliefs. IRRATIONALITY would be the state in which major contradictions or inconsistencies are left unreconciled (cf. I.2.12; I.2.23.7; III.2.23; III.3.28).[28] Or, the audience might consciously refuse to revise their belief system because they feel threatened by change (cf. Rogers, 1952). Irrationality (e.g. in politics or religion) is natural when cultural knowledge becomes so complex many people can't integrate it all into a rational model of the world.

3.16 Communication is a continual negotiation of concepts and goals within the contexts of beliefs and attitudes. The *value* of a text ultimately depends on its function within this framework. The text producer must not only succeed in presenting the text as an artifact, but must also appreciate the consequences of the total interaction. The text must be *efficient,* i.e., must be easy to process, and at the same time *effective,* i.e., must accom-

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[27] On models of conceptual intersection, see Quillian (1968); P. Hayes (1977); Brachman (1978); Fahlman (1979).

[28] If politics is the domain where personal goals can override ideas, we would expect it to be rife with irrational contradictions (cf. III.2.7). For example, opponents of abortion claim to champion human life but don't care about mass starvation in Africa. Politicians publicly denounce racism and sexism but practice them daily in private life. Religious activists appeal to the Bible's message of love but spread violent hatred against their opponents. And so on.

plish its purpose (cf. I.4.10; III.2.9). In general, there is a TRADE-OFF: the more effort the producer expends, the less work the audience has to do; and vice-versa (cf. IV.2.67; IV.3.35; VI.1.25; VI.2.37). Text producers possessing institutional or political leverage, especially bureaucrats (cf. II.3.26, 33; V.2.35; VI.1.26), characteristically favor their own convenience and habits over those of the audience. Sometimes, obscurity is used as an intentional means to prevent discussion or challenge. Ordinary citizens are at a great disadvantage in dealing with the law, simply because legal language is so hard to understand (Bond, Hayes, & Flower, 1980; Charrow, 1981). If you are presented with a legal document that carries a designation like (38), you won't know how to assert your rights:[29]

(38) Order to show cause why preliminary injunction should not issue and temporary restraining order made.

More often though, text producers simply want to save themselves trouble and effort. College writers, for example, lack the motivation and skill needed to be clear and precise. Their writing is seldom *incomprehensible,* but very often *inconsiderate.* They are constantly confronted with bad writing from successful people in positions of social responsibility, and don't see why clarity should be worth the effort (cf. VI.1.26ff).

3.17 Successful writers realize that discourse is part of a broader interaction and negotiation (cf. Shanklin, 1982). An audience must not merely understand, but must have enough resources left after having understood to modify their beliefs, or to carry out the actions the producer desires. The more the audience must strain to understand, the less they will be disposed to co-operate without coercion. Educational institutions seem to encourage lazy writing, devoid of purpose and commitment (cf. Macrorie, 1970: 13; Applebee, 1982: 377; III.2.12). Unskilled student writers typically see the filling of paper with text as the only goal. They are suffering from overload anyway and try to reduce it by leaving the audience either to piece together a badly organized message like (39) or by regaling them with trivialities like (40):

(39) Other occurances may be sitting down when you're supposed to be standing.
(40) The success of a person entering any field depends on self-motivation and the use of talent to the best of one's ability.

An active modification of an audience's beliefs, on the other hand, demands well-organized, original thesis statements supported by clear evidence (cf. VI.2.1). Obviously, the writer has to work harder — and has to

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[29] Opening passage of a restraining order issued by the State of California against the Hell's Angels, July, 1965 (reported by Thompson, 1966: 163). Its questionable legality was deliberately obscured by its language; not even professional lawyers could interpret it, much less the people it was aimed against.

recognize the value of doing so. Creating these preconditions is the main task facing composition instruction (cf. III.2.13, 19).

3.18 To begin with, students need a topic about which they are *knowledgeable* (I.2.8.8; III.3.21ff; VI.2.27). Organization is then less arduous, and motivation is stronger to *inform* an audience, not just to *invoke* everyday trivialities. Since most students entering college don't yet command extensive academic or technical knowledge, *personal experience* makes good content for learning to write (cf. Rohman, 1965; Moffett, 1968; Macrorie, 1970, 1980; Young, Becker, & Pike, 1970; Berthoff, 1972; Miller, 1976; Corder, 1979; D'Angelo, 1979a). Applebee (1982: 379) observes that personal experience puts the student in the rare position of knowing more about the topic than the teacher, and of conveying things not already known (cf. I.3.24; III.2.19). According to my interviews, this situation greatly improves the motivation of unskilled writers to face the hard job of saying something of their own in clear prose (cf. VI.2.32).

3.19 Some strategies for conveying one's experiences in a text are shared by the participants in a culture. The MONITORING of experience (cf. I.4.11.6; II.2.10) can be supported by NORMAL-ORDERING STRATEGIES for relating situations in the world—one's perceptual space in the sense of III.3.2.10—to the arrangement of the text (cf. IV.1.10; IV.2.56). *Earlier* events are mentioned before *later* ones (Clark & Clark, 1968; E. Clark, 1971; Opačić, 1973; Osgood & Bock, 1977. Objects *higher up* in a scene are mentioned before those *lower down* (DeSoto, London, & Handel, 1965; Clark & Chase, 1974). A *mobile* object is mentioned before a *stationary* one (Huttenlocher, 1968; Olson, 1970; Osgood, 1971; Osgood & Bock, 1977). Concepts that *involve* the text producer, because they are *salient* (intruding markedly on sensory perception), *vivid* (strongly evoking reality), *emotional* (related to, or eliciting, emotional states), or *motivated* (crucial for one's goals) are given earlier mention (Osgood, 1954) (cf. IV.2.56-58). Osgood and Bock (1977: 93) argue that discourse organization obeys a "naturalness" principle and reflects the organization of one's nonlinguistic experiences; that organization is "naturally" "taken over by the linguistic system" as a child matures (II.2.23). Still, the influence of perceptual space on discourse patterns has some important restrictions. First, these normal-ordering strategies are only *defaults* or *preferences* (I.4.8) and can be overridden. Second, the text often is highly *mediated* from experiential groundings (I.4.7; II.2.20ff). Third, experience may be too *complex* to be rated on the proposed scales, e.g., continuous perception not being easy to relay to discrete expressions (III.2.25). Finally, the scales may exert *conflicting demands* (IV.2.64). Due to these restrictions, normal-ordering strategies affect discourse patterns without strictly determining them.

3.20 Since personal experience supports the production of longer, better organized texts (Voss et al., 1980), surveys of students' knowledge and

beliefs can be helpful. Darlene Logan collected students' estimations of writing topics assigned at the University of Florida. Responses like these were typical:

(41) I can apply my full writing ability to something which I have knowledge of.
(42) I do well on papers that deal with my interests and/or past experiences. I feel I need to relate to a topic before I write about it.
(43) I enjoy water skiing very much, so I feel relaxed writing about it.

Students preferred a topic where they could "promote activities" they "enjoyed," "make the activity sound enjoyable," and "get the reader interested." Conversely, students considered a topic "difficult" if they knew little about it or were not involved:

(44) I didn't really know what view I wanted to show in my essay.
(45) I didn't really have a strong conviction one way or the other.
(46) If I had been interested in the topic, I would have put out a little more effort.

Students felt less adequate tapping the content of a reading selection than their own personal experience. One said:

(47) After reading it [an essay by Neil Postman], it became difficult to formulate my own ideas.

3.21 The survey bore out the importance of finding topics where the deep phases of goal-planning and ideation help support organization and informativity. My research group worked out a questionnaire with 18 topics that 164 students rated along four parameters: (a) topic is *interesting* vs. *boring;* (b) topic is *everyday* vs. *intellectual;* (c) student is vs. is not *knowledgeable;* and (d) student is vs. is not *personally involved.* The findings were surprising in two ways. First, wide agreement was scarce. Only the following were judged "interesting" by 85% or more of the students:

(48) Competitive sports are good training for the young
(49) Sex and the single student
(50) How the Reagan budget cuts will affect students
(51) Should we continue to make major investments in the space program?
(52) Should abortion be legalized?

Favorable ratings on all four parameters were even scarcer. Only (49) received such ratings straight across from over 85% of the students, apparently for motives unrelated to writing (III.3.23). Other topics, even those we had designed to elicit agreement, got scattered ratings. A third of the students declared the topic "Is there still a need for a college diploma?" to be intellectual and beyond their knowledge; a fifth professed neither interest nor personal involvement in the question! Yet involvement was claimed for topics like "How the telephone book is organized" (20 students), or "The future of abstractionism in art" (16 students).

3.22 The second surprising finding was that the four parameters did not heavily interact. Knowledgeability and personal involvement had been found to increase interest (III.3.20). But on the questionnaire survey, 85% of the students felt lacking in knowledge about only four topics; at the same time, half the topics were judged by almost all students to elicit no involvement. Interest was voiced for topics despite a lack of knowledge or involvement, e.g., in "Japan's technological revolution" (89 students) or "American investment in South America" (68 students). More predictably, disinterest was expressed for trivial topics despite knowledge about them, e.g., "The organization of the telephone book," or "Keeping an accurate checkbook."

3.23 The survey indicated a mere handful of topics suitable for assigning to a whole class, for instance, to gather a set of samples for student placement. The sports topic (48) has been the most advantageous. The ideology of sports is seldom controversial in comparison to sex (49). I tested (49) on a class toward the middle of the semester, and found a widespread lowering of writing quality: clichés, stereotypes, dodges, denunciations, and other signs of insincere, trial-and-error writing. The same ideological conflicts that make the topic interesting also make writers insecure about stating a thesis (cf. VI.2.1, 8). Such discrepancies between rating a topic and writing about it indicate the complex relation between statements of attitude and assignable topics.

3.24 A *visual presentation,* e.g., a scene, picture, or silent film, is another way to explore the transition from experience to writing (cf. III.1.2.5; V.3.6ff; Irmscher, 1979a: 83ff). Our test groups disagreed widely even about the limited, immediate input of a single scene. Students came up with 22 versions of the "main idea" in three cartoons on auto mechanics. A retest stipulating "the author's main idea" fared no better; students assumed their idea was also the author's. The inferred "main ideas" in turn controlled how arrays of lines and spaces were interpreted. A customer's face in one cartoon was called by various students 'stupid', 'goony-looking', 'confused', 'frustrated', 'irritated', or 'flabbergasted'. Two mechanics I thought were about to install an ignition coil were said to be 'trying to figure out what part they were holding'; 'playing with a finger trying to balance a nail'; or 'doing nothing'—because the students viewed the mechanics as 'incompetent' and 'disorganized'. The spread of interpretations was more limited for films, presumably because the narrative organization of the experience provided a richer, more determinate context. Seeing events in temporal and causal patterns evidently promoted agreement. All the same, students differed in their tendencies to omit or transport events, supply motives for characters, and offer value judgements (cf. samples (377-378) in V.3.7-9). These results suggest how risky it can be to base a "content grade" on whether the "facts" are accurate (I.3.18).

3.25 Though adequate to enable communication, cultural consensus al-

lows considerable freedom for personal interpretations. The mental imagery activated by a brief descriptive text is often diverse, though far from random. I had 35 students either read or hear me read the following text by Kenneth Pike about his boyhood home (from Young, Becker, & Pike, 1970: 122ff):

> (53.1) It was an old New England house directly joined to the barn, so that no space or outside wall came between them—in fact you could not tell where house stopped and barn began.
> (53.2) I lived in it as a boy. I would come home from school, always to find Mom there, and would run out to the woodshed to get wood for the stove.
> (53.3) It was hardly a mansion, but it was nicely situated on the common with its lovely maples, and centrally located so Dad's patients could find him easily.
> (53.4) It was one of a cluster that included the homes of the preacher and storekeeper, a general store complete with barrels and post-office, a red-brick schoolhouse with its one teacher and thirty pupils in eight grades, and a white clapboard church with spire rising above the pines.
> (53.5) Our house was two stories high; my room in the upper story was unheated, with snow blowing on the bed through the window—open-a-crack on cold winter nights.

I encouraged the students to "picture the scene in their minds." Then one of three tasks was performed: (a) answering questions orally for a tape recorder; (b) answering questions in writing; or (c) recalling the scene without prompts. Cued recall was thus elicited on (a) and (b), and free recall on (c) (III.3.5.4). The silent readers were permitted to consult the text if they desired, though most of them didn't. On all tasks, the students enriched the scene with mental images that were strikingly consistent. Even the diffuseness of details in free recall can be attributed to fairly uniform processes of elaboration and change:

3.25.1 Specification. The setting was a 'small town' or 'village'. Life in the town was recalled as 'quiet', 'peaceful', and 'enriching', and 'the small population was heavily wooded and quite friendly' (sic; a case of selective contamination, III.3.36). The time was 'in the early 1800's' or 'earlier than the 1900's' (whence the primitive heating) or, still more specific, 'Saturday' or 'Christmas' (probably to allow people to be out shopping).

3.25.2 Addition. Students added a 'barber shop' to the commons, a 'picket fence' to the house, a 'bell' to the school, 'three large arches' to the church, 'two lazy storekeepers' to the store, and a full-blown 'country with cornfields, cows, horses, and hay'.

3.25.3 Alteration. The 'preacher' was converted to a 'priest', and the 'maples' to 'oaks'. The schoolhouse migrated from the 'common' to 'the outskirts of the town'. The woodpile crept from its shed into 'the barn', or to 'the side of the house'. The 'maples' marched from the 'common' to Pike's 'yard'.

3.25.4 Conflation. Some alterations involved the confusing or combin-

ing of text-world elements (cf. III.3.27). The 'house' was given a 'barn-style roof'. The 'wood' was fetched by the 'mother', not the 'boy'. The two-story form was transferred from the house to the 'general store'.

3.25.5 Causal inferences. The students supplied things that could be caused by or result from text-world elements. The 'cold winter nights' brought 'wool coats' to the 'store', and 'red cheeks' and 'frosty breath' to the people. The 'wood' in the 'stove' led to 'smoke coming out of the chimney'.

3.26 In free recall, subjects report their remembered versions unsystematically. By cueing recall with probe questions, I hoped to detect consistent variations in content among the whole audience. For example, I asked for the color of the house and then of the barn—buildings that should have been the same (53.1). To match them up, 10 students made the barn white, and 6 made the house red. Other students followed cultural expectations and made the house 'white' and the 'barn' 'red', ignoring the need for a uniform color. On another question, 28 students all averred that the 'maples' were 'taller than the house', perhaps because the town and its trees seemed so old. 24 students clothed 'Mom' in an 'apron'; 21 placed her in the 'kitchen', where 18 saw her 'cooking' and 8 saw her 'baking'. 12 students had the storekeeper 'old' and wearing 'glasses'.

3.27 These responses suggest a fine-tuned memory interaction between commonsense knowledge and text content (III.1.14). Most students made 'Dad' a 'doctor' because of 'his patients' (53.3); but due to other cues in the text ('wood', 'New England'), a few students made him a 'farmer', 'lumberman', or 'pilgrim'. The 'schoolhouse', built of 'red brick' in the original (53.4), was described by 9 students as built of 'wood', painted either 'red', 'white', or 'red and white'. Conflation with the 'white clapboard church' may have been the cause, especially when the school got a 'tower' or 'tall chimney' like the church's 'spire' (cf. III.3.25.2). Intriguingly, these alterations were retained even by readers who had a chance to study the text again (cf. Kay, 1955).

3.28 Just as cultural consensus promotes unified interpretation and elaboration in text processing, cultural conflicts promote disparities. The photograph in Figure 7 was shown via slide projector by Steven Robitaille and John Pieters to 97 undergraduate students at the University of Florida. The slide either remained in view or was switched off while they answered the question, "What's going on here?" The photograph, taken by Charles Moore, [30] documents a racial incident where police deployed weapons and dogs to subdue demonstrators. We thought the picture would be hard to interpret as a police action against a criminal: a crowd is present, the officers are not using their firearms, etc. However, most of the students seemed

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[30] The photo appeared in *The Best of LIFE* (NY: Avon, 1972). The "Black Star" agency of New York was paid $75 for reproduction rights.



Figure 7.

unable or unwilling to see what my research group found obvious. Whether the slide was left on or switched off made no significant difference: apparently, students formed their opinions at once and stuck by them, unaffected by the chance to inspect the evidence (cf. III.3.27). 77 of the 97 mostly white students supplied some motive(s) for the event. 45 justified the police for capturing a 'criminal', 'rioter', 'heckler', or 'escaped convict'; the black man, they opined, had 'just committed a crime', 'obviously done something', 'allegedly broken the law', 'escaped from the police', acted 'irrational and desperate', or 'called something obscene at them'. The dogs were exonerated as being 'very angry', 'offended', 'scared', 'threatened', or just 'disliking' a man that 'was probably bugging' them. The entire police action was lauded as 'controlling a riot', 'restraining a crowd of black people', 'suppressing violence', and 'calming the masses'. Some students suggested the whole thing was a deliberate staging: a 'Sunday parade' for 'policeman with dogs'; a 'crowd control experiment'; a 'test' or 'demonstration'; a 'dog show'; or a 'movie'. The canine attackers were 'showing their technique on command' or at worst 'being disobedient'. The black people in the background were termed a 'mob', or even (irrationally) 'a small mob'. Some

students gave flagrantly implausible accounts of the scene: 'a new stress test for Levi's'; a 'public demonstration of a new doggie biscuit, life-size'; or 'a Hollywood movie' in which 'the torn pants leg of the stuntman' was 'torn for effect obviously because no dog is near the leg'.

3.29 Only 15 of the 97 students sided with the black man as an 'innocent' victim of 'the authorities blatant overuse of power' and of an 'uncalled-for act of violence by the police' against a 'passive', 'peaceful', or 'non-violent demonstration'. Robin Baldwin replicated the test with a predominantly black test population. The black students were much better able to identify the real source, though most of them were mild in their evaluations. A few discerned 'cops using dogs against the blacks to keep them as minorities in the sight of the law'; and 'cops (probably rednecks) enforcing *their* law upon black citizens'. It was hard to tell whether racism was no longer considered a major issue, or whether our students had simply resigned themselves to it in the force of current political trends.

3.30 Ideology poses one more dilemma for composition teachers (cf. I.3.13): how far everyday politics (in the sense of III.2.8) can or should influence literacy education. Few topics are totally neutral in their ideological impact. Even writers who strive to avoid value judgements have to decide what will or will not be mentioned. Merely organizing content demands participation in some ideology without which the relatedness of concepts and ideas could not be reconstructed. For the same reasons, teachers can hardly comprehend or evaluate a text without recourse to an ideology, habitual or assumed. Moreover, pressure is frequently felt from politicians, administrators, parents, and even a few students, to enforce ideologies prevailing outside the schools and colleges. My assistants report students asking them, "If you don't agree with my views, will you lower my grade?" Rightly or wrongly, students suspect composition courses of being exercises in ideological conformity (cf. I.2.19). I have found this impasse difficult to overcome; many students misconstrue a trend toward ideological freedom as merely another ideology they should pretend to act out.

3.31 At least, teachers can seek to identify and alleviate ideological tensions that would impede a fair evaluation of writing progress. An intention to express an idea can succeed or miscarry, whether or not the idea is judged to have merit. Teachers can help students learn to achieve intentions by showing how writing is an open and open-ended task, and how content is negotiable and slippery. Enforcing ideologies may hinder or block ideation—a deep, early phase of production—so strongly that contingent actions are also impeded. Conflicts on this level have been a major obstacle to literacy education within traditional institutions.

3.32 Some types of mishaps in the discovery of ideas and concepts can be clearly recognized. The processes of searching for content in memory, though usually rapid and reliable enough, do have weak spots and bottlenecks. CONTAMINATION occurs when one item or pattern interferes with

another so strongly that production is disrupted (cf. III.2.29; III.3.12). In LINEAR CONTAMINATION, search returns its results at the wrong instant, either too early or too late. If a word or word-part is implemented too early, we have PRE-ACTIVATION (III.2.30; IV.1.7; IV.2.45, 47; V.1.17, 39, 44). The sequence may be fully cohesive, but not fully coherent, e.g.:

(54) I do not see how the first paragraph follows from the first.

where the initial 'first' was supposed to be 'second' (Hotopf, 1980: 293) (putting 'second' ahead of 'first' could be a strain anyhow). Or, cohesion may be impaired as well:

(55) The federal Defense Budget is the only government that program will be increased in spending.

where the student put 'that' before 'program' instead of after it. The reverse linear contamination would POST-ACTIVATION, where the item appears too late (III.2.30; IV.2.11; V.2.34; V.3.30f), e.g.:

(56) Most of us share certain needs or wants (psychological).

in which the student tried to compensate by placing the post-activated modifier in parentheses after its head nouns (cf. V.3.31).

3.33 An intriguing variant of linear contamination—more frequent than pre-activation or post-activation—is REACTIVATION: an item reappears soon after its first use, sometimes apparently against one's will. The facilitation or "priming" of a later event by an earlier similar one is well known in psychology: "items that have just been processed" are "privileged in the sense that they are readily available [. . .] recoding is possible without requiring another rematch with the corresponding [. . .] memory representation" (Kintsch, 1974: 86). Reactivation may result when an item persists in a buffer of working memory and the execution instructions are confused (cf. V.1.35, 35; V.2.34). Recently, I dictated (57) to my secretary when I meant to say (57a):

(57) Recent debates have fanned a debate
(57a) Recent debates have fanned a dispute

Reactivation is most likely among expressions that are similar in both meaning and surface shape, e.g. 'debate' vs. 'dispute'. Both items match the search grid and confuse the processor, particularly when the latter is heavily loaded. Reactivation may disturb cohesion either mildly (58) or severely (59):

(58) There is also a large difference between the two also.
(59) Contrary to belief, losing does have does have a beneficial effect.

The fact that the writers overlooked these slips during proofreading up to the final copy suggests that reading is subject to the same contaminations as

writing. Processing registers the presence of the words, but not their repetition; or relies on the mental representation more than on the surface text (III.3.7; IV.2.36; V.1.45).

3.34 Some REDUNDANCIES may be a milder form of linear contamination. What was already expressed is reactivated and included again, though often not in the same words; or the first expression may be a preactivation of the concept intended to be dealt with later on. For example, the subject and predicate of a sentence get short-circuited:

(60) A loss of 100 million lives will be terminated.
(61) The difference between high school and college has many contrasts.

Redundancies may reflect uncertainty about what has been expressed so far, or about how explicit one needs to be:

(62) You mustn't fit the child with a shoe that has too wide a width. If you do, the baby's foot will tend to spread out and when he or she gets older it might be hard for him to find shoes with that wide of a width.

Tautologies suggest a partial or contaminated conceptual development that has not yet recovered enough material to make a worthwhile statement:

(63) Social work will continue to be in demand as long as social interaction takes place in society.
(64) Computer games are so ever-popular that almost everybody likes to play them.

Redundancies in writing may be due to the influence of speech habits formed under the need for continuous text production (V.3.32ff); or to a tactic to lower processing load (III.3.4.5).

3.35 It is unclear whether linear contaminations occur in memory search, in the buffer where search results are held, or in motor actions working from the buffer—or in all three of these domains (cf. MacNeilage, 1964; Shiffrin & Schneider, 1977: 151; Norman & Shallice, 1980). Hotopf (1980: 296) found that speech errors involved displacements spanning the same number of syllables as writing errors, namely about 6.5—a time lapse of about one second for speech (cf. Lenneberg, 1967), but of close to five seconds in writing.[31] If slips can occur only in the buffer, they could not be restricted to short-term sensory storage: its one-to-two second duration would suffice for the errors in speech, but not for those in writing, unless the errors were situated in the sound execution program and automatically recoded into the letter execution program— assuming that spelling works from an acoustic representation (cf. dispute in V.1.33ff). Certainly, linear contaminations are much rarer in writing than in speech, no doubt because

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[31] Hotopf's writers were hurrying on an exam. Matsuhashi's filmed writers were substantially slower; one averaged some 13 words per minute.

of difference in rate. But if slips can occur either during memory search or during execution, their timing could vary considerably.

3.36 Search also encounters SELECTIVE CONTAMINATIONS: the intended item is entirely displaced by an associated one from memory storage. Here too, surface resemblances co-operate with conceptual ones, as when Charles Fillmore said in a lecture:

(65) People don't leave in trees. [live]

In speech, selective contaminations are frequently noticed and corrected (Fromkin, 1971: 46):

(66) the two contemporary, er—sorry, adjacent buildings

In writing, these contaminations are less often made, again because of slower rate, but some do persist. Hotopf (1980: 294) found 'late' displaced by 'early', 'wife' by 'husband,' 'lunch' by 'breakfast', 'black' by 'red', and 'January' by 'Saturday'. These contaminations, in which the implemented item has only a partial conceptual overlap with the desired item, support the contention that search grids look for specifications, not just for whole items (III.3.12).

3.37 A vital question for future research is whether contaminations in search or action are random, or whether they follow patterns of their own. The latter possibility would explain why slip-ups are so often meaningful. The processes of memory suggest that an item could be unintentionally implemented if: (a) it is conceptually associated with the intended item; (b) it resembles the latter in surface shape; (c) it is frequently or habitually selected; (d) it is prominently recorded as personal experience in episodic memory; or (e) it is closer to one's goals and ideas than the intended item, but is being suppressed for some reason.[32] These motives could interact, as they appear to do in Freud's (1914) famous slips in "everyday life." A slip would be most probable if the processor's resources and attention are in heavy demand at the time.

3.38 Everyday communication includes a certain proportion of more or less incoherent statements that are nonetheless approximatively understood. The same fuzzy processing that produces such statements may also make them comprehensible. Trite sayings can get mixed up (reported in Sherwood, 1980: 228):

(67) He slammed the door at the top of its lungs.
(68) I wouldn't buy that house if it was given to me.

because people are accustomed to process them with little attention. In writing, a lack of skills encourages overload and thus favors contaminations

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[32] Freud stressed suppression much more than seems warranted in much of my error sample. Many slips of the tongue simply result from conflicts between competing ways to say the same thing. Still, attempts to go against one's habits of usage can lead to slips (V.3.23ff, 33).

and incoherence. Newspapers recently carried excerpts from accident reports submitted to insurance companies, e.g.:

(69) I had been driving for forty years when I fell asleep at the wheel.
(70) An invisible vehicle came out of nowhere, struck my car, and vanished.

Newspapers, being texts composed in great haste and read with little concentration, are beset by similar incoherence:

(71) He called on the Kentucky Legislature to clarify the state abortion statute to define whether it applied to pregnant women. *(Newsday,* Aug. 31, 1978)
(72) Half of U.S. High Schools Require Some Study for Graduation *(Los Angeles Times,* Aug. 10, 1981)
(73) Two innings later, Jefferson was beaned in the back of the head by a line drive [. . .] Jefferson was not injured in the play; the baseball, which ricocheted all the way to right field, was taken to hospital for X-rays. *(Toronto Globe and Mail,* Aug. 21, 1979)

Student writers overlook the same sort of oddities:

(74) Suicide leaves its victims unable to view their problems objectively.

3.39 Some cases of incoherence arise from a contamination—both linear and selective—among alternative phrasings:

(75) The disadvantage that I have against the university is that it is very large.

may be a mixture of 'the disadvantage of' plus 'the objection that I have against'. A contamination of grammatical roles such as agency is common:

(76) An alligator hunter has been hired by the state to pick up the gator, and to be taken to another area to be killed.
(77) Even if the person did not commit the crime, it has been known to be unfairly convicted, sentenced to death, and executed.

The omission of agents—enforced by the old-fashioned proscription of first and second person pronouns (I.2.14; VI.1.12, 19ff)—fosters incoherent statements:

(78) Tennessee is a small state when travelling vertically.
(79) Several minutes passed, establishing the intricate network of bloodlines within the county.

It was the writers who actually 'traveled' and 'established' (explained), but who shied away from saying 'I'.

3.40 Other cases of incoherence are found in the alternative statements allowed by *ambiguities*. Such statements attract attention because of their interest value, and divert an audience away from the text producer's intended message and purpose (IV.2.68; V.3.35). Newspapers are again a victim:

(80) Navy Finds Dead Pilots Flying With Hangovers *(Washington Post,* Sept. 18, 1981)

(81) Drunk gets nine months in violin case *(The Lembridge Herald,* Nov. 30, 1979)
(82) City To Add 12 Foot Cops *(The Trentonian,* March 24, 1977)

My students aren't far behind:

(83) Men who are only children show 5.72 times the average in the number of divorces.
(84) Doug B., the representative for mentally disordered sex offenders, urged participation on many levels.

The ambiguous pronouns common to speech may carry over to writing (V.3.25-29), allowing incoherent alternatives:

(85) when Chuck's partner died, he felt very disconsolate
(86) I hated grapes, but these people were so hospitable, I had to eat them.

The nefarious "dangling" or "misplaced" modifiers reflect the students' unskilled control of phrasing:

(87) Being a nice, fairly hard dirt road, I decided to do a couple of doughnuts.
(88) When first discovered, Dr. Li could find no use for the protein. [. . .] After being tested on mice, Dr. Kline tried the protein on psychiatric patients.

3.41 Several issues here require empirical research. Is processing so organized that lapses in coherence lead to an unintentional, sometimes outrageous, coherence? If so, what is the nature of this mode, and how is it controlled? How does it happen that a writer or reader fails to notice the lapse, though another person does? An extreme case is when a writer—whether for a newspaper or a college assignment—says just the opposite of what was intended:

(89) Nicaragua sets goal to wipe out literacy. *(The Boston Globe,* Oct. 1, 1979)
(90) Our overriding defense manpower objective is to increase the shortage of personnel.

Less striking, but still puzzling, are the bizarre, sometimes witty statements naive students create with no apparent intention:

(91) Fraternities believe that if fraternity men go out for extra-circular activities, they will be more well-rounded.
(92) The day begins at 7:00 a.m. when revelry blows.[33]
(93) When these recent rock songs sing about love, it is usually in its bare maximum, sexual intercourse.
(94) If you have a nice determined personality, you might get a head.

I know my students well enough that I would not expect them to deliberately work out elaborate puns like (93) and (94), or sly misspellings worthy of the later James Joyce, e.g., 'Munday morning', 'wedding engagment',

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[33] (91) and (92) appeared as "bona fide boners" in *CCC,* 1950, 1, 14, and were taken from the "Rhet as Writ" section of *The Green Cauldron. CCC* did not continue the column.

'President Reagun', and 'job poopertunities in our economy'. Cognitive processing is so accustomed to seek for coherence that contaminations and errors seem to involuntarily drift toward making sense, though in a rougher, less constrained mode than is normally approved with conscious attention. That mode seems to relax the usual standards of coherence to admit interesting configurations—a curious side-product, perhaps, of operating in an enormously complex and dynamic system.

3.42 However these questions may be resolved, the need for careful control and investment of resources in text processing is clear. The transition from the deepest phases to the final execution of the surface text is no forgone conclusion ensured by abstract rules. Learning to speak or write well cannot be divorced from learning to think well, and to judge how well one's discourse actions match one's intentions. The producer's effort is traded against the audience's (III.3.16). By appreciating how processing resources can be distributed and managed, the producer can feel confident that slip-ups or failures, though natural and predictable, can be monitored and remedied. In this activity, the producer can attain an organization that not only eases the audience's task, but also meets his or her own need to understand and portray the world, and take stock of knowledge (cf. I.2.23.5). This task is particularly vital in writing, whose results provide an enduring record of discovering and enacting one's peculiar role in the human scheme.

IV

The Linearity of Text Production

1. TEMPORALITY VERSUS SPATIALITY

1.1 The most essential precondition for the use of language elements is their *combinability* (Hartmann, 1963a, 1964). Until the elements are combined, they are not clearly defined (cf. I.4.6, 10, 14; V.2.15, 17). Early theories of language looked at combination mainly as a *word for word* procedure. Linguistics looked for "immediate constituents," "distributions," "slots and fillers," or "phrase structures," to show how words were adjacent (II.1.12f; II.3.5). Psychologists postulated "associative chains" where each word is the stimulus for the next one (e.g. Washburn, 1916; cf. II.2.2). Statistical information theory (cf. Shannon & Weaver, 1949) computed the "transition probability" for any element by looking only at what element it immediately follows. The less often a particular transition between two elements occurs, the less probable it is and the more information it conveys.[1] This theory was not intended to apply to language communication (cf. Shannon & Weaver, 1949: 8; Cherry, 1953: 383; Bar-Hillel, 1964: 222f). Unfortunately, its mathematical rigor and well-structuredness led to extrapolation in both linguistics (e.g. Lounsbury, 1954) and psychology (e.g. Goldman-Eisler, 1958a).

1.2 We don't need to think of language as processed word for word in order to relate linearity to probability. People are frequently able to guess the next letter or word in a sequence (cf. Shannon, 1951; Goldman-Eisler, 1958a, 1961a; Sprung, 1964; Stevens & Rumelhart, 1975). But this ability uses other cues (and other levels) besides the immediately preceding word.

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[1] For a discussion of the properties of linear automata, see J. Anderson (1976). Like most mathematical and logical systems, automata are of little use to human research as long as we have only vague notions of what should be formally reconstructed (cf. I.9.3).

To treat every word as a new decision point would entail an explosion of short-sighted calculations done right on the spur of the moment. People must apply *contextual* probabilities, not *statistical* ones. As discourse unfolds, people use all kinds of available cues to predict what will be said next. These predictions may not deal with the surface structure of the utterance itself, but with the general range of content that would fit an idea or topic (cf. Clark & Begun, 1968). Thus, the statistical probability of any sentence or utterance as such can be mathematically very low, yet its content and purpose could be highly predictable (cf. II.3.5). This approach allows people to overcome disturbances such as indistinct or missing words (III.2.38).[2]

1.3 Word-for-word transitions could be assigned to a general strategy of ADJACENCY: "Put two related words next to each other whenever it's convenient." Adjacency contributes to the linearity of English texts, yet only as a preference frequently overridden in more complex and extensive frameworks. In an English "noun phrase," for instance, only one dependent modifier can immediately precede the head; the others, though at a greater distance, are not necessarily less related to the noun (cf. IV.2.74). Conceptually related expressions will be recognized whether or not they appear next to each other in the sequence. In a passage like:

> (95) Am I a harp that the hand of the mighty may touch me, or a flute that his breath may pass through me? (Gibran, 1978: 7)

the pattern of associations ('harp-hand-touch', 'flute-breath-pass') is clear despite their lack of adjacency in the surface text.

1.4 Presumably, the linearity of language items is one aspect of the systematic linearity of human actions:

> The individual items of the temporal series do not in themselves have a temporal "valence" in their associative connections with other elements. The order is imposed by some other agent. This is true not only of language, but of all skilled movements or successions of movement. (Lashley, 1951: 116)

The syntactic order of language would be a special case of a more general human faculty for linear activities (cf. Lashley, 1951; MacKay, 1974; McNeill, 1975; Piaget, 1976; Jaffee, 1977; Rumelhart & Norman, 1981). Within the range of "all cerebral activity," "the syntax of the act" is "a generalized pattern or schema of integration which may be imposed upon a wide range and a wide variety of specific acts" (Lashley, 1951: 121f). If "intelligence" is the ability to fit one's capacities to the current demands

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[2] Though widely used, the "cloze procedure" of filling in deleted words (Taylor, 1953) is not yet explained in terms of discourse processing. In particular, other insertions besides the original word need to be categorized, not just uniformly labeled as wrong. Words should be taken out not just at fixed intervals (usually every fifth word), but wherever specific hypotheses can be tested.

(I.3.6), *linear intelligence* can designate all the abilities that enable linear processing of all kinds, including language.

1.5 The text production model set forth in III.2.28-31 distributes linearization across two phases, one for *phrases* and one for *sounds/letters*. Logically, these two phases duplicate each other, since the order of words entails that of word-components. But operationally, the sound/letter phase is responsible for the motor actions of uttering or inscribing (III.2.31). Decisions about phrasing are affected by deeper levels as well as by syntactic patterns. Errors in sound/letter placement are more common than errors in word order (cf. III.3.32; V.1.16f, 42), apparently because the former level is processed in a more automatic, shallow-level mode than is the latter.

1.6 The linearity of language is necessary because words have to be implemented one at a time. Spoken texts emphasize the *temporal* succession, whereas written texts emphasize the *spatial* one (cf. Nystrand, 1982c). The contrast results partly from the nature of the acoustic vs. visual modalities (cf. O'Connor & Hermelin, 1978). So far, most research has focused on temporality, because experimental results were so often measured by "reaction times" (III.1.2; III.2.2). Spatiality and the relation of spatial to temporal processing were seldom explored outside Gestalt psychology (which was for a long time officially disdained by American psychologists). Still, we have some evidence that not all acoustic processing is temporal, nor is all visual processing spatial (Das et al., 1975: 82), not even in discourse. Hearers can discern different speakers by their spatial location without having to see them. Readers move through a text with characteristic timing as they fixate successive words with their eyes (Just & Carpenter, 1980).

1.7 We need to sort out at least three senses in which discourse processing is "spatial." In the first sense, "space" is a property of *memory configurations* that form *arrays* of concepts and expressions, not mere one-dimensional series (cf. II.3.16). Lashley (1951: 128) viewed "the translation from the spatial distribution of memory traces to temporal sequence" as the fundamental "problem of serial order"; "since memory traces [. . .] persist simultaneously, it must be assumed that they are spatially differentiated." Lashley envisioned this dimension in terms of the actual neurological structure of the brain and nervous system, but physiological space is not as decisive as "cognitive space." An array can be simultaneously present in working memory, irrespective of participating brain locations. All the components of a *chunk* could be equally available at once (cf. III.3.5.2)—similar to the classic "Gestalt." The search contaminations that lead to pre-activation and reactivation (III.3.32ff) would result from minor miscalculations among these components; if the chunk were already linear, such cases should be impossible. Similarly, problem-solving addresses a "problem space" containing the alternative states that might lead to the goal (cf. III.4.16). A chunk or a problem space no doubt contains linear chains too, but processing can access and survey them from a spatial perspective if needed.

1.8 At certain points of a discourse, the text producer selects a word from a mental list of options (cf. IV.2.26ff). List-searching experiments raise several possibilities for deciding which word matches one's specifications. Sternberg (1966) argued that the search through the list is serial and exhaustive, even if a match is found early. Other psychologists proposed that list-searching is exhaustive, but parallel (Murdock, 1971); or serial, but not exhaustive, terminating when the item is found (Theios, 1973). Or, serial, exhaustive search might be suspended if list items are either highly familiar or highly unfamiliar — a view that fits the experimental findings best (Atkinson & Juola, 1974). "Reaction time" (III.1.2) does not always increase for longer lists, as would be predicted by the serial, exhaustive model advanced by Sternberg.

1.9 In text production, the set of vocabulary words under consideration would seldom be as cleanly defined as the lists in the experiments just cited. Those lists were established at the outset of the experiment with items in an exact order, whereas a person's vocabulary accrues from a rich, variegated experience in communication over a long time and is hard to keep in a set order. The "Sternberg paradigm," and the "serial position effect" (that words in the middle of a list get mixed up more than those near the beginning and end) can hardly apply to text production, where vocabulary is large and diverse: active/passive, concrete/abstract, content words/function words, and so on. The implications of list-learning for text processing is an open question for further research (cf. Kircher, 1971; Meyer, 1977; Brown, Campione, & Barclay, 1978; II.2.8). Atkinson and Juola's model could suggest why familiar items come to mind the soonest, and why word selection time need not vary according to the size of one's vocabulary. But other factors can also affect the time spent on choosing one's words (cf. IV.2.14-34).

1.10 In the second sense, "space" is a *perceptual* category, i.e., one reflecting the dimensions of physical objects and events in perception. That the parts of a whole are simultaneously available to perception is clear from experiments on short-term sensory storage (cf. Sperling, 1960; Keele & Chase, 1967). Humans must be able to generalize from scenes they have experienced, or synthesize novel scenes by recombining traces from past experience. Humans can take successively presented visual arrays and unite them in memory to create a unified image (Eriksen & Collins, 1967; Kosslyn, 1978). Similar capacities could map a mental image onto a surface text, and vice-versa. One such tendency appears in the *normal ordering strategies* of discourse (III.3.19; IV.2.56). Mental images of words themselves appear to influence spelling (V.1.20, 26, 33, 37, 48).

1.11 In the third sense, "space" is the dimension in which the physical movements of a *motor action* are arranged (cf. Schmidt, 1975), such as uttering or inscribing. Speech phonetics has sought to explain "the well-known fact that acoustic correlates of a given phoneme, and therefore, by

inference, vocal tract configurations, are known to exhibit enormous variability, due particularly to variations in phonological context, speaking rate, and stress" (MacNeilage, 1970: 183). If we postulate a separate variant of each phoneme for every context (Wickelgren, 1969), we face a staggering repertory of over 100,000 items (MacNeilage, 1970: 185; cf. Denes, 1963). MacNeilage (1970: 185, 189) concludes instead that "the motor system is controlled by the results of an internal specification of certain spatial targets" whose nature is essentially dynamic:

> The direct control of speech production would originate with the reception by the space coordinate system of phonological information as to the utterance required. Then it would translate the information into a series of spatial target specifications. This would result in a series of demands on a motor system control mechanism to generate movement command patterns which would allow the articulators to reach the specified targets in the required order. Finally, these command patterns would be issued to the muscles.

These operations resemble *model-building,* i.e., making a model of what is needed before trying to implement it.

1.12 The same conclusions may be drawn for writing. Inscription is again "not a result of stored patterns of motor activity, but of the imposition of movement by a space coordinate system" (MacNeilage, 1970: 188). "Motor programs are flexible, interactive control structures, capable of calling upon sub-programs" and of "making local decisions as a result of current conditions" (Rumelhart & Norman, 1981: 7). If visual feedback about one's hand motions is even briefly delayed, handwriting is severely degraded (van Bergeijk & David, 1959; Smith, McCrary, & Smith, 1960). A delay of 0.5 seconds makes handwriting almost illegible, and misspellings increase sharply, especially the doubling or tripling of letters. Figure 8 shows how two of my students wrote while looking off at a 90-degree angle toward the side opposite their writing hand (under each sample is an extract from one of their papers written at home). Vertical and horizontal displacement yielded uneven margins and crooked or overlapping lines. The students struggled to compensate for the evidently limited memory of line length and letter position. Note the erroneous, displaced attempt to cross, not dot, the first 'i' in 'university' in the top sample (unless the student mistakenly believed a 'the' to be there). Though these two students had fairly regular normal handwriting, less skilled ones could suffer overload from the complexity of motor actions in writing and perform below the language fluency they manifest in their speaking (cf. Connolly, 1982).

1.13 The linearity of text production, especially of writing, deserves more thorough investigation in composition research. I have argued that this linearity depends on general human capacities for correlating time and space, i.e., for correlating the order of actions with their cognitive, perceptual, and physical dimensions. The processor stipulates the execution of the

My name is Constance
L. Rambo and I am a student
at University of Florida and
I am majoring in Physical
Therapy.

My parents and I vacationed for ten days
this summer in California. Relatives
living in San Jose kept us constantly busy.

My name is Chris Irvin.
I am majoring in mechanical
Engineering at the University of
Florida.

At 2:00 in the afternoon,
I left Vero Beach. The trip to Gainsville
usually runs about 4 hours big on.

Figure 8.

surface text as a configuration of dynamic targets (IV.1.11) and monitors the actual outcome through open-loop and closed-loop feedback (III.3.2.2). Some margin of error is a side-product of the complexity and rapidity of the linearization. We need to explore writing skills in terms of how heavily this linearization loads the whole system of text production, and how large its

error potential is. Above all, we should describe how the linearity of texts is controlled by general principles that relate processing capacities and motivations to the surface text. This matter is treated in the next section.

2. SEVEN PRINCIPLES OF LINEARITY

2.1 A general theory of linear action should correlate the linear modalities of speech and writing with the levels and phases of processing. The *goal-planning* phase sets up pathways of actions that might lead to a goal (III.2.6ff). The *ideation* phase creates conceptual configurations that act as control centers for working with text content (III.2.14ff). The *conceptual development* phase enriches, specifies, and interrelates ideas (III.2.20ff). The *expression* phase assigns to concepts the appropriate natural language expressions (III.2.25ff). These phases do not immediately or directly yield the linearity of the surface text. Their patterns wouldn't be the same on all levels, nor would they uniquely dictate the order of words or word components. The deeper phases include sets of options arranged in non-linear configurations, such as importance hierarchies, memory arrays, and lists of options (cf. III.3.7; IV.1.8ff). The two *linearization* phases for *phrases* and *sounds/letters,* in contrast, must conform to a sequential pattern that reflects both the input from the deeper phases and the concerns of syntax, utterance, and inscription (III.2.28ff).

2.2 The LINEAR PRINCIPLES of so complex a processing system must be sufficiently *powerful* to work for all phases. Tasks whose linear output is similar in organization could be integrated and combined to run all at once (III.1.27). However, this tactic would be limited by *asymmetry* and *redundancy* among phases (III.2.27); and by the danger of confusing similarly structured actions (III.1.21). At any rate, non-trivial operations are probably needed to linearize anything but highly stereotyped texts.

2.3 Seven general-purpose principles of linear operation appear necessary for any activity involving a linear modality (cf. Beaugrande, 1982f):

2.3.1 The CORE-AND-ADJUNCT PRINCIPLE distinguishes between central and peripheral entities.

2.3.2 The PAUSE PRINCIPLE allows the on-line sequence to be retarded or suspended.

2.3.3 The LOOK-BACK PRINCIPLE subsumes all consultations of the prior discourse.

2.3.4 The LOOK-AHEAD PRINCIPLE (the converse of look-back) subsumes all anticipations of the subsequent discourse.

2.3.5 The HEAVINESS PRINCIPLE concerns gradations of importance, emphasis, focus, length, salience, or novelty, in the sense that these all draw a "heavier" load on processing (cf. III.1.17).

2.3.6 The DISAMBIGUATION PRINCIPLE deals with excluding alternative patterns, both formal and conceptual.

2.3.7 The LISTING PRINCIPLE handles the enumeration of comparable items in a sequence.

2.4 These principles allow processing to navigate freely within an essentially linear modality such as language. We see their graphic representations in Figure 9. The core-and-adjunct and heaviness principle reflect the functional equilibrium in the sequence: that some things have priority over others.[3] The pause principle regulates the rate and timing of the forward progression. The look-back and look-ahead principles access non-current stretches of the sequence. The disambiguation principle reduces branchings to one track, whereas the listing principle arranges branchings in a succession. These principles could also be stated in terms of *problem-solving* (cf. I.4.16). The goal is the core, and the steps leading to it are the adjuncts; progress is gauged via look-back and look-ahead; pauses allow time to evaluate the situation and assemble resources; heaviness arises from the seriousness of the problem; disambiguation defines alternative plans; and listing enumerates multiple solutions to be tested.

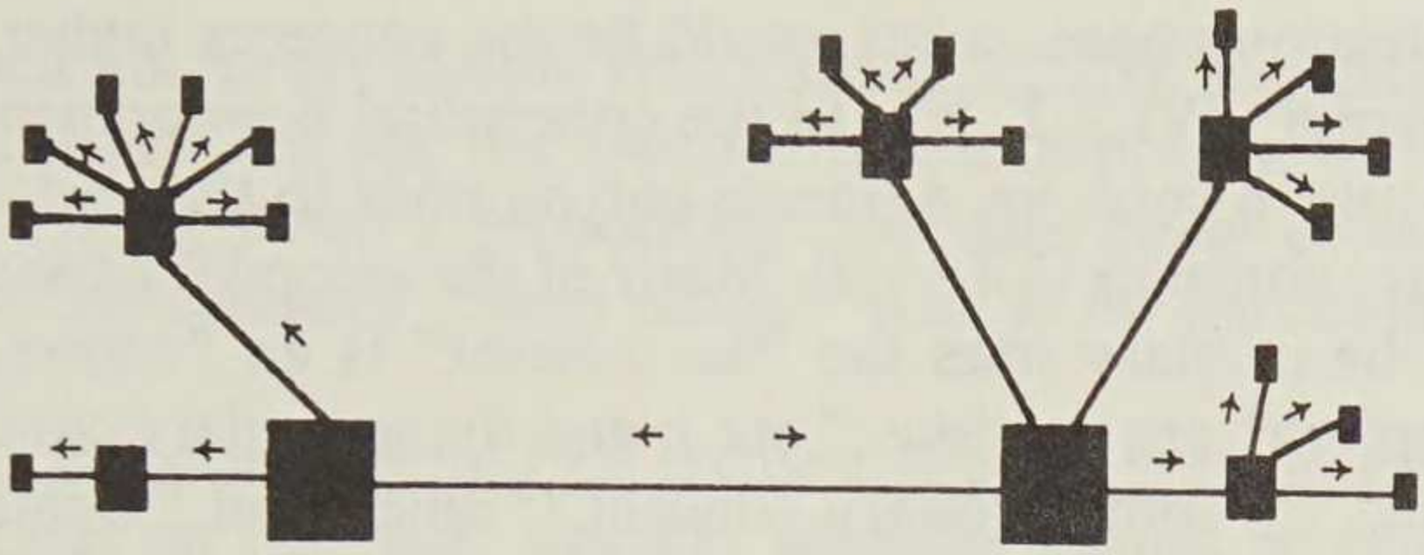
2.5 The seven principles are given *operational* designations (what they do), rather than *logical-taxonomic* ones (what they do it on) (cf. I.4.14). A taxonomic or logical task-analysis could enumerate the structures of the various language levels, but not account for how those structures are set up and mapped among levels. This fragmentation would impede realistic models of cohesive and coherent discourse. Operationally, every linguistic rule or regularity is related (at least implicitly) to one or more of these linear principles. Even a one-word utterance (sometimes called a "holophrase")[4] occupies a position within the successive events of a communicative situation. Thus, the linear principles seem to be *necessary* conditions for the application of any linguistic rule, but not yet *sufficient* ones. Each rule would require its own specifications (distinctions, categories, options, constraints, etc.) to meet the demands imposed on it.

2.6 The CORE-AND-ADJUNCT PRINCIPLE distributes the flow of control within a structure. Processing would control the structure best by zeroing in on its CORE element, as if building a bridge: at strategic intervals, stable supports must be anchored before the complete superstructure is attempted. A language sequence often resembles a provisional multi-level bridge whose materials differ in their nature, span, and resiliency. The core-and-adjunct principle also regulates the *complexity* (part-whole relationships) of discourse processing (cf. II.3.12f, 21ff, 36ff; III.1.10; III.3.2.7). In the phase of sound/letter linearization, for example, the vowels appear to act

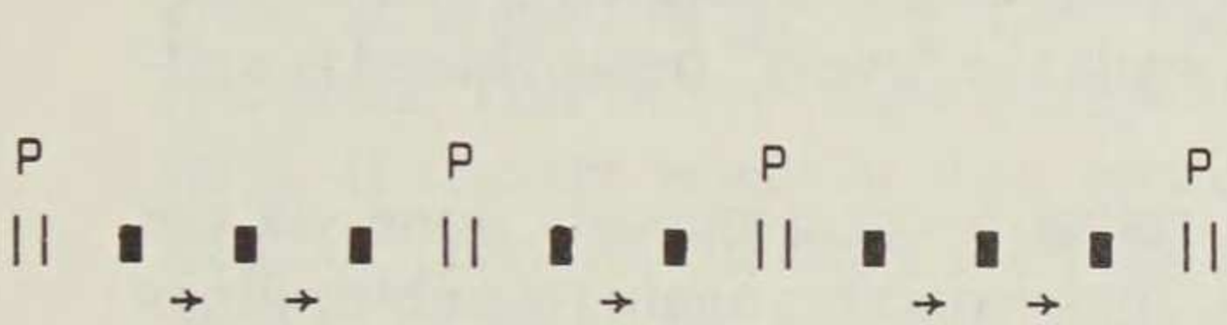
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[3] On distinguishing between the core-adjunct and heaviness principles, see IV.2.53; V[32]. The point is that any structure tends to have central vs. peripheral elements, irrespective of the processing load it imposes, either as a whole or via its components.

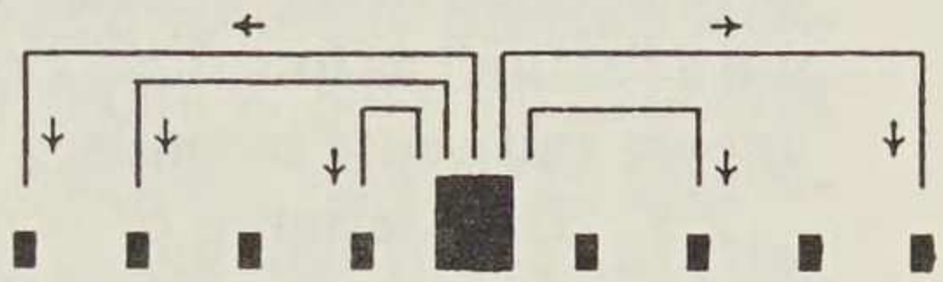
[4] The term "holophrase" reflects the supposition, aligned with transformational grammar, that one-word-utterances come from "underlying" sentences (cf. II.3.13). But the evidence is against that assumption (Bloom, 1973).



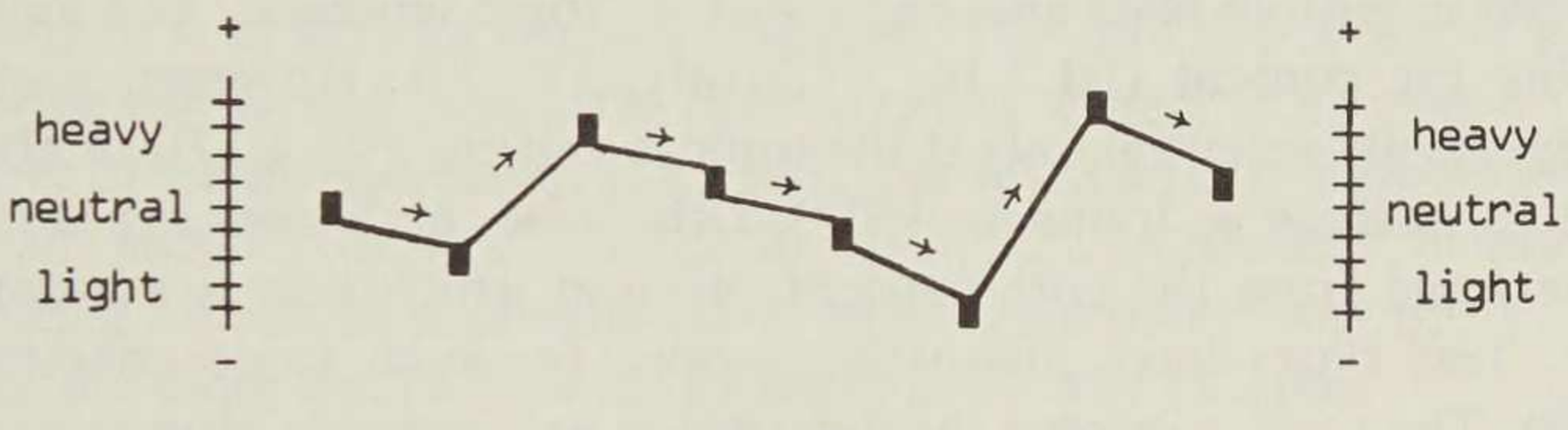
CORE-AND-ADJUNCT



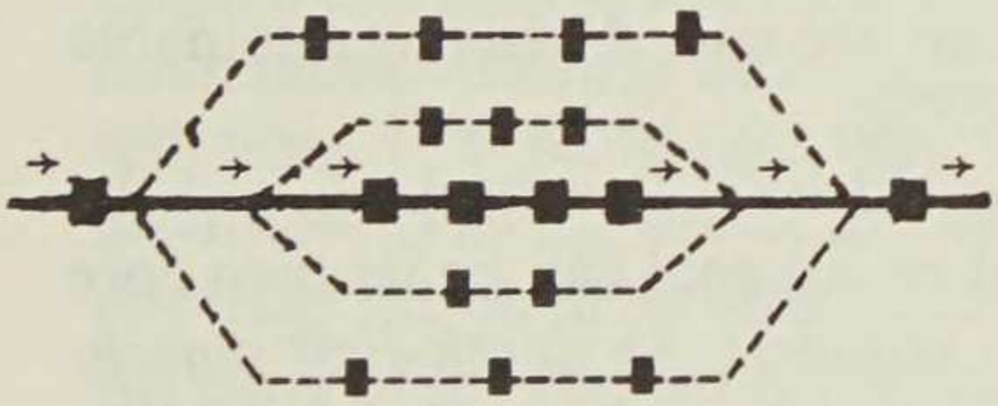
PAUSE



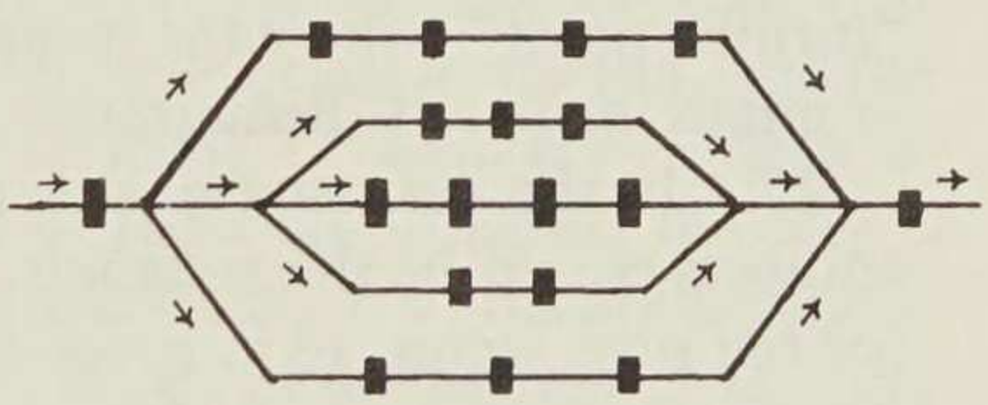
LOOK-BACK AND LOOK-AHEAD



HEAVINESS



DISAMBIGUATION



LISTING

Figure 9. Seven principles of linearity
■ = element; → = flow of control

as syllable cores, at least in English (V.1.39). In the phase of phrase linearization, *content words* would provide the most cores, whereas *function words* would routinely be adjuncts (cf. I.4.6; III.3.13; IV.2.11ff). Phrase-structuring would assign active status as a core or an adjunct to each "immediate constituent" (II.1.13). A core could be the head of a noun phrase or verb phrase, and modifiers would be adjuncts; on a larger scale, these roles could be assigned to the subject-verb unit vs. the rest of the clause; or to the main clause vs. all dependent clauses (cf. IV.2.12).

2.7 In the ideation phase, cores would be the concepts higher up in a hierarchy of generality (VI.2.2, 22). In the conceptual development phase, the distinction between cores vs. adjuncts corresponds to that between primary vs. secondary concepts (I.4.11.2). Many of the secondary concepts are special cases of the primary ones (an "instrument" is an "object," "motion" and "perception" are "actions," etc.); and the secondary concepts are normally activated via some primary concept ("time" and "location" are applied to a "state," "object," "event," etc.) (cf. Beaugrande, 1980a: 79ff). As in phrasing, the cores or adjuncts on the conceptual level can be defined or re-defined in the ongoing context. For example, a scientific treatise may use a "cause" as its primary concept, while the "event" being caused is well-known and hence secondary.

2.8 This defining of conceptual status is conspicuously done via the *topic:* an idea made explicit (III.2.16). Topic concepts again resemble pilings for a bridge under construction (IV.2.6). Typically, the topic is announced early in the text, e.g., by a title or opening thesis statement (VI.2.2). Many paragraphs in written texts also begin with a "topic sentence" as a guide for processing the content (III.2.16; VI.2.14ff, 17, 28). However, topic announcements are essential only if the topic is shifting (VI.2.17), or else ambiguous (Bransford & Johnson, 1973). Otherwise, audiences can normally infer the topic from the core concepts around which they are organizing content. Text types have distinctive modes for such topic construction (III.1.29). The topic concepts for description are typically objects or situations; those for narration are typically events or actions arranged in a temporal and causal sequence to form a story line whose main core is the "turning point" (where the protagonist's goal becomes decisively attainable or unattainable; cf. Beaugrande & Colby, 1979).

2.9 In the planning phase, the core would be the *main goal,* and the adjuncts would be the *subgoals.* Each goal or subgoal can be its own core for the *plan states* (e.g. preconditions) as adjuncts. In *depth-first search,* the planner tries to rush along the most direct path to the goal; in *breadth-first search,* the planner considers all candidate pathways before deciding which to follow (Winston, 1977). The first approach is apt when the problem is well-defined and its solution is obvious; the second approach fits better for vague, complex, or risky problems (cf. Beaugrande, 1979d, 1980b). To persuade an unfamiliar audience, for example, you may have to try a range of methods, monitoring the reactions for signs of success or failure.

2.10 The order in which cores or adjuncts are selected or presented is a difficult issue. If the bridge analogy (IV.2.6, 8) holds, the core should be activated before its adjuncts, though it may not be immediately implemented in the text. However, there is evidence from both speech and writing that this order doesn't always happen. In the phrasing phase, adjuncts such as articles and prepositions are sometimes uttered or written down before

their head nouns are chosen (III.2.30; IV.2.27ff). Possibly, the *category* of the core is set, but not the *specific item* to represent the category. For instance, writing down a preposition or a determiner commits the text producer to the category "head noun," even if no particular noun has been selected.

2.11 Efficiency would be greatest if conscious, attentional processing could focus on the core, whereas adjuncts should be processed automatically (cf. III.1.21). Such appears to be the normal case in the treatment of content vs. function words (cf. IV.2.6). If content words have denser search grids, as argued in III.3.13, their recovery would naturally demand more resources. This factor might disrupt the linearization of phrasing in several ways. If content words or their concepts are complex, unfamiliar, specialized, or creative, memory searches could be taxing and time-consuming enough to block the normal core-first method. The text producer might decide on a powerful category for the core element and set the search running; meanwhile, less problematic adjuncts could be chosen and implemented, such as articles and prepositions. The core search might terminate and bring the needed item (a) in time to say or write it at its proper position; (b) after an additional pause (IV.2.28ff); or (c) at a point beyond the proper position (post-activation, cf. III.2.30; III.3.32f). In contrast, a core element presenting no search problems could be selected before any of its adjuncts, so that phrasing would have all its materials ready at hand.

2.12 This account indicates that the actions of constructing clauses and sentences can be affected by factors not usually considered syntactic. In an English declarative sentence, the *preference order* would be to have the first noun phrase (usually determiner + modifier(s) + head) as subject, and the following verb phrase (usually verb + modifier(s), or auxiliary + verb + modifier(s)) as the predicate. Within each of these constituents, the core is normally the noun or verb, while modifiers and function words are adjuncts. All parts of the constituent should be placed in one of the *buffers of working memory* (III.2.29; III.3.5.4). The buffer should hold them long enough to label them and create the instructions that will output them into a proper phrase. Whether a text producer uses simple or complex phrasing would depend on how well working memory masters these tasks. If the materials are difficult to find and arrange, the buffer would tend to hold smaller amounts and phrasing would be simple. If the materials are familiar and easy to work with, the buffer could hold more, and complex dependencies would be easier to formulate. If this account holds, then syntactic complexity could hardly be a stable trait of a person or an age group (cf. II.3.23).

2.13 The *recursion* of cores or adjuncts might also be controlled by buffers. In contemporary English, recursion applies mostly to content words: two or three nouns, verbs, or modifiers in a row are vastly more common than two or three determiners (articles, deictics) prepositions, or conjunctions in a row. Intriguingly, function-word recursion is a common

writing error, e.g., 'the the', or 'and and'—just what would be predicted if these word categories receive little attention (cf. V.1.46). If recursion requires elements that are both conceptually and syntactically comparable (IV.2.71; IV.3.39), then one search grid could gather several such elements into a buffer to await output. However, if content words have dense search grids (III.3.13), a long recursion might hinder easy sorting within the buffer. Hence, the fact that more than three elements are not common in recursions would make good sense. Special effects (surprise, confusion) would result from exceeding this strategic length, e.g., in this passage with nine present participles deliberately exaggerating the foolish excess of 'Protestant taboos':

> (96) the entire cupboard of Protestant taboos against drinking, lusting, gambling, staying out late, getting up late, loafing, idling, lollygagging around the streets, and wearing Capri pants (Wolfe, 1977: 17)

For the same reason, recursion of complex elements would be hard to manage. For instance, a series of more than three dependent clauses in one sentence is much rarer than a sequence of more than three modifiers.

2.14 The PAUSE PRINCIPLE meets the need to retard or suspend the linear sequence from time to time,[5] for example, to bring the processing of the current stretch of text up to a reasonable threshold of termination (cf. III.1.25); to plan out the next stretch; and so on. Pauses and hesitations, being observable and measurable, have figured in much psychological and linguistic experimentation (cf. surveys in Rochester, 1973; Rosenberg, 1977b; Matsuhashi, 1982). In the behaviorist outlook, *reaction time* or *latency* (time between receiving a stimulus and starting to perform) and *time on task* (time between start and finish) were standard indicators of the nature and difficulty of an operation (III.1.2). *Fluency* (the rate and the smoothness of transitions in a task) was the principle indicator of learning (II.2.5). If these notions are to help us interpret pauses in an activity as complex and elaborate as text production, observed data should be carefully fitted to correspondingly complex and elaborate models of the production processes.

2.15 A word-for-word model, e.g., one conceived in terms of word-chains and transitions (cf. IV.1.1f), would predict pauses and hesitations falling before any unusual or difficult word choice. Goldman-Eisler (1958b: 67) started from the behaviorist view (cf. Hull, 1943) that conditioned habits control what is probable:

> Fluent speech was shown to consist of habitual combinations of words such as were shared by the language community and such as had become more or less automatic. Where a sequence ceased to be a matter of common conditioning

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[5] For this discussion, the distinction between "hesitations" and "pauses" will not be maintained; but some of the literature cited in IV.2.19 does so, particularly following Mahl (1956) and Maclay & Osgood (1959). See Rochester (1973) for a survey.

> or learning, where a speaker's choice was highly individual and unexpected, on the other hand, speech was hesitant.

Maclay and Osgood found that pauses (either silent or "filled" with non-word sounds like 'um') appeared more often before *content words* than before *function words*—the latter class being of course smaller to choose from than the former. Restarts (going back and recommencing a stretch, cf. IV.2.50; V.2.34; V.3.20f, 33) included any already uttered function words at the start of a phrase. If restarts included revisions, content words were more often changed. Thus, the customary distinction between the two word types was indeed reflected in processing (cf. III.3.13; IV.2.6, 11f). These findings suggest that phrasings are at least sometimes selected before the expressions that go into them (cf. II.2.14; III.2.30; IV.2.10, 27). Boomer (1965) reached a similar view by analyzing pauses not in terms of the sentence, but in terms of the utterance unit he called "the phonemic clause": a segment of speech having only one primary stress and ending with a terminal juncture (Trager & Smith, 1951; compare the "tone group" in III.2.28). In extemporaneous speaking on such everyday topics as "hobbies, sports, summer vacations" (1965: 150), Boomer found that pauses did not routinely fall before specific rare or difficult word choices, but rather after the first word (usually a function word) of a phrase or clause. His conclusion (1965: 156) would be compatible with the notions of probabilities and transitions (cf. IV.1.1f):

> The initial word in a phonemic clause sets certain constraints for the structure of what is to follow. The selection of a first word has in greater or lesser degree committed the speaker to a particular construction or at least a set of alternative constructions, and has also foreclosed the possibility of other constructions [. . .] Hesitations in a phonemic clause are most likely to occur after at least a preliminary decision has been made concerning its structure and before the lexical choices have been finally made.

Here also, memory search would be a key factor (cf. IV.2.26ff).

2.16 If clauses and sentences are the basic units of language processing, a text producer should pause at the end of each clause or sentence, plan out the next, run straight through, and pause again. Goldman-Eisler (1972: 103) hoped this hypothesis would relate grammar to "objective behavior and psychological reality" (cf. V.2.7-17) (perhaps resolving the antagonism between behaviorist and mentalist viewpoints?):

> If in the flow of spontaneous speech the transitions between its various constituents between words, clauses, co-ordinate and subordinate [. . .] are of characteristic duration, then we can speak of their differential psychological reality and draw conclusions as to the degree of integration and independence of any of these units.

She found that the longest pauses appeared between sentences or before co-ordinated clauses. Pauses got shorter in this progression: (a) before non-

relative dependent clauses, (b) before relative dependent clauses (especially beginning with 'which'), and (c) within clauses. She concluded that "the grammatical description of each of the clause types has its quantitative reflection in the length or absence of pauses which precede it in natural unprepared, and spontaneous speech" (1972: 106f). To some extent, the word-for-word transition model in her earlier work (1958a) was traded in for a clause-for-clause transition model.

2.17 However, two major difficulties arise from Goldman-Eisler's studies (cf. critique in Boomer, 1965: 149; Rochester, 1973: 56f; O'Connell, 1977: 310). The first is the biased sample quite unlike "natural, unprepared, and spontaneous speech" (IV.2.16). Such speech is frequently hard to identify as a sequence of clearly marked sentences (II.3.13; V.2.18; V.3.7ff). Even many established, prolific scholars produce irreduceably ungrammatical sequences in extemporaneous discourse, e.g. (cf. I.4.11.2):

> (3) As far as I know / no one has done the / in a way obvious now and interesting problem of // doing a / in a sense frequency study of the alternative // syntactical / uh / in a given language / say like English / the alternative // uh / possible structures (from Maclay & Osgood, 1959: 25)

In early work, Goldman-Eisler (1958a: 99) "eliminated a large mass of recorded material of spontaneous speech," since "even with highly educated speakers, spontaneous speech is such that well constructed, grammatically correct sentences spoken without repetition or midway changing of grammatical construction, etc., are few and far between." Later (1972), she picked out skilled "academics" (including a radio broadcaster) whose speech was fluent and grammatical, the more so as literate speakers may tailor the habits of their speech to those of their writing (V.3.27). She increased regularity even more by allowing one group to study written texts silently and then read them aloud. In addition, a single secretary made the transcripts, imposing interpretation and punctuation. Thus, speech sample was filtered through the influence of writing in three ways.

2.18 The second difficulty is that pausing may reflect several motives at once, not just the formatting of sentences and clauses (cf. Kowal, O'Connell, & Sabin, 1975; Flower & Hayes, 1981; Matsuhashi, 1982). To sort out the possibilities, Goldman-Eisler (1972: 110) distinguished between "cognitive pauses" for planning and selecting materials, vs. "rhetorical pauses" for demarcating sentences and clauses to guide the audience. Reading aloud ought to eliminate the need for the "cognitive" type (cf. IV.3.10). Yet the findings on "miscues" in normal reading (cf. IV.2.48) suggest that reading aloud is by no means trouble-free, even if materials are familiar. Another line of Goldman-Eisler's (1972: 111) argument was that "in most cases, a sentence presents the externalization of a thought unit" (cf. II.3.42; Chafe, 1982), so that her findings should apply to conceptual organization as well as grammatical. Yet she did not explain what "thought units" are "external-

ized" by her clause types. And her argument is circular as long as she based her definition of a "thought unit" on the sentence itself (O'Connell, 1977: 310). Taylor's (1969) study found, on the contrary, that pausing varied according to concreteness vs. abstractness of topic words, whereas length, type, and syntactic complexity of sentences made no difference. Finally, no provision is made for pausing to look back rather than ahead (cf. IV.2.31; IV.3.11).

2.19 Experimental findings indicate how unlikely it is that a single cause could be responsible for all the pauses and hesitations in text production. All of the following have been pursued as plausible causes:

2.19.1 type of text or discourse (especially description vs. explanation) (Goldman-Eisler, 1961a, 1961b; H. Levin, Silverman, & Ford, 1967; Lay & Paivio, 1970; Matsuhashi, 1981, 1982);

2.19.2 degree of conceptual integration (Caccamise, 1981; Spittle & Matsuhashi, 1981; Chafe, 1982; Cooper & Matsuhashi, 1982; Matsuhashi, 1982);

2.19.3 concrete vs. abstract topic concepts (Reynolds & Paivio, 1968; Taylor, 1969; Matsuhashi, 1981);

2.19.4 textual ambiguities (MacKay, 1966; Siegman & Pope, 1966);

2.19.5 reductions of coherence (O'Connell, Kowal, & Hörmann, 1969);

2.19.6 breathing patterns (Barik, 1968; Hixon, Mead, & Goldman, 1976);

2.19.7 personal rates of speech (Maclay & Osgood, 1959; Pope & Siegman, 1968; Jaffee & Breskin, 1970) and of writing (Matsuhashi, 1979; Flower & Hayes, 1981);

2.19.8 extent of automatic processing (Butterworth, 1975), as contrasted with creating new patterns (Cooper & Matsuhashi, 1982);

2.19.9 stages or cycles within a conversation (Henderson, Goldman-Eisler, & Skarbek, 1965; Butterworth, 1975; cf. VI.2.3-5);

2.19.10 length of the text (Feldstein, 1962; H. Levin & Silverman, 1965);

2.19.11 difficulty of speaking task (Goldman-Eisler, 1961a; Lay & Paivio, 1969);

2.19.12 speaking vs. reading aloud (Henderson, Goldman-Eisler, & Skarbek, 1965);

2.19.13 anxiety (Mahl, 1956; Krause & Pilisuk, 1961; Kasl & Mahl, 1965; Siegman & Pope, 1965 ; cf. III.1.4);

2.19.14 stress (Cervin, 1956; Casotta, Feldstein, & Jaffee, 1967; Lalljee & Cook, 1967; H. Levin & Silverman, 1967);

2.19.15 adjustment to another speaker (Jaffee & Feldstein, 1970);

2.19.16 speaking alone vs. to an audience (H. Levin & Silverman, 1965);

2.19.17 visible vs. invisible audience (Feldstein, Silverman, & Ford, 1967);

2.19.18 face-to-face vs. telephone conversation (Kasl & Mahl, 1965);
2.19.19 approving vs. disapproving audience (Cervin 1956; Pope & Siegman, 1966; Murray, 1971);
2.19.20 likelihood of being interrupted (Lalljee & Cook, 1967);
2.19.21 exhibitionism of speaker (Levin, Baldwin, Gallwey, & Paivio, 1960; Paivio, 1965);
2.19.22 deceitfulness of speaker (Mehrabian, 1971);
2.19.23 age of speaker (Kowal, O'Connell, & Sabin, 1975);
2.19.24 social class standing of speaker (Hawkins, 1973; Wodak, 1980).

2.20 These factors are all experimentally documented. Others might well be envisioned, such as: mental updating of a scene or event being described (IV.2.33); the social standing of one's audience; the value of the goal, and one's hopes of attaining it; one's enthusiasm about an original idea; the social implications of literate activities; etc. Even now, the listing in 2.19 reveals how observed data, such as a pause or hesitation, may relate to a host of underlying causes, or to an interaction of these. Manipulation of one variable may affect others in complicated, unforeseen ways. For example, if one's audience shows disapproval, the text producer may become anxious and consider the situation stressful (IV.2.19, 13, 14)—three reasons why speech would be hesitant and disjointed, and the resulting text brief and poorly integrated (III.1.5).

2.21 We can thus appreciate the acute dilemma of complex process theories: that observed data can in principle be interpreted in many ways, depending on one's model (I.1.5; III.1.6). We can manipulate any of the factors in IV.2.19, and no doubt others as well, to influence pause ratios. The tighter the control on performance, the more secure the cause-effect relationship will be. For instance, Lackner and Levine (1975: 109) had people study and memorize sentences on cards for days before the laboratory session. Lindsley (1975: 4) had people practice choosing from a list of four subjects to use in a predetermined sentence form. But such tight controls suppress normal search and decision-making operations and thereby distort our view of natural discourse processing (cf. III.1.3). The cause of an observed pause in spontaneous communication cannot usually be determined with certainty, but at most with fair probability. Similarly, the evaluation of text production can hardly be based on observed pauses alone, since the factors responsible may be either positive (e.g. careful selection) or negative (e.g. anxiety) (cf. II.2.28f; IV.2.29, 34). In a general way, though, educational training could be designed to strive for conditions that don't aggravate the disfluency of text production (IV.2.34).

2.22 Most pause studies examined speech. It would be useful to see if comparable patterns also appear in writing (cf. Matsuhashi, 1979; 1981, 1982; Flower & Hayes, 1981; Spittle & Matsuhashi, 1981; Cooper & Matsuhashi, 1982). On the one hand, these patterns should be different because writing (a) runs at a much slower rate (Horowitz & Berkowitz, 1964; Horo-

witz & Newman, 1964; Blass & Siegman, 1975; Gould & Boies, 1978b; Gould, 1979; Chafe, 1982); (b) does not immediately interact with other people's text production (cf. Rosenberg, 1977b); (c) is often not subject to interruption (cf. Lalljee & Cook, 1967); and (d) has no motive for inserting "rhetorical pauses" to signal sentence or clause boundaries (IV.2.18; cf. Matsuhashi, 1982), since the audience is not present. On the other hand, patterns might be similar because writing (a) shares with speech the system of text production; (b) is learned later in life than speaking (V.3.3); and (c) entails sounds, not just letters, in spelling and word identification (V.1.31ff). Thus, learning to write involves both the extension and the reorganization of skills already well practised in speaking (V.3).

2.23 To observe patterns of action, I set up a television camera to film people as they wrote (cf. Matsuhashi & Cooper, 1978; Matsuhashi, 1979). When they finished, they spoke the same messages they had written, though without specially trying to reproduce the exact words; this performance was taped and transcribed. I sifted through the films to see where writers paused, crossed out, went back, or otherwise departed from the left-to-right sequence. Among the thirty-two writers, only two wrote without any significant occurrences of these types: a professor of English and an undergraduate student in broadcasting, both writing on familiar topics. Everyone else, myself included, paused here and there (not just between sentences); many of us crossed out words (either immediately or later), or went back to make insertions.

2.24 Twenty of the test persons came from composition classes. They were assigned a simple, well-structured task: to give discursive directions (no maps) on how to get from the north-bound Interstate 75 west of Gainesville to their own residence, mostly in the campus dorms. If they had no cars and were unfamiliar with the town, they described how to get across the campus on foot. The task has a clear beginning and end,[6] and the ordering of content closely follows the spatial progress of an imagined person (cf. IV.1.10). However, problems can still arise. With very few exceptions, Gainesville's streets are not named, but numbered, moving out in the four directions of the compass from the central axis of Main Street and University Avenue. Street designations are hard to remember: a number, a direction (NW, NE, SW, or SE), and a type (Street, Avenue, Place, Lane, Road, Terrace, Court, etc.), e.g. '2306 SW 13th St.'. Besides, many people have vague mental maps of their towns (cf. Riesbeck, 1980), especially if (as for most of my freshman) the town is not very familiar.

2.25 I tentatively classified pauses and hesitations according to their locations in the text (cf. IV.2.15ff). In the following samples, a short pause

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[6] Such tasks are as closed-ended as writing can become (cf. III.1.1, 26); but some students still made revisions after they'd finished their directions.

is marked with "/" and a long one with "//".[7] Cross-outs are placed in pointed brackets, and later insertions in curly brackets. Original spelling and punctuation are retained.

2.26 Writers tend to pause for a *choice among alternatives.* When the set of options is clearly defined (cf. IV.1.9), locations and motives for pauses can be classified at least three ways:

2.26.1 First, the pause falls *immediately before the decision word:*

(97) Then go straight down Stadium Road until the / Florida Field.
(98) turn / right into the parking lot
(99) procede / east toward the town
(100) there are / <f–> three exits for Gainesville
(101) you reach the intersection of // University
(102) Make a left on 13th / street until you get to // <inner> Inner Circle Road.

Landmarks (97), directions seen by a person (98) or on the compass (99), the number of exits (100), the names of a street (101), or the designation 'street' (vs. 'avenue', 'road' etc.) (102) present clearly defined sets of options. The writer may not make the final selection until the slot in the sequence actually arrives (cf. II.2.14; III.2.30; IV.1.9; IV.2.10, 15, 27).

2.26.2 Second, the pause falls *before the phrase* in which the choice will be made, but *not immediately before the decision word:*

(103) Exit on / the third ramp
(104) Stay on 26 // for about 2 miles
(105) Stop at Broward Hall //, which is the second group of buildings on the left
(106) a shopping center // on the right side of the road
(107) Travel on the road / taking the left fork

Writers can anticipate and confront choices at some distance from the current point of the text: e.g., a number (103, 104, 105) or a direction (106, 107).

2.26.3 Third, the pause falls both *immediately before the decision word* and *before the phrase that contains it:*

(108) turn left and / go to the / next stoplight
(109) I live / on the / fourth floor

A phrase involving two choices may have pauses both before and inside it:

(110) Continue / on Newberry / road

The examples in IV.2.26.2-3 again involve clearly defined sets.

2.27 Examples (97-110) suggest that discourse choices can be made not only when the appropriate slot is reached in the sequence, but whenever

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[7] In contrast to some studies (e.g, Goldman-Eisler, 1972; Matsuhashi, 1979, 1981), I did not undertake to compare the exact length of pauses, given the poorly defined, complicated causalities involved (IV.2.19-21).

they are anticipated and confronted. In (103), (104), and (106), the pause comes before the introductory function word (article or preposition), while in (97), (101), and (102), the pause comes after the function word and before a content word; and in (109), we find both cases in a single clause. This variation could arise if the function word itself is a decision point in some cases, but not in others. Or, *look-ahead* could anticipate decision points in the upcoming phrase or clause and resolve them in advance. The second account postulates a *time lag* between pauses and decision points: a phrase structure could act as a "distant early warning" system that triggers a set of roughly parallel searches for its constituent elements (cf. IV.2.11). The time expended on these searches would add up to the total pause time. However, if processing is heavily loaded, those searches might be slowed or sidetracked, so that hesitations or pauses would also be needed immediately before the decision point to settle final problems. This account reconciles the dispute over whether words or phrases are selected first (cf. II.2.14; III.2.30; IV.2.10, 15): the order of selection adapts to fit the nature and difficulty of search and decision processes. Thus, the pauses before clauses or sentences partially match syntactic types (IV.2.16), because the latter stipulate the sets of searches to be done; but factors that load the system, such as abstractness, conceptual integration, ambiguities, and reduced coherence, raise the likelihood of pauses irrespective of syntax.[8] Therefore, the variety of causes listed in IV.2.19.1-24 is not contradictory, but natural.

2.28 The system load would also be increased when decisions confront a vague, poorly defined set of alternatives, because more effort would be needed to determine the goodness of fit between one's specifications and any available word-choice (cf. III.3.2.5). Pausings would thus be predicted here. For example, visual descriptions of things are more helpful than proper names when a stranger is trying to drive through a town, but are harder to select. My writers had to choose not only the landmark, but also a recognizable description they had probably not had to give before. Pauses could indicate the need to search and evaluate:

(111) You are at the O'Connel Center, a large white / domed // arena.
(112) turn right just after you pass // the huge white // sports facility, <called> the O'Connell Center
(113) Across the street on Museum road <is> will be two / tall brick towers
(114) There is a road right <before> before <the> Shands /, <you will> which is / noticed by the railroad crossing / sign on the right

The O'Connell Center that troubled the writers of (111) and (112) is constructed of a special cloth-like substance developed in the space program, and resembles a "Star Wars" station more than a sports arena; no time is

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[8] Just & Carpenter (1980) suggest on the basis of eye-movements that in reading, each word is processed as far as possible when it's encountered. Such a supposition does not fit the hand-movements of writing, which are far slower and more cumbersome.

needed to tell that it's 'large' and 'white', but its bizarre shape makes one wonder what to call it for the guidance of a stranger on campus. The pause in (113) fell not at the decision-word 'two', but at the designation for a dormitory. In (114), the writer was having trouble organizing the scene: the landmark 'Shands' (Hospital) is not identifiable until after the place where you should turn left; hence the mention of the more visible 'railroad crossing' and (after a pause) its conspicuous 'sign'. (114) illustrates how conceptual indecision, a matter of coherence, can impair cohesion as well.

2.29 The account suggested in IV.2.27 relates pauses to *look-ahead.* Pauses before a phrase or clause may signal the act of choosing the phrase format, plus some of the words; pauses inside a phrase or clause may signal problems in searching out and implementing words after the phrase format has been chosen. Nonetheless, some pauses must also be devoted to *look-back:* inspecting the phrase or clause just composed to see how successful it was and how it will affect what comes next—an instance of open-loop feedback (III.3.2.2). Such pauses would resemble the "rhetorical pauses" identified in speech by Goldman-Eisler (IV.2.18), except that they are for the benefit of the writer, not the audience. Skilled writing might involve many such pauses and thus not appear fluent at all. Careless writing would look faster and smoother, because feedback and evaluation would scarcely be attended to. Therefore, fluency by itself is an inconclusive measure of writing quality (cf. II.2.29; II.3.21, 38; IV.2.34).

2.30 My filmed writers paused noticeably at the end of most, but by no means all, sentences. Sometimes a writer continued instantly to the next sentence, as if having at least partly planned out the latter while putting its predecessor down on paper.[9] At least three ways to omit pauses between sentences seem plausible. First, the slow rate of writing compared to speaking (IV.2.22) could allow on-the-spot planning. When my writers watched their words on the video replay and tried to read them aloud at the same rate they had written them, their speech rhythm kept getting far ahead; they strained to pause before almost every word, just to keep in step. When subsequently asked to read aloud at their normal rate, they paused mostly at the boundaries of sentences or clauses—the usual "rhetorical" motive (IV.2.18, 29). Second, pauses between sentences could be spared if the inscription of the final stretch of a sentence is handled by packages of automatic sub-routines (cf. III.1.24; III.2.31; IV.1.12; V.1.35). These actions wouldn't interfere with planning out the next sentence, or at least its opening stretch. Whenever the system is not heavily loaded, it could be looking ahead (cf. IV.2.50f). Third, the content of two sentences could be so closely associated via spreading activation (cf. IV.2.47) that planning both at once would be easy, and no pause would be needed between them, as in:

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[9] Marie Nelson, my colleague who wrote without pauses, reported having deliberately trained herself in college to think ahead in just this fashion.

(115) I worked / closely with / the // AOML on Rickenbacker Causeway in Miami. The job itself entailed editing / English language / scientific papers

On the whole, this writer was not rapid or fluent, witness the choppy sequence. Yet 'the job itself' designates content already activated for the first sentence, and no pause was needed. Instead, pauses occur at points where new content was being searched and selected.

2.31 My film data on writing did not show the correlation between pause length and clause type observed by Goldman-Eisler (cf. IV.2.16). Many pauses within phrases or clauses were as long as or longer than pauses between main clauses or sentences. Even though writing is slower than speaking (IV.2.22, 30), a similar variety of causes appears to influence pausing (IV.2.27). Only if all matters of content, vocabulary, etc. were already resolved could pauses match the complexity of upcoming clauses. My data suggest that writers compose a stretch of text without necessarily having decided the boundaries of clauses or sentences. As they go along, they gather feedback about the current stretch of text and mark off phrase units as seems appropriate. My films revealed pauses between finishing a clause or sentence and placing punctuation after it:

(116) Stop at Broward Hall //,
(117) The papers were the results / of various research conducted / over a / two-year period / (1975-76) //;
(118) It <is> believe it is Road 2 //.
(119) Get into the left lane <and> // <until> {when} / you see the V.A. Hospital on the right and Shands //.

Feedback is used to determine what kind of unit should be terminated. A decision is then made for a comma (116), a semicolon (117), or a period after either a short sequence (118) or a long one (119). In (119), the writer paused and changed 'until' into 'when' before putting the period—more evidence that the pause served for gathering feedback on the previous text.

2.32 To decide about clause or sentence boundaries, writers no doubt consider the conceptual integration of text content (compare the "thought-units" in Goldman-Eisler 1972: 111, cited in IV.2.18; and the "conceptual content units" in Matsuhashi, 1982: 286f). A well-integrated configuration of concepts maps easily onto a good clause or sentence (cf. V.2.5). However, the processes of conceptual development need not be completed before phrasing can start (III.2.30). Consider the entire sentence whose opening stretch, as we saw in (115), began without a pause:

(115a) The job entailed editing / English language / scientific papers / which / various scientists from / this hemisphere // delivered at a symposium in Caracas, Venezuela / in the / winter of 1976.

Since the passage represents a reasonable "thought unit," the sentence works out very well. But instead of a long initial pause followed by fluent

production of the whole unit, the evidence suggests that concepts (agents, location, time) were still being integrated during the execution of the phrasing. Hence, "thought-units" can be the *result* of producing the sentence, not just its *precondition*. The levels of conceptual development, expression, and linearization are organized and chunked in concerted interaction, so that the corresponding production phases run in parallel and influence each other's progress. This account explains why a long pause followed by the fluent production of a lengthy stretch of text was rare, e.g., in the second sentence of (120):

(120) Stay on that road / and / go // straight down // until you hit N.W. 13th St. // Make a left on N.W. 13th Street and go up to N.W. 12th Avenue.

Even my literate academics (with one exception, IV.2.23) fluctuated between fluent vs. hesitant writing of sentences.

2.33 My students knew how to get from one place in Gainesville to another. But their *procedural* knowledge did not immediately convert into *declarative* knowledge (cf. I.4.7). As for many actions (tying a shoe, riding a bicycle, etc.), knowing how to do it was quite different from knowing how to say it. The act of writing made the students take stock of their own knowledge in a new way to make it communicable (cf. I.2.23.5). Instead of going through town themselves, they had to visualize a reader making the trip. Each statement had to be a practical directive whose effect would be to *update* the scene (cf. I.4.11.2). Some pauses before simple, easily found words, such as 'and' and 'you', could have been caused by updating:

(121) Stay on that road / and / go // straight down untill you hit N.W. 13th St.
(122) turn right and // you will / be on S.W. Archer.
(123) Go into the one on the left // and take the lobby <in the> elevator to floor 5, room 508.

Using discrete language to express the continuity of experience is certainly complex (III.2.25; III.3.19). The writer of (123) blurred the event sequence to rush the audience along, as if the elevator would go down the hall to 'room 508'. The absence of writing pauses in (123) might correspond to this rush of actions—an unusually tight "thought unit."

2.34 Even this limited, provisional account of pause types from my film data should suggest the complex correlations between the real time of writing and such mental events as phrasing, memory search, decision, feedback, conceptual integration, updating, and so forth (cf. IV.2.21). As evidence, the pause itself is neutral, often ambivalent. Supportive factors like careful selection and evaluation may create pauses just as much as disruptive factors like anxiety or reduced coherence (II.2.29; IV.2.19.5, 13). And a certain amount of pauses are probably natural side-products of process organization. To judge someone's literacy according to fluency, though commonly done, is obviously inconclusive (I.2.8.3; IV.2.29). Still, educators

could encourage fluent processing by keeping down anxiety, offering approval, tolerating language varieties, encouraging "free writing," tailoring the instruction to the individual, negotiating with students, and so on (cf. I.2.23.8; VI.1.9; VI.3.12, 27)—conditions easier to meet by using interviews for instruction (I.3.25; III.3.18; VI.3.14; cf. Murray, 1971; Odell, Goswami, & Herrington, 1982). Further research should explore how we can constructively use pauses to monitor and guide text production.

2.35 The LOOK-BACK PRINCIPLE subsumes all activities in which processing is influenced or controlled by previous activities within the same text or discourse (cf. IV.2.29, 31; IV.3.9, 30ff; V.1.39). As a discourse progresses, current decisions and events are continually affected by those that have already occurred. These constraints, though they do not often narrow down choices to a single possibility, conserve substantial processing resources. If the meaning of a text is a set of hypothesis about appropriate processing actions (I.4.6; II.1.2.2; III.2.26; III.3.14), whatever can be done to define that set simplifies the task and reduces cognitive load. Even "the selection of a first word has in greater or lesser degree committed the speaker to a particular construction or at least a set of alternative constructions" (Boomer, 1965: 156) (IV.2.15). The same narrowing of alternatives presumably takes place in all phases of text processing, but not obligatorily (cf. IV.2.41).

2.36 Involuntary look-back is manifested in *reactivation* (cf. III.3.33): a word or word-part already implemented appears again. The outcome may be an error in the linearization phases for sounds/letters—both in speech (124) and writing (125)—and for phrasing (126, 127):[10]

(124) John *g*ave the *g*oy—John gave the boy (Fromkin, 1971: 39)
(125) There we l*ear*n*ea*d the actual mechanics.
(126) The interactions affect the ability of people to *accomplish accomplish* their life tasks.
(127) The field goal is done by kicking the *ball,* which is held up by a team mate, *ball* through the uprights of the goal posts.

Reactivations may be immediate, as in (125) and (126), or considerably delayed, as in (127). Either way, they can evidently be overlooked during deliberate proofreading, for at least two reasons. First, the processor might register the presence of the item, but not notice the number of occurrences during production (III.3.33; V.1.45), and then repeat the same processes during reception (cf. III.3.7). Second, the direct contact with the surface text might be so brief that the error doesn't enter the writer's mental representation (cf. III.3.7; IV.2.43). The second reason predicts that the shallower the phase, the more likely the error; the first reason does not.

2.37 Look-back figures prominently in the means for maintaining the

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[10] Samples are from students except where indicated otherwise.

cohesion of the surface text (cf. Beaugrande, 1980a: Ch. V; Beaugrande & Dressler, 1981: 54ff; I.4.12). RECURRENCE is the reusing of surface expressions at a later point, usually an intentional reactivation, e.g.:

(128) make a right turn *on Archer Road*. Stay *on Archer Road*
(129) *Make a left* on N.W. 13th St [. . .] go down to the corner, *make a left*
(130) within a given slice of time *different* speakers of *different* ages from *different* backgrounds speak *different* varieties of the same language.

The recurrent expression may refer to the same thing throughout (128) (i.e., may be "co-referent," cf. IV.2.42; IV[13]); to comparable but separate things (129); or to a concept shared by various things (130). A related usage is PARTIAL RECURRENCE (Beaugrande & Dressler, 1981: 56f): a part of a word, e.g. the word-stem, is used again, rather than the whole word ("polyptoton," cf. IV.2.41)

(131) As a technical *editor* [. . .] the job entailed *editing* papers
(132) until getting to the *exits* for Gainesville. *Exit* on the third ramp.

There is typically a shift in word-class, e.g., from noun to verb (132). Reference can vary, e.g., from agent to action (131), or from a set of objects to an action performed on one of the set (132).

2.38 Recurrence illustrates one of the characteristic *trade-offs* in cognition and communication (cf. I.4.15). On the one hand, the recurrent item can be easily processed by merely reactivating roughly the same operations used on it before; effort increases as the items are spaced further apart (cf. Melton, 1970). On the other hand, this ease may impair processing through loss of interest. Apparently, when the system load becomes too light, operations degrade much as they do when load is too heavy: inattention, low motivation, fuzzy operation, and so on. Therefore, the decisive factor cannot be the recurrence itself, but the *context* of the recurrence. An enriching, dynamic context leads to positive effects, e.g., learning (IV.2.39), emphasis (IV.2.40), or rapport (IV.2.41). In this passage:

(133) Hazel loved to *talk*. She was a very outgoing friendly person. She *talked* to people on the street, she *talked* to everybody. When she went to the market to buy some tomatoes, by the time she stopped *talking* to the grocer the tomatoes were out of season. (Burns, 1980: 114)

the recurrences deliberately mimic Hazel's 'talking' and make the story more lifelike. But recurrences in a static or very slowly developing context have negative effects, e.g. boredom. For example, (134) is distinctly less readable than its revision in (134a):

(134) You have to learn how to do *tricks* while *barefooting*. The only *trick* I have mastered while *barefooting* is *barefooting* on one foot.
(134a) You have to learn how to do tricks while barefooting. The only one I mastered was skiing on one foot.

Speaking typically tolerates more recurrence because of the greater need to remind oneself and one's audience of the topic at hand; a student passage like (134) could be a side-effect of speech habits (cf. V.3.10, 32ff). Student writers should learn where recurrence is or is not to their advantage (cf. Macrorie, 1970: 24ff, on "strong" vs. "weak repetition"; and Van Nostrand, Knoblauch, McGuire, & Pettigrew, 1978: 313ff, on "strategic repetition").[11] Skilled writers find the appropriate ratio between the new and the given, or between the unpredictable and the predictable (IV.2.41).

2.39 Similar considerations apply to PARAPHRASE, where content remains largely constant while surface expressions are varied (cf. I.4.11.1; II.3.15; VI.1.3)—the redundancy is in concepts, not expressions. The change in expression makes it hard to tell what counts as a true paraphrase. In these passages:

> (135) There was no more any surprise; there was nothing that was not known beforehand. (Govinda, 1976: 206)
> (136) I had no idea what they wanted with me, so I just went down there quietly, not knowing what to expect when I got there.

it is disputable whether the final clause (135) or phrase (136) is a paraphrase of the preceding statement, or else a new statement closely linked to the latter via commonsense causality. In (137), the meaning of 'drifters' is rehearsed in two whole sentences:

> (137) Lenny and George's constant moving about has forced them to become drifters. They have no permanent home and no family. They constantly move from town to town.

The writer must decide whether the context justifies a possible self-paraphrase. Sometimes, the effect is to retard or impede the development of content (cf. V.3.37; VI.2.31). Tolerant audiences can adjust to conceptual redundancy by ignoring some content (cf. Ehri & Muzio, 1974). Yet paraphrase that enriches or shifts context can support learning better than recurrence (cf. Honeck, 1973; Mandler, 1979).

2.40 Look-back also figures in PARALLELISM: re-using a surface format with different components. Here, the redundancy is neither in concepts nor expressions, but in phrase-structuring. Processing load is reduced by packaging new content into already activated phrasings, leaving resources free to focus on content and purpose, as in:

> (138) He has plundered our seas, ravaged our coasts, burnt our towns. *(Declaration of Independence)*

Parallelism can be combined with recurrence for special emphasis:

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[11] Rochester (1973: 84) reports that thought-disordered schizophrenics overuse recurrence to the extreme of making it their only device for cohesion.

(139) government of the people, by the people, and for the people shall not perish from the earth. *(Gettysburg Address)*

Conversely, non-parallelism in formatting comparable content can be disorienting. Compare (140) (student's version) with (140a) (revision):

(140) Style to many women is still a mystery, yet to others they have found the secret to the meaning of style.
(140a) Some women still find style a mystery, while others have found the secret to its meaning.

The contrast between the two kinds of 'women' emerges more clearly in (140a) through parallelism (agent + verb + object) and partial recurrence ('find/found') (cf. IV.2.51; VI.2.18).

2.41 Classical rhetoric developed an elaborate repertory of "schemes" for using recurrence and parallelism (cf. R. Graves, 1974: 187ff). Recurrent items might appear in word-stems (polyptoton, i.e. partial recurrence); in two successive phrases at the start (anaphora), at the end (epistrophe), or at the end of the first and the start of the second (anadiplosis); or, inside a single phrase at the start and the end (epanalepsis). Sound/letter patterns could recur inside words, e.g., at the start (alliteration), at the end (rhyme), or in varied positions (assonance). These schemes were effective in classical oratory partly because audiences expected them and enjoyed the elaboration of the text. But beyond that factor, the schemes presumably affected the cognitive processing of the text itself (cf. Beaugrande, 1979e). The scheme was taken as given, but not its specific use. Hence, discourse events were in part anticipated and seemed fitting and necessary when they occurred; yet they were in part surprising and kept the audience's attention in focus.[12] Look-back was thus a simultaneous enactment of opposing tendencies—redundancy in some phases (expression, phrasing, sounds/letters) and innovation in others (ideas, concepts). The dynamic tension helped promote rapport between orator and audience. Such effects are general and powerful enough that modern writers could profit greatly from studying classical rhetoric (Corbett, 1971). For example, Christensen (1965: 148) advocated that a series of co-ordinate statements (on the same plane of generality) be parallel, while a series of subordinate statements (descending level of generality) be varied. Resemblances and contrasts in format thereby help to identify the hierarchy of content.

2.42 While the devices sketched in IV.37-41 *increase* redundancy in the shallow phases, a second set of devices *decreases* that same redundancy, notably: PRO-FORMS (short, conceptually empty place-holders) and ELLIPSES (incomplete surface structures processed by consulting complete ones in their vicinity) (cf. Beaugrande & Dressler, 1981: 60-69, and refer-

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[12] For detailed treatment of samples of this kind, see Beaugrande (1978c, 1983b); Beaugrande & Dressler (1981).

ences there). Discourse frequently requires CO-REFERENCE: more than one word to denote the same thing in the textual world. The two options just mentioned are much more economical than constant recurrence, and less likely to destroy interest. Pro-forms are termed *anaphoric* if they look back (if the pro-form follows its co-referent),[13] and *cataphoric* if they look ahead. *Pronouns* were the pro-forms most often treated in traditional grammar, mar, but others have been recently discussed (cf. Quirk et al., 1972: 667-700), e.g., *pro-verbs* ('be', 'do', etc.) and *pro-modifiers* ('so', 'such', etc.).

2.43 Pro-forms are controlled less by grammatical rules than by the exigencies of linear processing, e.g., how much text can be spanned by look-back signals (cf. IV.2.66; V.3.27). Brevity should not be sought at the expense of clarity and comprehension. The preference is for a pro-form to look back to the nearest co-referent available in the surface text (Springston, 1975). Yet even skilled writers override this preference by using pro-forms for a conspicuous and reasonable co-referent further away. A composition expert wrote:

> (141) Authors who support themselves by writing have the same reluctance about actually getting down to the words-on-paper stage of their job that students do, and overcome their hesitation by using these methods. *They* set aside a special period of the day [etc.] (S.P. Miller, 1976: 73)

The 'they' in the second sentence looks back to the most distant candidate 'authors', not to 'students', 'methods', or 'words'. Though 'methods' and 'words' are plainly unreasonable, 'students' is ruled out by the general meaning and purpose of the whole passage. The statement made in the first sentence is to be illustrated in the second, i.e., to depict the 'methods used by 'authors' (not by 'students') to 'overcome' their 'hesitations'.[14] The proper co-referent is found by attaching the pro-form to the topic concept 'author'; if a topic is a control center in the mental representation (III.2.14ff), it would readily attract any doubtful instances of co-reference. However, unskilled writers use vague pro-forms in ways that confuse or distract from the message (cf. III.3.40; V.2.25-29).

> (142) By placing a hockey stick in the palm of your hand, *it* becomes a lethal weapon.

An entity in the mental representation may engender a pro-form for which the writer entirely forgets to provide an explicit co-referent:

> (143) Physical therapy is a demanding job. *They* must be both mentally and physically strong.

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[13] "Co-referent," though a recent coinage, is precise. "Referent" makes it seem as if the pronoun referred to the noun, rather than both referring to the same thing in the world; and "antecedent" implies "before," which need not be the case (IV.2.42).

[14] The comma after 'do' signals that the next verb looks further back to 'authors' (not 'students') (cf. IV.3.31).

The missing co-referent must be inferred by association (the people who take the 'job'). In such cases, the text producer evidently relies on the retrospective mental representation of prior text and devotes less care to perceiving the surface text (cf. III.3.7; IV.2.36).

2.44 ELLIPSIS cuts down the need for recurrence by simply omitting expressions (Quirk et al., 1972: 538):[15]

(144) I'll pay for the hotel if you will for the food.
(145) You must also be a member of the party, since he is.

Linear processing may consult the complete phrasing to fill in the missing elements ('pay for', 'a member of the party'). Or, the mental representation of prior text may supply the needed concepts directly, without passing through the shallower phases. Ellipsis is kept efficient by certain constraints. A second core (main) clause (146) permits ellipsis more readily than does an adjunct (dependent) clause (146a):

(146) Mary was happy and Alice miserable.
(146a) Mary was happy while [because, when, although, etc.] Alice miserable.

Unskilled student writers who shift phrasing around produce confusing ellipses, e.g.:

(147) RCA concentrated on business applications, IBM and UNIVAC on business and scientific and the highest speed computers.

Like proforms, ellipsis is to save effort, not to waste it piecing things together. Parallelism obviously assists the supplying of ellided items, e.g.:

(147a) RCA concentrated on business, and IBM and UNIVAC on business, science, and top-speed computers.

2.45 The eye doesn't appear to see very far back from the point where it's reading (McConkie & Rayner, 1976).[16] Look-back could be done by simply scanning the linear sequence of the surface text backwards, but that seems unlikely. Eye-movement studies indicate that readers fixate the specific prior words that are most likely to assist current processing (cf. Just & Carpenter, 1980). For example, to find the co-referent for a pronoun, the eye selectively focuses on the most plausible preceding nouns. A mechanical backward scan would waste effort on many irrelevant words. Moreover, as I noted in IV.2.43, deeper phases than phrasing are consulted, especially when the co-referent for the pronoun is remote, vague, or missing. Perhaps

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[15] Grammarians define ellipsis variously, according to what they consider the ideal complete form (cf. Quirk et al., 1972: 538, 574; Clark & Clark, 1977: 16). The definition here is in terms of processing: perceiving an incomplete structure and supplying the rest from a nearby complete structure, or less often, from an inferred complete structure.

[16] According to McConkie and Rayner's experiments, anomalies just three or four letters to the left of the eye fixation point seem to go unperceived.

the processor does a single all-purpose look-back operation to meet current requirements, like a bus carrying passengers watching for their respective stops (compare Fahlman's 1979 memory model). The processor may routinely consult the mental representation of prior text and re-scan the surface text only on strategic occasions, e.g. for revision (IV.2.49f). The eye movements of readers and hand movements of writers go backward relatively seldom in comparison to the extensive need for look-back to maintain cohesion and coherence (cf. Matsuhashi, 1982: 279). Besides, the spoken modality scarcely permits any such backward surface scans, whence its higher ratio of redundancies and inconsistencies (V.3.10). Consulting the mental representation, though conserving on the surface, may have negative side-effects such as pre-activation and re-activation (IV.2.36, 47), where the processor appears to lose track of the surface text momentarily. The same cause would account for an audience's tendency to confuse what was said with what they supplied during comprehension (cf. III.1.14; III.3.7; III.3.27).

2.46 Such tendencies (along with those treated in IV.2.47ff) yield clues about the relation of the linear surface text to overall processing. The mental representation of the text, being a memory store, necessarily shares the general properties of memory itself. Hence, the representation would adapt to the perspectives adopted by the processor in each context (cf. III.3.10). This effect would fit the nature and extent of the processes themselves, e.g. their motivation, duration, thoroughness, and so on. At various times, the representation could assume an order of dimensions such as (a) *linear* (to reflect the surface sequence); (b) *hierarchical* (to reflect degrees of generality and importance); or (c) *categorical* (to reflect the classifications or associations obtaining among concepts, expressions, phrase formats, or sounds/letters). When a given dimension becomes relevant, the corresponding perspective becomes active. Admittedly, such a versatile mental representation is much harder to formalize than sentence structures or logical forms (cf. J. Anderson, 1976, vs. Beaugrande, 1980a, 1982e). but it appears justified in view of recent findings on processing and memory.

2.47 The LOOK-AHEAD PRINCIPLE is the complement and converse of look-back, and subsumes all activities directed to subsequent parts of a discourse. Aside from deep-level goals, look-ahead ought to have lower priority than look-back, because the latter can compensate for the former more readily than vice-versa: it's easier to make the current decision fit previous recorded ones, than subsequent anticipated ones. Hence, look-ahead would tend to be sacrificed under heavy system load (III.3.5.5; IV.2.50f). Still, the operations of look-ahead ought to resemble those of look-back. For example, look-ahead should also operate on a versatile, multi-phase mental representation (IV.2.45f)—the more so as the surface text per se is not normally available in advance. Some sounds, words, phrases etc. may be correctly anticipated, but not a complete, detailed text

(III.3.5.5; III.3.7). How rich, specific, flexible, or conscious such expectations may be is far from established. At least some look-ahead is automatic, thanks to spreading activation (IV.2.48), but is likely to make more material active than is relevant to the ongoing discourse (III.2.20f). Both the producer and the receiver of a text must have some screening process that scans memory associations for relevance (cf. IV.2.49; VI.2.32). If look-ahead is especially sensitive to heavy processing loads, screening could easily misfunction. For instance, just as involuntary look-back is documented in *reactivation* (IV.2.36), involuntary look-ahead is documented in *pre-activation*. Linear errors can appear on the level of sounds/letters, both in speech (148) and in writing (149), or on the level of phrasing (150, 151):

(148) the *s*ird and—the *b*ird—the third and *s*urviving *b*rother (Fromkin, 1971: 30)
(149) All basketball*s* game are started on jump shots
(150) The Federal Defense Budget is the only government *that program* will be increased.
(151) take the *lobby <in the> elevator*

Unless corrected (148, 151), the error may seriously damage cohesion (150) and coherence (151). On a larger scale, pre-activation may start a whole clause too soon:[17]

(152) go east <until coming / to> // (you are now on {West} University Blvd.) // until you come to 20th St.
(153) Turn left / <stop at the stop sign,> {follow / the / road} and turn // right into the parking lot / of the hospital. // <you> The lot is // immediately after the stop sign.

In (153), 'stop at the stop sign' was not deleted until after 'turn right' was inscribed; there was a pause before 'right' and a slowdown on the word itself. During another long pause after 'hospital', the hand moved back to cross out 'stop sign' with more ink and to insert 'follow / the / road'; only then was the comma after 'hospital' converted to a period and a new sentence was begun. These linear rearrangings, unlike those in (148-151), are conscious, voluntary acts of look-ahead.

2.48 The impact of look-ahead is also manifested in MISCUES, where people alter a text as they read it aloud (cf. Goodman & Burke, 1973). The same rapid, largely automatic processes that constantly engender hypotheses about what is going on in the world naturally make occasional mistakes (Neisser, 1982; cf. I.1.7). Readers sample the printed text while at the same time guessing what words are probably on the page (Goodman, 1970; Frith, 1980). The most immanent miscues are those where the interpolated word both looks like the correct one and makes sense in context (cf.

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[17] On the bracketing conventions, see IV.2.25.

III.3.37). Students who had already closely studied the texts containing (154) and (155) nonetheless miscued when reading aloud to a class:

(154) Through dust where the blacksnake *dries* [dies] (James Dickey)
(155) My crop of corn is but a field of tares.
And all my good is but vain hope of *grain* [gain]
(Chidiock Tichborne)

Associations such as 'dust-dry' and 'corn-grain' easily come to mind via *spreading activation* in people's memory for world-knowledge (cf. I.4.11.2; III.2.14, 20). Miscuing even on familiar texts again shows how performance need not reflect real knowledge or ability (cf. I.3.3). Miscues are the sign of efficient readers; children who slavishly cling to the printed page generally do poorly on comprehension and learning of content (Goodman & Goodman, 1979). When I record college students reading aloud, many are unable to recall the content of simple passages because they were "concentrating on the words" (their explanation). If expressly told to read for content, they regularly produce miscues, especially ones I have designed into the samples. One version of my 'rocket'-text (Beaugrande, 1980a: 222ff) contained contrived oddities:

(156) With a roar and a burst of flares, the *giant rocked* on its pad.
(157) It plunged down to the earth's surface 40 miles from the *launching padded by landing gear.*

Almost all readers miscued on (156) with 'giant rocket' (one person three times in a row) and on (157) with 'launching pad'. Even persons who did not miscue later reported having read 'giant rocket' and 'launching pad'. 'Rocket' was the *topic* concept high in the hierarchy of the mental representation and thereby dominating look-ahead and look-back. Readers thus miscued although there were 84 words between 'rocket' and 'rocked'. The 'roar' and 'burst' were at once construed as results of the rocket's take-off.

2.49 Look-ahead would operate in a special way when written texts are *revised.* The surface text is now available for consultation alongside the predictive mental representation of it. Current decisions can be better aligned with anticipated ones. Processing load is generally lower than during the original act of production, because many tasks are provisionally done. In terms of the scheme in III.3.2, there is a rise in *familiarity* and *perceptual immediacy* (visible text), and a lower demand for *motor control. Feedback* is easier to obtain, and *attention* can be focused on a few specific problems, rather than diluted over a great many. Lower processing load in turn creates more favorable conditions for look-ahead (cf. IV.2.47). The writer can inspect results and detect noteworthy departures from the communicative intention. Larger chunks can be formed in order to compare a specific point with its general context. Content can be judged for relevance and interest, so that trivial or pointless associations that had automatically come to mind can be consciously screened out (IV.2.47). Preference should

go to variable or problematic content that elicits interest (cf. III.2.24; IV.2.11; VI.2.2, 8f, 32). Such content might carry special markings in memory storage to alert the scanning techniques (cf. Schank, 1977).

2.50 A sub-type of revision can be called RESTARTING: a stretch of text is not finished, but started over (cf. IV.2.15; V.2.34; V.3.20f). Processing presumably reactivates operations, adding conscious effort to resolve problems or blocks. My film showed writers altering phrase-initial function words, either right away (158), (159), or after the phrase was done (160):

(158) There is a road right <before> before <the> Shands
(159) Once there, turn right / <until> on university until you come to the intersection <on> at Museum road.
(160) Get into the right lane <and> <{until}> {when} you see the V.A. Hospital

The initial word was used after all in (158), and saved for later in (159). Under proper conditions, look-ahead can apparently judge the appropriateness of phrase-initial words quite soon. This faculty operates less well over a larger stretch of text. In (161), the writer crossed out 'w' for 'we' at once, opting for an active over a passive construction to put the 'horrifying' cause in focus (cf. II.3.12.2; IV.2.61). Yet after writing 'frightens us', he made a long pause, went back, and changed 'horrifies us' to 'we enjoy being horrified by'—the experiencers were judged more in need of focus than the causes of the experience. The original version was inconsistent, because the crucial distinction (being 'horrified' vs. 'enjoying' it) was not made clear soon enough.

(161) I am interested in what <w> <horrifies us> {we enjoy being horrified by}, in what we communally and voluntarily seek out to be thrilled by: I am not interested in what really frightens us.

Whether revision can profit from restarting depends on the writer's skill. Unskilled writers are prone to work without very much look-ahead, the more so if the latter degrades under heavy processing load (cf. IV.2.47, 51). These writers tend to restart so often that they get writer's block long before a paper is finished (cf. III.2.9, 17, 20; III.3.4). If they could hold off until they have a fairly long stretch of text, at least a paragraph, they would draw more profit from restarting. At that time, context and purpose are better defined to provide direction and criteria for decision-making. Skilled writers are better equipped to look ahead, and hence to restart brief passages.

2.51 The cohesive devices noted for look-back in IV.2.37-44 also apply to look-ahead. Recurrence, paraphrase, and parallelism may be planned such that the prior passage anticipates subsequent ones. Shakespeare's sonnet (XX) beginning:

(162) A woman's face, with nature's own hand painted,
Hast thou, the master mistress of my passion;
A woman's gentle heart, but not acquainted
With shifting change, as is false woman's fashion;

uses artful recurrences of 'woman', emphasized with parallelism in line openings, to look ahead toward a surprising contrast when the addressee turns out to be a man (cf. IV.2.40; VI.2.18). The streamlining devices of proforms and ellipsis can look ahead *cataphorically* (IV.2.42). The pro-form then precedes the expression providing the content:

(163) Because *they* go into the blood directly instead of through ducts, *hormones* circulate all over the body.

The reverse (anaphoric) placement would be ambiguous:

(163a) Because *hormones* go into the blood directly instead of through *ducts, they* circulate all over the body.

Ellipis can also be cataphoric:

(164) Because Alice won't, Mary is dusting the furniture. (Quirk et al., 1972: 538).

Cataphoric uses of pro-forms and ellipsis are much rarer than anaphoric. Look-ahead seems to be more limited than look-back, presumably because the encounter with the surface text has not yet occurred (cf. III.3.5.5); and because look-ahead would be likely to suffer immediately when processing is heavily loaded (cf. IV.2.47, 50).

2.52 JUNCTIVES are a word-class that links a forthcoming stretch of text to the currently ending one. Junctives contribute to look-ahead by indicating the nature of that linkage. CONJUNCTION (e.g. 'and') is a neutral signal of addition. DISJUNCTION (e.g. 'or') announces alternatives. CONTRAJUNCTION (e.g. 'but') prefigures unexpected or contrastive content. SUBORDINATION signals a range of dependencies, notably, causality (e.g. 'because') or time proximity (e.g. 'whenever'). In strict classifications, subordination prevents a clause from having sentence status (cf. V.2.24, 36, 40). If a subordinating junctive opens a sentence, an independent clause is expected later on. The other three types of junction are not so constrained, and can appear freely at the start of sentences as well as inside them (V.2.26).[18] Disjunction offers dual signals ('either/or') to alert the audience right away that alternatives will be presented.

2.53 The HEAVINESS PRINCIPLE concerns the extent to which materials in discourse impose a load upon processing, because they are important, salient, complex, unfamiliar, unexpected, and so on. Though logically diverse, these aspects have much the same operational effect of loading the

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[18] Unless odd "rules" are passed against junctives at the start of a sentence (I.2.14).

system. The heaviness principle can interact with the core-and-adjunct principle, but the two are not identical. Any ongoing structure has central vs. peripheral components (cores and adjuncts), but only some components or whole structures create a heavy load on processing in a given context. A core need not be heavy, nor must every heavy element be made a core; these correspondences are strategic—drawing control toward items that are important for two reasons—but not necessary. For example, the subject of sentence is a core element, but often conveys familiar content (IV.2.63f). And, some adjuncts are made heavy by getting moved outside the structure containing their cores (cf. IV.2.58; V.2.32; V.3.30).

2.54 In terms of information theory, heaviness depends on the degree of UNCERTAINTY (cf. IV.1.1f). Every act of communication removes some uncertainty about what will be said. Statistics tell us little about the experience involved (IV.1.2), particularly since the surface text is a sparse document of only those alternatives that were finally chosen, not those that might have been. Heaviness results from a fairly improbable choice within a rich context, as in this narrative by Franz Kafka (in Landy [Ed.], 1980: 246f):

> (165) I must have coal; I cannot freeze to death; behind me is the pitiless stove, before me is the pitiless sky, so I must ride out between them and on my journey seek aid from the coal dealer. But he has grown deaf to ordinary appeals; I must prove to him irrefutably that I have not a single grain of coal left [. . .] My mode of arrival must decide the matter; so I ride off on the bucket. Seated on the bucket, my hands on the handle, the simplest kind of bridle, I propel myself with difficulty down the stairs; but once down below my bucket ascends, superbly [. . .] Through the hard frozen streets we go at a regular canter [etc.]

Readers don't expect the narrator to 'ride off' on his coal-bucket; but in context (need to prove the bucket is empty; inability to afford a real horse), the action seems motivated, and is soon integrated into the story line, making later events seem natural (cantering through the streets, etc.).

2.55 NEGATION is a useful gauge of uncertainty, because it usually repudiates what would otherwise be assumed (cf. Wason, 1965; Osgood, 1971; Beaugrande, 1978c; Givon, 1978). (161) rejects the notion that 'horror' includes 'what really frightens us'; (162) makes an exception to its own general statement that a 'woman's heart' is 'acquainted with shifting change'; (164) would be appropriate only if there were reason to expect 'Alice' to 'dust the furniture'; and so on. Languages typically associate positives with good, and negatives with bad (Clark & Clark, 1977: 538f).[19] By an odd coincidence, composition instruction has a traditional bias

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[19] Boucher & Osgood (1969) found that many languages add negating affixes to good evaluation words, but not to bad: 'unhappy' vs. 'unsad', 'unclear' vs. 'unmuddled', etc. This favoring of the good gave rise to the "Pollyanna" hypothesis, named after the cheerful heroine of Eleanor Porter's 1913 novel of the same name.

against multiple negation, either as "wordy" (166) (cf. Williams, 1981a: 158) or as a "stigmatized" (167) usage, e.g., in Black English, which, similar to such languages as Russian, has "negative concord" (Labov, 1970) (cf. Shaughnessy, 1977: 93):

(166) Housing for married students is not unworthy of consideration.
(167) It won't make no difference.

In everday language, multiple negatives intensify, rather than cancel, each other (I.2.16.8). Multiple negatives are hard to process only if they do cancel each other, because having one's expectations repeatedly violated increases heaviness (cf. Carpenter & Just, 1975; Sherman, 1976). Each negation removes us again from our point of orientation. The Duchess's injunction (Carroll, 1960: 122):

(168) Never imagine yourself not to be otherwise than what it might appear to others that what you were or might have been was not otherwise than what you would have appeared to them to be otherwise.

is impenetrable (not just to Alice) with five negations (plus a recurrent 'otherwise' at the end that is not a negation). When four are removed, the content comes into reach:

(168a) Never imagine yourself to be what it might appear to others that you were or might have been under other conditions.

that is, 'always be what you would seem to be'.

2.56 SALIENCE can be defined as the quality of impinging strongly on the senses. Among all the things available in perceptual space (the totality of what is perceived at any moment, III.3.2.10), salient ones draw focus: extremes in size, color, brightness, loudness, mobility, novelty, and so on. Osgood (1971; cf. Osgood & Bock, 1977) undertook to prove that salient elements tend to be expressed earlier in an utterance or sentence than nonsalient ones. For example, mobile objects would be mentioned before stationary ones—an illustration of the "normal ordering strategies" enumerated in III.3.19. Osgood placed a cardboard tube upright on a plate, and 21 out of 26 test persons said things like (169) rather than (169a); 23 out of 26 mentioned a mobile ball before a stationary one despite the latter's large size and bright color, e.g. (170) rather than (170a) (Osgood & Bock, 1977: 107f):

(169) A cardboard tube is on the plate.
(169a) The plate has a cardboard tube standing in its center.
(170) The small black ball hits a very big orange ball.
(170a) A very big orange ball is hit by a small black ball.

Evidently, the different aspects of salience can compete with each other in determining linear formatting (cf. IV.2.62).

2.57 IMPORTANCE is another gradation of heaviness. Materials may be important for the text producer's goals, but not for the receiver's. Goals may interlock (e.g., entertain vs. be entertained), conflict (e.g., deceive vs. not be deceived), or simply be unrelated (e.g., deliver a sermon vs. walk across the campus). Each of these situations affects the organization of the text, and the heaviness of its elements. In this text from a stage play (cf. Beaugrande, 1980a: 183ff), the speaker imposes her goal on a co-operative group:

> (171) We got one thing, and one thing only, to do now. And that is to find out if Abby's planning to take that portrait to Chicago with her.

The important goal of getting Abby's 'portrait' calls for creating focus with dummy (place-holder) expressions ('one thing', 'that') which look ahead to heavy elements (IV.2.63), and then announcing a main plan step ('finding out' etc.). Notice that postponement can signal heaviness just as well as early mention.

2.58 INVOLVEMENT can designate the intensity with which people are participating in discourse interaction. In the studies cited in IV.2.56, Osgood argues that involvement also moves elements earlier in the sequence. Laboratory experiments—e.g., describing to an unseen child what Osgood did with a shopping bag full of items on a table—seldom elicit much real involvement. An everyday illustration is found in this science-fiction story, where the absent-minded pilot is threatened with disaster unless he finds the 'cribsheet' with the flight code he was supposed to have memorized:

> (172) He suddenly went numb all over. "The crib! Where's the cribsheet!" That was the awfully important detail. (Lem, 1981; 16)

His shout begins with the item of greatest involvement moved outside the sentence structure in which the question word would come first; the complete format is then uttered.[20] The heaviness principle has moved an element outside of its normal core-and-adjunct pattern (cf. IV.2.53; V.2.32; V.3.30). Ertel (1977) suggested that "ego involvement" can decide which objects in one's perceptual space get expressed in subject slots of sentences. The object nearest the "ego" becomes the point of orientation for planning the sentence. In 26 out of 32 newspaper reports about soccer matches, he found a consistent tendency to mention players of one's home team (close to one's "ego") in subject position and players of the opposing team in the predicate of the sentence (1977: 156f).

2.59 Uncertainty, importance, involvement, and salience naturally interact. Someone beset by grave uncertainty can become heavily involved,

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[20] On the tendency to create sentence fragments for emphasis, see V.2.32.

and the resolution can be experienced as a salient event. Many text producers choose such devices as suspense, shock, and surprise to heighten audience involvement, especially if the text's main purpose is entertainment. It would be hard to distinguish, as Osgood and Bock (1977: 90) want to do, between the *inherent* heaviness of discourse materials (e.g., objects in a perceptual space) and the heaviness *assigned* by a processor.[21] What counts as salient in an object depends in part upon how humans conceptualize the normal values for the object. A bright orange color and a size of two feet across are far more salient for a golf ball than for a beach ball.

2.60 In speech, heaviness can be distinctly signalled with intonation, pitch, stress, and volume. A heavy element like 'crib' in (172) would be uttered in a loud, emphatic voice, accompanied by salient gestures and facial expressions. Brazil (1975) presents a system for correlating the heaviness of discourse elements with a rise or fall in tone. A passage presenting new or uncertain knowledge has a falling intonation curve; strong involvement would show first a rise, then a fall (cf. also Halliday, 1967; Coulthard, Sinclair, & Brazil, 1978). Writers can use special print (italics, bold, block capitals, etc.) and punctuation (question marks, exclamation marks) to reflect heaviness, notably in transcribed speech (IV.3.18ff). But these devices soon lose their effect. A subtler method is to format heavy materials in short, simple clauses and sentences, as in (173), the finish of a dramatic science-fiction yarn (Lem, 1981: 37). For added effect, each sentence forms its own paragraph (cf. IV.3.17; VI.2.15). The second row of spaced periods adds a split second of suspense about the identity of the pilot (cf. IV.3.25).

(173) Then, from out of the cabin staggered a writhing hulk of a man in a brown uniform, his helmetless head bobbing around like a blurry blotch, his face contorted in a mute shriek . . .

Pirx's knees buckled.

It was...Boerst.

He had crashed into the Moon.

Familiar materials stated in short sentences seem more important than otherwise, e.g., in this text beginning (cf. Beaugrande, 1977b: 329):

(174) Light is radiation that we can see. Heat is radiation that we can feel. [. . .] Now we are hearing more and more about another kind of radiation as a result of man's continuing scientific and engineering achievement.

This is nuclear radation.

This text was distributed by the Atomic Energy Commission to persuade the public that nuclear energy is safe and reliable. Recurrence and parallelism

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[21] If conflicts arise between the environment and the human, Osgood wants to show that the former wins out, since he favors a perception-based organization for all language (II.2.23). But we need evidence from more natural settings.

enhance familiarity and make the message appear fitting and inevitable (cf. IV.2.38) by the time 'nuclear radiation' is mentioned (again in a one-sentence paragraph for greater effect). Shortness of sentences goes well with these intentions.

2.61 Heaviness interacts with phrasing to distinguish between *active vs. passive sentences*. Grammar alone might predict that passives, being longer and more complex, are harder to produce and understand than actives (cf. Coleman, 1964). Composition teachers and handbooks traditionally disparage or even forbid the passive (I.2.14; VI.1.22). Yet cognitive processing favors this format when the subject of the passive sentence outranks the agent (the subject of the corresponding active) in (a) *animateness* (H. Clark, 1965); (b) *size* (Johnson-Laird, 1968; Flores d'Arcais, 1974); (c) *earlier perception* (Prentice, 1967; Turner & Rommetveit, 1967); (d) *focus of attention* (Tannenbaum & Williams, 1968; Olson & Filby, 1972); (e) *imageability* (James, Thompson, & Baldwin, 1973); or (f) *prior mention* (Hupet & Le Boudec, 1975). These findings caution against a narrowly grammatical evaluation of linear patterns that should rightfully be included in the repertory of learners (cf. Walpole, 1979).

2.62 The linear ordering inside written clauses and sentences is prominently determined in English[22] by an interaction between the heaviness principle and the core-and-adjunct principle (cf. Beaugrande, 1977a, 1979b). Cooper and Ross (1975) collected standing phrases in which the element closer to the "ego" ("me") precedes a more remote one (cf. IV.2.58). This ego is stereotyped as "here, now, adult, male, positive, singular, living, friendly, solid, agentive, powerful, at home, and patriotic"—a regular "Archie Bunker" (1975: 67). Hence, we find 'this and that', not 'that and this', or 'come and go', not 'go and come' ("here" dimension); 'sooner or later', not 'later or sooner' ("now" dimension); 'husband and wife', not 'wife and husband' ("male" dimension); and so forth. Fillmore (1977) sorts out much-debated sentence pairs like:

(175) I smeared mud on the wall.
(175a) I smeared the wall with mud.

where only (175a) implies the entire wall was covered. The difference is due to placing 'wall' in the core-unit slot of direct object in (175a), as opposed to the adjunct slot of phrasal modifier in (175); the core is readily taken as the focus of concern. A related finding emerged from Linde and Labov's (1975) study of how people describe their apartments from mental maps. By and large, major rooms (usual points of orientation) were mentioned in core slots (e.g. subject or direct object), while minor ones were mentioned as adjuncts (e.g. prepositional phrases) as in (1975: 937):

(176) I entered a large living room with the kitchen off the back.

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[22] On some other languages, see the literature cited in IV.2.63.

In Pike's description of his boyhood home (III.3.25), the house is the topic, and figures in the subject slot of five of the ten independent clauses. The 'barn', 'woodshed', 'homes of the preacher and store keeper', 'general store', 'schoolhouse', and 'church' are all mentioned in predicate slots. Cooper and Ross's "here" dimension seems to influence whole passages, not just standing phrases.

2.63 In linguistics, the impact of heaviness on the linearization of sentences has been designated "functional sentence perspective," "theme vs. rheme," or "topic vs. comment" (cf. Halliday, 1967-68; Chafe, 1970; Sgall et al., 1973; Danes [Ed.], 1974; Grossman, San, & Vance [Eds.], 1975; Li [Ed.], 1976; surveys in Chafe, 1976; Firbas & Golkova, 1976; Jones, 1977: 52-101; Beaugrande & Dressler, 1981: 75f). In many languages, the early stretch of a sentence format, often the subject, is routinely used to express the point of orientation (known or predictable content) whereas heavy materials are mentioned late in the sentence, often in the end stretch of the predicate. A beginning with heavy materials is reserved for special emphasis (salience, importance, involvement, IV.2.56-58). Thus, heaviness normally follows look-ahead, but in emphatic cases, follows look-back. The so-called "cleft" construction[23] starts with a dummy subject and predicate 'it + be' to delay communication momentarily (cf. IV.2.57) and to reserve the high-focus predicate nominative core slot for items that would otherwise appear as adjuncts and attract less attention. Contrast (177) against (177a) or (177b) (Quirk et al., 1972: 951):

(177) John wore his best suit *to the dance last night.*
(177a) It was *last night* that John wore his best suit to the dance.
(177b) It was *to the dance* that John wore his best suit last night.

In return, the materials in the relative 'that'-clause are taken as obvious, known, or non-heavy (II.3.41). The "pseudo-cleft" construction does the reverse: putting lighter materials before heavier ones. Compare:

(178) We want Watney's
(178a) What we want is Watney's

The first version of the slogan, though shorter and denser, proved far less durable and effective (Halliday, 1967: 224). The second one focuses on the ale brand by announcing that something is 'wanted': a momentary vacuum is created into which the brand name is then placed.

2.64 As we see, heavy materials can migrate either toward the end of a sentence or toward the beginning. If these tendencies conflict, the outcome

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[23] The term "cleft" construction goes back to Otto Jespersen (1924: 147f): "A cleaving of a sentence by means of 'it is' serves to single out one particular element of the sentence and very often, by directing attention to it and bringing it, as it were, into focus, to mark a contrast." The "cleaving" is seen by comparing (177) to (177a) and (177b). The "pseudo-cleft," e.g. (178), doesn't actually "cleave."

is decided by participant roles, according to Osgood and Bock (1977: 93). If the text producer is the center of concern, heavy elements come earlier; if the audience is the center, heavy elements come later. Early mention reflects the producer's immediate reactions; late mention is a better guideline for the audience.[24] Or, the producer may elect to place the point of orientation in the sentence subject, irrespective of heaviness. Consider:

(179) Two harlots came to the king and stood before him. The one woman said, "Oh, my lord, this woman and I dwell in the same house; and I gave birth to a child while she was in the house. Then on the third day after I was delivered, this woman also gave birth; and we were alone; there was no one else with us in the house, only we two were in the house." (I *Kings* 3: 16-27)

The subject of the first sentence conveys new content, 'Two harlots', whereas 'the king' Solomon is already familiar from previous stories in the book of *Kings*. But subject placement helps to announce the *topic* characters for this particular story (point of orientation), whereas the predicate gets them onto the scene. The same two characters, taken together or singly, fill the subject slots of the next four clauses: 'one woman', 'this woman and I', 'I', and 'she'. New, important events and situations are announced in predicates of main clauses: 'came to the king', 'dwell in the same house', 'gave birth to a child', and 'were alone'. Predicates whose content is predictable appear in dependent clauses: 'while she was in the house', and 'after I was delivered'. The next two assertions use *paraphrase* to rehearse content which, though already known, is crucial for legal proceedings when the two sole witnesses make contradictory reports. This contradiction creates the suspenseful problem the king will resolve with his famous judgement. Thus, the phrasings are subtly designed to look back and ahead across various spans, regulating the ratio of the known vs. the new, of stability vs. innovation (cf. I.4.9).

2.65 The DISAMBIGUATION principle subsumes all activities of reducing or precluding multiple conceptual configurations for a single stretch of surface text. AMBIGUITY can designate an unintended multiplicity of meaning, and POLYVALENCE an intended one (Beaugrande & Dressler, 1981: 84). Only the former counts as an impediment to communication, whereas the latter is an enrichment, especially in literature (cf. Empson, 1930; Kris, 1952; Dillon, 1978). Disambiguation was extensively treated in mentalist linguistics because of its central role in philosophical semantics. It is no coincidence that Katz and Fodor (1963: 174f) started their frail "semantic theory" with the ambiguous utterance:

(180) The bill is large.

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[24] Unskilled writers often use non-strategic sentence formats that fail to guide focus. This tendency may be related to their strong ego-involvement vs. that of the audience (cf. Lunsford, 1977, 1981; Odell, 1977; Maimon, 1979).

They argue that "semantic theory" must "reconstruct" people's ability to "detect nonsyntactic ambiguities and characterize the content of each reading of a sentence." Yet they reject the operational solution of studying how the context determines the meaning because—true to the philosophical, classifying methods of linguistics (I.4.3, 13; II.1.5)—they think such a theory would need to "represent all the knowledge speakers have of the world" (1963: 178). Instead, they prefer the mentalist approach of assigning disambiguation to "deeper" levels of structural analysis (cf. II.3.6f).[25] In the procedural outlook, the quantities of ambiguities found by such analysis far exceed those that are relevant in real discourse. The question is then: what ambiguities are processed, and how are they precluded or resolved?

2.66 Processors must have skillful operations that relate any element or linear sequence to context and communicative setting. Hence, the disambiguation principle is fully integrated with the other principles of linear processing—indeed, largely a by-product of their functions. Look-back and look-ahead determine how a current stretch of text should be interpreted in view of previous and subsequent ones. Heaviness marks off the point of orientation and the important material. Ambiguities are thus constrained by expectations arising both from the text itself and from shared cultural knowledge. For instance, within the Pike text (III.3.25), the 'it' in (53.2, 3, 4) obviously looks back to topic concept of 'house' (IV.2.62), though the surface text has competing nouns nearby ('barn', 'stove', 'mansion', etc.). Commonsense reasoning about goals obviates grammatical ambiguities in a surface text like this (after Wilensky, 1980: 28):

> (181) John wanted Bill's bicycle. He walked over to him and asked him if he would give it to him. He refused. Then he told him he would give him five dollars for it, but he would not agree. Then he told him he would break his arm if he didn't hand it over. He didn't want to get hurt, so he gave him the bicycle after all.

Though extremely careless, the text is not incomprehensible. A reader imagines an everyday bargaining situation with two character roles pursuing their respective goals, and easily attaches each pronoun to one or the other. No reader would stop at each pronoun to compute all logically possible combinations for 'Bill' or 'John'. Readers want to maintain coherence, not postpone it.

2.67 Still, ambiguity is a real communicative obstacle on certain occasions. If a topic or context is withheld, comprehension and memory suffer

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[25] Occasionally, transformations can be harnessed to make grammatical ambiguities clear without technical explanation. For instance, whether an '-ing' form is a predicate modifier or a part of a present continuous (or "progressive") verb can be made clear by converting to 'should (not)' + infinitive. 'The drunks were staggering', for example, can be converted to 'The drunks should not stagger'; hence the participle belongs to the verb. 'The bill was staggering' cannot be so converted; hence the participle is a modifier.

drastic setbacks (Bransford & Johnson, 1973). Ambiguity may be consciously experienced and resolved, especially if it is persistent and salient. Or, it may remain unconscious, barely on the peripheries of working memory.[26] For example, the several senses of a word often go unnoticed in context, but behavioral signals such as hesitations, restarts, or errors indicate they may all be activated (cf. MacKay, 1966; Conrad, 1974; Warren & Warren, 1976). This activation, though automatic, nonetheless seems to increase processing load. Communication could register and resolve ambiguities on many levels of processing and degrees of conscious awareness. A careless text producer leaves this task to the audience—biasing the trade-off in effort noted in III.3.16. Different frameworks of reference may also be the culprit. Soon after I arrived at the University of Florida, I asked my secretary, 'Where are the alligators?' Her reply, 'We keep them on the coffee table in the lounge' created an alarming mental image until I learned that she meant the school newspaper *(The Florida Independent Alligator).*

2.68 Such incidents show that whether an ambiguity is present is less crucial than whether it comes into focus. The "Lower Case" page in the *Columbia Journalism Review* displays unnoticed ambiguities from hastily written newspapers and thereby makes them salient:

(182) Teachers Strike Annoying Students *(Palm Beach Post,* Nov. 21, 1979)
(183) Some fossils said to back creationism *(Chicago Sun Times,* Dec. 16, 1981)
(184) Officers Finally Getting Shot at Promotion Exams *(Atlanta Constitution,* May 4, 1981)
(185) Cooper feels secretaries more than clerks *(Fort Collins Coloradoan,* Feb. 24, 1980)
(186) Utah Girl Does Well in Dog Shows *(Salt Lake Tribune,* Dec. 30, 1981)
(187) Reagan wins on budget, but more lies ahead *(The Morning News,* Blackfoot, Idaho, May 22, 1981)

As we see, the point is not whether readers can puzzle out the sense, but whether the writer can afford to be careless and inconsiderate (III.3.17; V.3.29). A student's passage like:

(188) I hated eggs, but these people were so hospitable that I had to eat them.

is comprehensible enough, but disturbs communication with a salient ambiguity and leaves the impression of an unskilled or negligent writer (III.3.40). On the other hand, my students sometimes create seeming ambiguities expressly to increase interest, e.g., this description of Mardi Gras:

(189) One of the biggest things to do In New Orleans is sucking heads and pinching tails. I am sure you guessed that I am referring to eating crawfish.

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[26] Presumably, some portions or features of the items must get into working memory, enough to increase processing load, but not enough to reach the threshold where they would be consciously registered (cf. III.2.4; III.3.7; Marcel, 1980; Morton, 1980).

A logical deficiency can be an operational advantage if strategically applied (cf. IV.2.55).

2.69 The LISTING PRINCIPLE subsumes the means for enumerating in sequence a set of related or comparable items. Like the other six linear principles, this one applies to all scales and levels. On a local scale, the list may be inside one sentence:

> (190) The Mechanical Engineering department offers the following degrees: Bachelor of Sciences in Mechanical Engineering, Master of Engineering, Master of Science, and Doctor of Philosophy.

List items may fill one paragraph each, as in samples (511, 515, 516, and 541) in VI.2.18, 20f, and 33. On still more global scale, items may each fill a series of paragraphs, as in the discursive listing of the seven principles of linear operation in this book section.

2.70 Formally, listing is a type of RECURSION. One category in the linear sequence is selected and repeated. Processing adapts by re-activating its operations for each recursion until the list terminates—a specialized use of look-back and look-ahead (cf. IV.2.35ff). This tactic cuts down on load so that the normal preference for twos and threes can be suspended without strain, e.g., for the four direct objects in (190). Presumably, processing specialists identify the shared criteria of the list and integrate as many items as required (IV.2.13). Look-ahead dominates if the criteria are evident at once, and look-back dominates if they must be extracted after consulting all or most of the list. List processing would function best if the list items facilitate these operations. Lists should be controlled for unity, explicitness, and ordering.

2.71 In a *unified* list, the items are distinctly comparable among themselves. On the conceptual level, the items should have clear content relations, as in (190) ('degrees'). This unity should be recognizable after two or three items at the latest, so that processing can adapt accordingly (IV.2.70). Conceptual relations decide if a list is disjunctive, e.g. (191), or additive, e.g. (191a) (cf. IV.2.72):

> (191) young, middle, and old adults (Meyer, Rice, Knight, & Jensen, 1979: l)
>
> (191a) young healthy, and energetic adults

Mutually exclusive concepts sort the list into as many groups as items (191), while compatible concepts yield one group with multiple attributes (191a). A markedly disunified list should be disturbing or surprising, e.g., in order to confuse an audience:

> (192) "The time has come," the Walrus said, "to talk of many things:
> Of shoes—and ships—and sealing wax—of cabbages—and kings"
> (Carroll, 1960: 235)

Conversely, list items too close in meaning appear redundant:

(193) Quarterbacks need quickness, speed, fast reactions, and rapid motions.

except for special effect. e.g., to depict repeated actions:

(194) His mind was always on the script, whether he was sitting in a bar, driving his car, sitting in a bar, relaxing at home, sitting in a bar, eating at a pizzeria, or maybe even sitting in a bar. (Burns, 1976: 175)

On the phrasing level, parallelism supports unity. The items on the list may be all cores, e.g. direct objects (193) or verbs in the predicate (194, 196a); or all adjuncts, e.g. adjectives (191, 191a). In (190), the list names 'degrees in mechanical engineering' formatted as noun phrases (noun + preposition 'of' + noun) in apposition with the direct object of the main clause. Non-parallel phrasing of lists in unskilled writing can be a needless processing obstacle. In (195), from a paper on juvenile delinquency, the student obscured the boundaries of list items, whereas her revision (195a) is much clearer:

(195) The child must do one of several things—pay tuition or a fine, community service, or even a suspended disposition.
(195a) The child must do one of several things—pay tuition or a fine, perform community service, or even accept a suspended disposition.

Recurrences and pronouns can be saved by making a compact, parallel list. Contrast (196) with its revision in (196a):

(196) The architectural engineer studies the drawings and plans. He inspects the building to insure that it will withstand everyday use. The engineer looks for ways to minimize the use of energy and space. He makes suggestions to the architect.
(196a) The architectural engineer studies the drawings and plans; inspects the building to ensure that it will withstand everyday use; looks for ways to minimize the use of energy and space; and makes suggestions to the architect.

2.72 In an *explicit* list, the category to which items belong is announced. A colon or typical listing signals can be inserted (e.g., 'the following', 'includes', 'first'/'second'/'third', etc.). It is strategic to place the list late in a sentence, where audiences expect focussed materials (IV.2.63f). Therefore, the announcement typically precedes the list, as in (190) and (195), so that look-ahead can begin at once (IV.2.70). Less often, the announcement comes after:

(197) Bookkeeping, games, and communication are three common uses of micro-computers.

Either way, the final list item is usually introduced by a *junctive:* 'and' if the list is additive, and 'or' if the list is disjunctive (IV.2.52). Odd placement of junctives confuses the list (cf. IV.3.38).

2.73 An *ordered* list is one whose linear succession has a discoverable motive, e.g., moving forward in time:

(198) The contractor builds the foundations, sets up the walls, and puts on the roof.

or progressing to steadily greater degrees of heaviness:

(199) Possible options include diplomatic protest, economic sanction, military pressure, or declared war.

These 'options' go from less to more extreme—the usual sequence for building gradually to a climax (cf. VI.2.34), e.g., in an international confrontation. Here, listing interacts with heaviness as a sequential strategy. The reverse seems oddly anti-climactic, as in this student passage about the hostages in Iran:

(200) They experienced fake executions, beatings, imprisonment, isolation, and uncertain futures.

2.74 The listing of modifiers is a special problem (cf. V.2.14). The list is often linearly fixed, e.g. in (Halliday & Hasan, 1976: 40):

(201) two high grey stone walls along the roadside

Yet the ordering criteria are hardly defined and certainly not learned in school grammars (cf. Ziff, 1960; Vendler, 1968; Martin, 1969; Danks & Glucksberg, 1971). Quirk et al. (1972: 924ff) suggest:

> Evaluative or subjective adjectives frequently precede those relating to size, while these in turn frequently proceed those of girth [. . .] modifiers relating to properties which are (relatively) inherent in the head of the noun phrase, visually observable, objectively recognizable or assessable will tend to be placed nearer the head and be preceded by modifiers concerned with what is relatively a matter of opinion, imposed on the head by the observer, not visually observed, and only subjectively assessable; [but] there is plenty of room for difference of opinion.

Similarly, Judith Martin (1969) argued that the more "instrinsic" modifiers—closely tied to the nature of the object/event expressed via the noun head—are placed nearest the head and selected earliest (with the aid of spreading activation?), though uttered last; but experimental evidence is inconclusive. Young children may have trouble with modifier sequences (cf. V.2.12f), e.g. this sixth-grader:

(202) The fast, enemy, slow airplane was flown by the intelligent, killer, tired robot.

defying both order and conceptual compatibility.

2.75 The seven principles of linear processing have now been illustrated on various scales and levels. The seven regularly interact: cores vs. adjuncts being separated by pauses, or determined by heaviness; look-back balanced

against look-ahead; lists controlled by heaviness or look-ahead, and so forth. Under heavy load, the processing system might be forced to sacrifice some principles. Disambiguation is commonly neglected when texts are produced in haste, e.g., newspapers rushing to press (IV.2.68). Extremely disordered speech may reduce core-adjunct patterns toward lists, such as the "telegraph style" of some aphasics (Luria, 1979: 285).[27] Look-ahead seems to degrade before look-back (IV.2.47, 50f). Heaviness shifts from later to earlier sentence positions if the producer is strongly involved (IV.2.64). In any case, the modality of writing is better equipped to control, reconsider, and revise linear patterns than speech is. Many possible problems are ruled out by *punctuation:* a system for marking linear relations and thereby guiding processing. In section IV.3, I shall try to show how punctuation fulfills that function.

3. LINEARITY AND THE MOTIVES FOR PUNCTUATING

3.1 "Although punctuation is often set off in the *mechanics* section of handbooks and English courses, it should not be isolated in this way from the dynamics of composition, for the process whereby writers *mark* sentences is related to the process whereby they *make* them" (Shaughnessy, 1977: 28). Punctuating can signal text structures as well as the writer's intentions about how such structures should be organized and utilized: subsidiary instructions passed along to the audience with the main instructions about processing meaning and purpose (cf. I.4.6, III.2.26). Punctuating not only reacts to the text, but also intentionally shapes it. Punctuation is a textual sub-system that meets various communicative needs of linearity: marking off units and sub-units, pausing, indicating priorities, pointing backwards or forwards, excluding alternatives, and so on. The use of a particular punctuation mark influences other selections in its vicinity. The whole paragraph, rather than by the single sentence, should be considered (Christensen, 1965: 155).

3.2 The huge Survey of English Usage concluded that punctuation varies considerably:

> We are dealing with tendencies which, while clear enough, are by no means rules [. . .] the closer the relation between the parts of a sentence, the less need there is for punctuation (Quirk et al., 1972: 1060f).

There is no firm authority to settle disputes in professional writing; the illusion of uniformity in punctuation arises mainly from coercion by pub-

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[27] Luria's (1979: 285) illustration was: 'Oh / the jackdaw / the doves / good food / the white color / deception / a cry'. On an interesting use of telegram style for a special goal, see V.2.32.

lishers, not from agreement in manuscripts (Quirk et al., 1972: 1055f; cf. VI.1.18). English instructors have two choices. First, they can spend eternity changing student punctuation to fit their own inclinations—a tactic that impedes cumulative learning from class to class, and promotes anxieties (I.2.12f). Greenbaum and Taylor (1981: 173) found that English teachers devote more time to "comma errors" than to any other matter except "pronoun reference." Second, they can uncover and present the punctuating *motives* observed by skilled writers, and leave the students to decide what options are best. An "error" is then a failure to respect motives, not a departure from unexplained personal biases. Unskilled writers are not aware of the motives, and sometimes invent arcane punctuation systems leading to baffling errors (Shaughnessy, 1977: 40; cf. IV.3.45). Red marks intimidate such learners, but do not teach motives (cf. Butler, 1980).

3.3 If the seven linear principles presented in IV.2 operate in discourse, they should also provide the motives for punctuating. The CORE-AND-ADJUNCT principle would apply in several ways. The *period* demarcates a phrase-level sequence with at least one independent subject-verb core. Between two periods, a writer can juxtapose two independent subject + verb cores with a *semicolon* between them. Normally, the content of the two cores is closely related, e.g., the second elaborates or backs up the first:

(203) You'll have good luck there; you're the type.[28]

If a phrasal adjunct is linked beyond a period, the outcome is the well-known *sentence fragment:*

(204) This was the second time the U.S. was humbled by a country. The first being in Vietnam.

The adjunct-fragment hovers on the border of the sentence containing its core, typically the sentence just before it (cf. V.2.33ff).

3.4 More frequently, two independent subject + verb core units in one sentence are linked with a *junctive* (IV.2.52f). Their boundary will be marked with a *comma* unless they are quite short and obviously related. The need for a comma is less acute in (205) than in (205a):

(205) The night was stormy and the wind was strong.

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[28] The samples in this section IV.3 are from student papers except for the following: (211-212, 249) from Carroll (1960: 117, 90); (214-221, 229-232, 238, 239, 241, 256-259, 294, 295) from Lem (1981: 10ff, 14, 34, 46, 68, 49, 35, 30, 50, 56, 55, 31, 88, 10, 87); (228) from Wicker (1977: 58); (234) from Ramirez (1977: 127); (236, 260, 263) from Wolfe (1969b: 19, 17, 27); (240, 242, 245) from Wolfe (1977: 98, 145, 99); (244, 250, 296) from Thompson (1971: 21, 153, 51); (243, 264, 265, 282-288) from Quirk et al. (1972: 243, 1069, 1073, 752ff, 778, 553, 621f); (246, 247, 267) from the *DOS Manual* (p. 2, 13); (251) from Mead & Metraux (1977: 153); (252) from Mannes (1977: 244); (253) from Levin (Ed.) (1977: 203); (255) from Maynard (1978: 377); (261) from *Love's Labour's Lost* (III, i, 181); (269) from Gambino (1974: 26ff); (270) from Shattuck (1980: 89); (273) from Nilsen (1978: 137); and (289) from Dickens (1906: 189).

(205a) The night sky was filled with restless clouds, and the wind rebuked the bleak landscape.

Since contrasts increase heaviness (cf. IV.3.27), cores joined with 'but' are prone to have commas:

(205b) The night was cloudy, but the moonlight was still clear.

Conversely, commas are not usually interposed inside a core, unless one of the other principles applies. Thus, a comma need not be used if a single subject agrees with two verbs (206), or a single verb agrees with two subjects (207):

(206) The valve has only two flaps and is called the bicuspid.
(207) Prescribing medication and recommending dietary programs are also part of his job.

The motive for a comma is stronger if a contrast is made:

(206a) The valve has only two flaps, but is shaped like a triangle.

or if the two elements are particularly lengthy:

(207a) Prescribing medication for resident patients with acute heart ailments, and recommending diets for outpatients with chronic heart trouble, are also part of his job.

One student habitually inserted commas even into simple cores:

(208) The advisor, was a very likeable person.

Recordings revealed that his speech made a pause at such points (cf. IV.3.16).

3.5 If one subject + predicate core is an element in a larger core, the tendency not to break up the larger core usually overrules the tendency to mark off the smaller. Such is the case if a dependent-clause core figures as a subject (209) or as a direct object (210):

(209) That they arrived at all surprised us.
(210) I know why he was so worried.

Usage is less certain for clauses made into predicate nominatives. Even the meticulous Lewis Carroll (1960: 117) was inconsistent:

(211) The King's argument was, that anything that had a head could be beheaded.
(212) The Queen's argument was that, if something wasn't done about it in less than no time, she'd have everybody executed, all round.

The need for a comma before 'that' is plainly weak; it was apparently overridden by the need to set off the 'if'-clause depending on the 'that'-clause in (212). Indirect quotes could be influenced by the analogy to direct quotations, which are ushered in by commas (cf. V.2.41). But the indirect ones are less likely to have a pause at this point. Hence, vacillating usage may reflect an uncertainty in linear principles.

3.6 The tendencies illustrated so far can be summed up as a punctuation strategy:

> *Cores are more likely to be separated from each other by commas; and less likely to have commas inside them.*

The "core" is at least subject + verb, along with the direct object or predicate complement, if present. This strategy is a guideline, not a compulsion, the more so when the core-and-adjunct principle interacts with other linear principles. Heaviness results from contrasts (206a); pausing is helpful for lengthiness (207a); and so on. Such interactions also influence the placement of punctuation between a core and an adjunct. The core-and-adjunct principle favors this strategy:

> *Adjuncts are likely to be set off from cores unless closely integrated with the latter.*

There are (a) OPENING ADJUNCTS before the core; (b) INSERTED ADJUNCTS in between core elements; and (c) FINAL ADJUNCTS after the core. English clauses have a higher ratio of opening and final adjuncts than of inserted ones. The subject + verb core appears to resist the insertion of both adjuncts and punctuation (IV.3.5). Also, an opening adjunct tends to depend on the subject of the clause, and a final one on the predicate; inserted ones go either way and might therefore be avoided for motives of clarity.

3.7 OPENING ADJUNCTS can dispense with a comma if they are short and well-integrated:

(213) Finally the rocket took off.

A comma after 'finally' would increase heaviness, as if the writer were indignant or impatient about the delayed take-off. Opening adjuncts centered around present or past participles are normally followed by a comma, as if the verbal form acts as a quasi-core:

(214) After sealing off the cabin, he climbed a small flight of steps padded with a rough but pliant material, before reaching the pilot's seat.
(215) Once seated in a semisupine position, the pilot had, to the right and left of him, two reactor and altitude control levers, three emergency controls [etc.]

On the other hand, inverted predicates need no commas, because the participle belongs to either a present continuous (= present progressive), a passive, or a predicate complement, and thus to the core:

(216) Standing just above the floor was a sprawling hub
(217) Located just under the pilot's feet were the braking pedals

A participle used as the subject of the clause also belongs to the core and needs no comma:

(218) Making the cadets give an oral recitation of the mission was a deliberate hoax.

3.8 INSERTED ADJUNCTS usually have commas, e.g., for 'to the right and left of him' in (215). A contrastive (219) or a lengthy (220) insertion favors commas (cf. IV.3.4, 6):

(219) The blister, though transparent, was not made of glass.
(220) The pilot, by sitting in his "dentist's chair," was able to monitor the entire instrument panel.

On the other hand, a modifier appended to the head noun of the subject is so close to the core element that it may dispense with commas:

(221) The voice booming in his ears roused him from his predicament.

The lack of comma creates a strong linkage between the modifier and the preceding expression (cf. IV.3.9), as in identifying vs. descriptive adjuncts (IV.3.31, 37).

3.9 The punctuation of FINAL ADJUNCTS must respect the requirements of *look-back:* a comma signals a look-back over a greater distance than if the comma is omitted (IV.3.31). In sample (214), the 'steps' were 'padded' (hence no comma in between), while the action of 'climbing' was 'before' the 'reaching' (hence a comma). The opposite punctuation could suggest that 'he' was 'padded,' and that the 'padding' was present only 'before' the 'reaching'. By the same token, the 'averaging' goes with 'players' in (222), and with 'coach' in (222a):

(222) Our coach gave an award to outstanding players averaging over four touchdowns.
(222a) Our coach gave an award to outstanding players, averaging four a season.

To maintain such distinctions is to be considerate of the reader.

3.10 The PAUSE PRINCIPLE is the most obvious control on punctuation in general. Perhaps a pause during the act of writing, such as those found in my film data (IV.2.23-33), routinely triggers a query to the production system whether punctuation is needed: a positive answer is returned

if the writer's pause is judged a strategic point for a reader's pause as well—the correlate of the "rhetorical pause" in speech (IV.2.18, 22). Otherwise, the answer is negative, e.g., if the writer was pausing only for a momentary word-search (IV.2.26-28). Since reading aloud tends to pause for the audience's benefit, the general strategy could be:

> *Mark with punctuation the points where, when reading aloud, you would pause.*

The most emphatic pause would be for a period at the end of a paragraph. After that, the progression toward steadily less emphatic pauses would be: the period at the end of a sentence, the semicolon, the dash, the spaced periods, and the comma. The hyphen suggests a minimal pause inside a word, e.g., 'pro-verb' vs. 'proverb'.

3.11 Pauses made right before selecting or changing a punctuation mark (IV.2.31) demonstrate the writer gathering feedback about the preceding sequence, or deciding what transition is needed to the following sequence (cf. Matsuhashi, 1982: 278). Consider:[29]

> (223) Turn left /, <stop at the stop sign> {follow the road}, and turn // right into the parking lot / of the hospital <,> /.
> (224) I live in Jennings Hall, which is across the street from the tennis courts // <,> and between // the Police Station and Beaty Towers.
> (225) This // goes on for <two> // three weeks or so <.> //, and the total grade counts // 10%.
> (226) I then had to jack up the engine <.> //, so I had to remove the motor mounts.

A comma may be rejected in favor of a period (223) or an unmarked continuation (224). A period may, after a reflective pause, be discarded for a comma (225, 226). In speech, these transitions would be undifferentiated, and pauses should indicate other kinds of look-back and look-ahead, or reflect the causes enumerated in IV.2.19.

3.12 The comparatively long pause signalled by a period would allow readers to "wrap up" the processing of the sentence (cf. Just & Carpenter, 1980: 345ff), i.e., bring it to a threshold of termination (III.1.25). Naturally, the processing of heavy materials would be easiest if the sentences are fairly short; less heavy ones are suited for longer, more complex sentences (cf. II.3.41; IV.2.60; IV.3.17, 20). A writer can take advantage of these tendencies to make ordinary material *seem* important by using short sentences. This tactic is typical of Walker Gibson's (1966) "tough talkers," writers like

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[29] On the bracketing conventions, see IV.2.25.

Ernest Hemingway (cf. II.3.22, 41; IV.2.60). Again, we see punctuation both responding to and influencing the processing of the text. For the same motive, a semicolon signals a moderate pause prior to reasonably familiar or predictable materials, rather than surprising or unrelated ones (IV.3.3). This use also guides chunking:

> (227) The meeting seemed to last a long time; I was feeling more and more uncomfortable. The management had a great many complaints.
> (227a) The meeting seemed to last a long time. I was feeling more and more uncomfortable; the management had a great many complaints.

In (227), the 'discomfort' was due to the 'long time', and in (227a), to the 'many complaints'. A use of periods after all three clauses would be indeterminate.

3.13 As noted in IV.3.4, the junctive is a more common and specific means for linking clauses than a semicolon. The semicolon only signals relatedness; the junctive states the nature of the relation (cause, time, etc.) (IV.2.52). However, no writer links all possible clauses with junctives, because the pause principle discourages unmanageably long sentences. Relations may be shown by adverbials, e.g., 'then', 'next', 'soon', 'therefore,' 'hence', etc., which can appear in separate sentences.[30] Or, junctives can alternate inside a long sentence with a semicolon to provide a brief pause without breaking up the statement:

> (228) The Turkey had played with more minor leagues than probably exist today and was at the end of the line in Class D; his future was ten seasons behind him and he was old enough to be the father of most of the post-high-school kids he played with.

(228) contains a total of five clauses, the opening one interrupted between its first verb ('had played') and its second ('was'). The semicolon marks a transition from the person's past record over to his equally glum future, and saves another junctive in addition to 'than' and two 'and's. The movement of the passage is suspended to integrate the opening materials, and the semicolon tells us that the sequel will depict more of the 'Turkey's' career. Punctuation and junction thereby guide chunking of content without a strain on processing.

3.14 The *dash* sends a distinctive signal. The chief strategy is:

> *Use a dash to make a relevant insertion or addition without affecting the surrounding format.*

Its pause value is probably *less* than the period, since a dash doesn't end the sentence, but *more* than the comma, since a dash is used to elicit suspense with a tiny delay (where a comma would be less effective):

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[30] Student writers may confuse adverbials with junctives and produce "comma splices" (V.2.40). A sameness of function obscures a difference in grammatical categories.

(229) Pirx could only guess whether his flight curve ran three kilometers above the boulders—or below.

The dash can break a sentence structure with free insertions, e.g., with a listing of impressions or events in the text-world:

(230) Scintillating shapes—faceless, spherical, gaping, dispersing every time he tried to confront them—advanced, bore down upon him, swelled his insides . . . .

Unlike the dash, *spaced periods* (usually three, less often two or four) suggest a pause during which a statement or a train of thought is allowed to fade away gradually, as at the end of (230) (cf. IV.2.60; IV.3.25). Thus, dashes and spaced periods influence heaviness through the different quality of the pauses they indicate.

3.15 By permitting insertion or addition of fragmentary patterns, the dash relaxes the core-and-adjunct principle. The insertion or addition is an adjunct of the sentence from a pragmatic more than syntactic standpoint. The writer makes an aside to the audience, a commentary on the main statement, whether or not the syntactic formats are consistent or complete. If the interrupted syntactic format seems unfinished, a second dash is expected to usher in the completion. In (231), a dependent clause is interrupted between subject and verb ('plain' + 'could') with an independent one that qualifies the attribute 'boulder-cluttered':

(231) The terrain to the east was relatively flat, if an endless boulder-cluttered plain—some stones were the size of apartment houses—could be called flat.

This format enables a double nesting in a hierarchy without the syntactic complexity of a double dependency such as:

(231a) The terrain to the east was relatively flat, if an endless plain cluttered with boulders, some of which were the size of apartment houses, could be called flat.

Thus, the dashes provide an option disallowed by syntax alone: to subordinate an independent clause to a dependent one. Also, a dependent clause can be inserted between the core elements of an independent clause:

(232) He stared into the mirror—not because he expected to see his hair streaked with gray, but on a whim—took one look at his broad-boned pie face, wheeled around, and marched off.

The dashes clearly mark the boundaries of the inserted clause, whereas commas would be ambiguous:

(232a) He stared into the mirror, not because he expected to see his hair streaked with gray, but on a whim, took one look at his broad-boned pie face, wheeled around, and marched off.

The verbs 'took', 'wheeled', and 'marched' can't be mistakenly assigned to the dependent clause if dashes are used.

3.16 The *comma* usually coincides with a pause juncture, but not vice-versa. Not every pause in speech falls where a comma should go: many other motives for pausing have been found (IV.2.19). Some student writers insert an unmotivated comma between a subject and its verb where they would stop to breathe if they were speaking, or to plan the sequel (cf. IV.3.4):

(233) A young person getting out of high school today, should go on to college.

The "rhetorical" pauses inserted when reading aloud to an audience (IV.2.18, 22; IV.3.10) are more reliable. I tell students to check for commas by reading the sentence aloud, or, in highly doubtful cases, having several people do so; the more readers agree on a pause, the stronger the motive for a comma (or other punctuation). Even skilled writers insert commas inside a grammatically close-knit structure in order to break up sequences that might seem too long. In (234), commas fall before a preposition ('in') starting a closely integrated adjunct, and before a junctive ('or') in a list of two, a structure not normally broken apart (IV.3.37):

(234) It eludes their reach, in their own backyards, and the people, unable and unwilling to see the future, or even touch the present, perpetuate the past.

The commas allow small pauses in a long sentence (26 words) and keep a leisurely pace suited to the content. In contrast, a hurried tempo for depicting a rapid event sequence can be aided by omitting commas:

(235) A good VW motor exchanger can go up to a parked Volkswagen, and a few rachets of the old wrench here and there and it's up and out and he has a new motor.

Without such motives, sequences as long as (235) would normally be subdivided.

3.17 The HEAVINESS principle yields this strategy:

The heavier a segment, the more likely it is to be bounded by punctuation.

Due to its load on processing resources, a heavy segment of text would normally be chunked by itself, rather than as part of a larger chunk. This tactic would allow lower *complexity* by provisionally processing a heavy chunk outside any further part-whole relations (cf. III.3.2.7). Illustrations include expressing heavier materials in short sentences (IV.3.12) or in short paragraphs (IV.2.60; VI.2.15); putting semicolons between related chunks (IV.3.13); and placing dashes to promote suspense (IV.3.14) or to limit syntactic complexity (IV.3.15). The heaviness principle also decides whether adjuncts are set off by commas (IV.3.7). On the following samples:

(236) In recent years many people have grown suspicious.
(237) After many hours of study we came up with an answer.

less than half my test writers found 'in recent years' heavy enough to need a comma, whereas they all put one after 'study'. Length was probably a motive as well.

3.18 The function of the *exclamation point* is to increase heaviness and assert the certainty of a statement. This mark is distinctive enough to act as the traditional indicator of *exclamatory* sentences: a type defined more by heaviness than by grammatical structure alone (cf. III.2.28). An exclamation can have the same phrase format as a *declarative* sentence (238), an *interrogative* sentence (239), or a sentence *fragment* (240):

(238) They might as well send us up in a coffin!
(239) How could he have been so stupid!
(240) Rank moderne! Teenage Paris! Harvey's Drive-in!

Specific formats can identify exclamations and place heaviness on particular phrase elements: 'what' for a noun phrase (241); 'how' for a verb phrase or modifier (242); and subject-verb inversion for the whole clause (243):

(241) What a sight he made, barrel-assing out of his room at midnight, bellowing like a water-buffalo with a tiger on his tail!
(242) How they sniggered!
(243) Wasn't the concert terrific!

Exclamations are most frequent in narratives, where they reproduce or suggest reported speech, e.g.:

(244) "God didn't do that!" I shouted.

By analogy, the narrator seems to be reporting thoughts in exclamations like (238) and (239); first and third person work equally well because the passages were not uttered. In expository texts, exclamations are rare, since the text producer is typically less focused on reacting to events in a story than expostulating facts whose certainty is assumed without extra signals.

3.19 *Imperative* sentences have exclamation points if heaviness is intended:

(245) Hey listen! Guess what my old man just called my mother!

Being structurally marked by the absence of a subject for the verb, imperatives often dispense with this punctuation, especially in expository texts, e.g., an instruction manual:

(246) Don't jam the cable between the connector and the controller card.

If the imperative calls for heaviness, block capitals and salient spacing of print may be deployed:

(247) Before connecting
ANYTHING
on the Disk II or Apple II
TURN OFF THE POWER.
This is a must.

Italic or bold type may also serve. In didactic or scientific texts, these print devices can highlight important concepts. The writer thereby signals that the concepts should be control centers for comprehension (cf. Beaugrande, 1982b).

3.20 The converse of heaviness could be termed NON-HEAVINESS: conditions which put a light load on processing. In speech, a rapid rate and an even level of voice are common indicators, e.g., among officials who perform a ceremony with high frequency and familiarity (III.3.2.8). In writing, non-heavy materials typically appear in long sentences or in subordinate clauses (cf.II.3.41; IV.3.12, 17), for example, this elaborate cliché about a sorority (one kind of "English," cf. III.2.19f):

(248) Its aim is to foster an atmosphere in which women will develop a deeper love and consideration for mankind, a more profound understanding of the purpose of life, and a basic wisdom upon which to build their lives.

Non-heaviness can also be signalled by punctuation: question marks, parentheses, and spaced periods. Apostrophes show where word-parts are non-essential enough to be omitted ('didn't' for 'did not', 'comin" for 'coming', ''cause' for 'because', etc.).[31]

3.21 The *question mark,* the converse of the exclamation point, reduces the writer's show of emphasis to a minimum and signals uncertainty. In speech, the audience is normally expected to react and help resolve the uncertainty. In writing, where such reactions are less immediate, questions, like exclamations (IV.3.18), are most often used for reporting speech:

(249) "By-the-bye, what became of the baby?" said the Cat.

The uncertainty is assigned to the reported speaker, not to the writer (who had, in the case of (249), already told us the baby changed into a pig). Or, again like exclamations, the writer can use a question to report thoughts:

(250) Would they report that terrible quick encounter to the police?

The writer encourages readers to ask the same question and thus to relive the narrative.

3.22 The functions of questions illustrate the special situationality of writing. Except in settings where the readers are genuinely expected to reply, the question loses the standard function it has in speech (or reported speech). Instead, the written question instructs readers to adopt a perspective of uncertainty. In the so-called "rhetorical" question, the writer intends to resolve the uncertainty, e.g.:

(251) Surely people in every country value friendship?

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[31] The apostrophe for the possessive is unique in English grammar and spelling, and hence a source of endless confusion. Many people either leave it out, or else use it in noun plurals as well.

Mead and Metraux's question invites the audience to question a commonplace assumption before the discussion proceeds—a common tactic in the personal essay (VI.2.7f). The same content in a declarative sentence would seem less *interesting*. Doubting a well-known fact is less probable than asserting it; a problem is raised where it would not be expected (cf. III.2.24). Or, a writer may place a question at the end of the text so that the audience will continue to ponder it. In (252), the writer's question points up the irrationality (unresolved contradiction, III.3.15) of public policy and is therefore not answerable:

(252) How can the sanctity-of-life argument prevail in a society that condones death in war of young men who want to live, but will not permit the old and hopelessly ill, craving release, to die?

In didactic texts, whose purpose is to introduce a knowledge domain to a learner audience (III.1.29), the writer already knows the answer to a question. The audience is supposed to reply to themselves or to a teacher, not to the writer. The question encourages the audience to address issues that would otherwise not be considered. A English textbook selection followed by:

(253) Do you find shifts in tone?

confronts the students with issues that, in real-life communication, might be marginal or non-existent. The students may not really 'find shifts in tone', but are alerted by the question—and long years of schooling—to discover some anyway. A 'no' answer is not going to be accepted just because it happens to be truthful.

3.23 These similarities between questions and exclamations—indicating heaviness and certainty, reporting speech or thoughts (IV.3.18, 21)—shed doubt on the traditional classification with four equal and opposed sentence types. Even the surface signals for the two formats overlap: the initiating words 'what' (241) and 'how' (242), and subject-verb inversion (243). In the negative, both formats anticipate that the audience agrees with the corresponding positive statement; (254) and (254a) would both be used if the speaker thought it really was 'terrific':[32]

(254) Wasn't the concert terrific!
(254a) Wasn't the concert terrific?

From a processing standpoint, questions and exclamations belong together as complementary ends of a gradation of heaviness and certainty. When the value of a statement passes a threshold at the weaker end, a question is

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[32] In the question, uncertainty is converted to its opposite by the negation (cf. IV.2.55). In the exclamation, this cancellation is not necessary, so that the negative (254) and the emphatic positive ('Was the concert ever terrific!') are equally certain. Intonation is also decisive: a ironic/sarcastic tone can easily convert the certainty to its opposite.

selected; if the same happens at the stronger end, an exclamation results; anywhere in between, a declarative sentence is chosen. In line with the notion of the trade-off (I.4.15), an excess of certainty might make an audience mistrustful, as in Mark Antony's speech in *Julius Caesar* (III, ii, 79-235) (destroying 'Brutus's honourable' nature by asserting it). Conversely, an elaborate show of uncertainty might wake suspicions that the text producer really knows the fact to be true, as in Iago's torments of his master in *Othello* (III, iii, 92-175) (suggesting the offense of Cassio and Desdemona by ostentatiously doubting it).

3.24 *Parentheses* also indicate non-heaviness. Like dashes, they can be used to insert any phrase format anywhere into a sequence, but with a stronger suggestion that the insertion is non-heavy (incidental, unimportant, outside the focus, etc.), e.g.:

> (255) I remember Castro. (We called him Castor Oil and were awed by his beard—beards were rare in those days.) We might not have worried so much (what would the Communists want with our small New Hampshire town?) except that we lived 10 miles from an air base.

Unlike a dash, the right-hand parenthesis can stand next to other terminal punctuation (Quirk et al., 1972: 1072). Hence, a statement, a question, a command, or even an exclamation can be a commentary upon the main message and occur in parentheses—hierarchically subordinate to the patterns outside the parentheses. In (255), parentheses enclose a question, as well as a sequence with its own insertion subordinated by a dash. Dashes and parentheses can thus be alternated in order to to make still more elaborate hierarchies of subordination without raising the complexity of surface syntax (cf. IV.3.15).

3.25 *Spaced periods* indicate non-heaviness in two ways. First, they indicate a fade-out into uncertainty, whether the stretch of text is resumed (256) or not (257) (cf. IV.2.60; IV.3.14):

> (256) Certain aspects still remain under a cloud of . . . let's call it ambiguity.
> (257) "But during your comprehensive examination I shall see to it that Professor Laab . . . "He left the rest to Pirx's imagination.

Second, they signal that the writer has removed from a quotation some materials not important in the current context, as I did in (269) in IV.3.29. I always use square brackets to distinguish this second use from the first, though many editors and publishers do not.

3.26 The LOOK-AHEAD PRINCIPLE yields this strategy:

> *Use punctuation to mark and describe the transition to the next stretch of text.*

A hyphen marks the boundary between two word-parts (IV.3.10), and a line end inside a word. A dash or a left parenthesis looks ahead to an insertion, and a second dash or a right parenthesis signals a return to the interrupted

sequence (IV.3.15, 24). The colon promises conceptually related materials more strongly than do the semicolon and the comma, whereas the period is neutral about what comes next. We could replace the colon with a semicolon in (258), or do the opposite in (259):

(258) There was no one to whom he could call in distress: he was alone.
(259) Langner was not oppressed by his surroundings, by this desiccating world; he made it serve him.

The colon says more plainly than the semicolon that the next passage will elaborate, qualify, or justify the one just ended. The "semi-colon" serves double duty, being also a pause signal (IV.3.13)—half a colon, and half a comma, as its shape reveals.

3.27 As a possible marker of heaviness (IV.3.17), the comma can look ahead to unpredictable or contrastive material (IV.3.4). For example, closely unified modifiers in a list sequence (260) are less likely to be separated by commas than diffuse (261) or contrastive (262) ones:

(260) a boy with great lank perfect surfer's hair
(261) this wimpled, whining, purblind, wayward boy
(262) a small, but effective charge of dynamite

Some writers deliberately omit commas between modifiers in order to create the impression of a complex unit, as if the linearity of the sequence were being compressed toward the simultaneity of perception (cf. IV.1.10):

(263) He has a rain-barrel old-apple-tree Tom-Sawyer little-boy roughneck look about him.

Hyphenation, being a mark for combining two or more words into one, intensifies the effect. Creativity finds new possibilities by going contrary to convention (cf. I.3.7; III.2.15; III.3.10; VI.1.9).

3.28 Look-ahead can interact with the core-and-adjunct principle. A writer may elect to sort out cores and adjuncts with commas and develop an elaborated system (cf. IV.3.1):

> Punctuation marks can enforce proliferations, so that once a little punctuation is admitted, much more is necessary in order to preserve a consistent and logical ordering of hierarchical relationships. (Quirk et al., 1972: 1070)

The system in turn supports disambiguation (cf. IV.3.34). One illustration is this strategy:

> *Use a comma to mark where the look-ahead of a construction (typically an adjunct) ends.*

According to Quirk et al. (1972: 1069f), the lack of a comma before 'and' in (264) makes 'slowly' look ahead to both verbs (suggesting an oddly 'slow smile'); the comma before 'and' terminates the stretch of the modifier (a more sensible statement):

(264) Slowly, he strode over and she smiled gaily at him.
(264a) Slowly, he strode over, and she smiled gaily at him.

A related strategy is:

Use a comma to mark where one core stops and another starts.

'Mary' is correctly recognized as a second object of 'at' in (265); the comma in (265a) looks ahead to a new core-unit (after Quirk et al., 1972: 1073):

(265) He smiled at Joan and Mary.
(265a) He smiled at Joan, and Mary, seeing this, was cross.

To the extent that phrase structures support conceptual processing (III.2.28), it pays to clarify them with commas. But a trade-off arises if too many commas slow down or fragment the reading process.

3.29 Look-ahead interacts with heaviness in the uses of *quotation marks*. The first quote looks ahead to material regarding which the writer does not feel strongly involved or responsible, and the second quote restores the previous state.[33] Reported speech is the most common use, e.g. (243) and (256). Others uses include materials the writer considers dialectal or slangy (266, 269), specialized (267), dubious (268), or deceitful (269):

(266) We smile at each other and tell Gayle and Sharon that we are "checking out" and going dancing, as the M.D.A. is "hitting" us.
(267) The INIT command can be used to initialize a "slave" diskette.
(268) Advertizing deals in the production of "engineered messages."
(269) Illegal activity is spoken of as "games". Criminal conspiracy becomes a "game plan." Conspirators are "team players." [. . .] What ordinary crooks call "casing the joint" before a burglary is called by the Watergate bunch "a vulnerability and feasibility study."

Scientific or technical writers can thus show which terms they reject or accept:

(270) Everything was done according to a plan based on the "moral treatment" [. . .] we would probably say psychotherapy.

This 'moral treatment' of 18th century seems quaint alongside the 'psychotherapy' of the 20th, just as the latter will (I hope) seem quaint alongside the refined methods of future centuries.

3.30 The LOOK-BACK PRINCIPLE is the natural converse of look-ahead (IV.2.47). The main strategy is (cf. IV.3.26):

Use punctuation to terminate and characterize the preceding stretch.

Exclamation points and question marks signal the heaviness of that stretch (IV.3.18-23). The period is neutral. The semicolon and comma indicate that

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[33] Quotes in quotes alternate between single and double marks, but soon become confusing, like multiple negation (IV.2.55). The point of orientation is easily lost after two embeddings.

the foregoing needs further development. The pauses before placing or changing punctuation (IV.2.31; IV.3.11) show the writer looking back on the preceding stretch to see how it might qualify on the conceptual and phrasing levels as a discourse unit. If the unit is approved, a mark is selected that respects distinctions of heaviness, core-adjunct, and disambiguation, as well as the writer's general tendency toward or against proliferating punctuation (cf. IV.3.28).

3.31 The *comma* has a similar role in look-back to that illustrated for look-ahead in (264) vs. (264a). The strategy is:

> *Use a comma to make a construction (typically an adjunct) look further back than if no comma were inserted.*

The best-known case is the distinction between *identifying* relatives (that single out and identify the referent of the preceding expression), e.g. (271), vs. *descriptive* relatives (that only elaborate), e.g. (272):

(271) A man who never tells a lie shouldn't go into politics.
(272) George Washington, who never told a lie, got be President anyway.

The relative clause is the only way to tell which 'man' is meant in (271); the clause in (272) merely adds a detail about a readily identifiable person. Conservative grammarians, apparently thinking the comma an inadequate marker, insist we use 'that' (with no comma) for all identifying relatives, and 'which' (with comma) for all descriptive ones.[34] This "rule" is both inaccurate and restrictive (cf. I.2.16.2, 5). First, many competent writers freely use 'which' in identifying clauses, e.g., in this passage by an authority on language:

(273) In nearly all cases it is the masculine word which is the base with a feminine suffix being added for the alternate version.

Second, 'that' will not always work for 'which', e.g. in:

(274) The black-out was the major incident after which more strigent tests were run.

Third, the comma regulates look-back for many constructions not involving either 'which' or 'that', for example, identifying clauses introduced by 'who', 'where', 'when', and 'why' (Quirk et al., 1972: 863f); there is no rational motive to discriminate against 'which'. Commas suffice to distinguish descriptive appositives from identifying ones (IV.3.37). The look-back of adjuncts to cores is similarly controlled (cf. IV.3.9), as in:

(275) She sat down and laughed uncontrollably like she used to as a child.

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[34] In my experience, copy-editors at publishing houses are more old-fashioned on this point than composition authorities (cf. IV.3.2; VI.1.18).

Without the comma, the adjunct attaches to the proximate verb (the 'laughing' was 'like a child'). With it, the adjunct would link to both verbs ('sitting down' and the 'laughing' were 'like a child'). In these samples:

(276) "Sit down right here," said the policeman with an ugly scar.
(277) "Sit down right here," said the policeman, with an ominous gesture.

the lack of comma before 'with' in (276) makes the 'scar' identify this particular 'policeman'; the comma in (277) links the 'gesture' with the 'saying' action, not with the 'policeman'. As we can see, there are no grounds for a special "rule" to obviate the role of the comma before 'which'.

3.32 The use of commas in look-back and look-ahead exemplifies the marking of linear sequences to aid visual scanning. With no comma, the processor prefers to scan the near vicinity for the core to which an adjunct should be attached. With a comma, the scan jumps further away, rather than simply moving back or forward over every word in the sequence (cf. IV.2.45). Scanning should naturally focus on a major core element such as the subject in (276) or the main verbs in (275) and (277), the more so as the distance increases. These preferences help to arrange processing hypotheses in a plausible order (cf. I.4.6; II.2.21; III.2.26; III.3.14; IV.3.2) and thereby support efficiency and effectivity. This function again argues that punctuation cannot run according to strict rules of the "which/that" type. Realistic "rules" are general strategies that work well most of the time to constrain and assist communication.

3.33 The DISAMBIGUATION PRINCIPLE contributes this strategy:

Punctuate so as to reduce or preclude multiple readings.

Aside from pausing, the major function of all punctuation is to signal a preference for one particular way to organize a passage: commas to indicate degrees of integration between an adjunct and its core (213, 221); semicolons to indicate content associations (227 vs. 227a); dashes or parentheses to insert clauses subordinated in function, but not in form (231, 255); exclamation points, question marks, or periods, to make the same phrase formats heavy, non-heavy, or neutral, respectively (IV.3.18); commas to guide look-ahead or look-back, e.g., to single out the core for an adjunct (214, 222, 222a, 275-277), or to distinguish identifying adjuncts from descriptive ones, (271, 272, 289, 290); quotation marks to indicate attitudes toward expressions (269, 270); and so on.

3.34 Operationally, the important question is how ambiguities are registered and processed (IV.2.65ff). Vast numbers of them can be discovered by analyzing words and phrases out of context. Writers and readers consciously experience only a small portion. Wrong punctuation can severely distort the intended statement:

(278) Excess of vitamins harmful, expensive specialist warns *(London Free Press,* June 22, 1980).

One type of ambiguity used in many experiments is "garden path sentences" leading readers down a path that turns out to be a blind alley (cf. Clark & Clark, 1977: 80ff). Punctuation can be a resource for precluding such confusion. To test students' awareness of this issue, I distributed examples I considered more or less ambiguous. 25% of the college students who saw:

(279) Whether or not we win the game will be more exciting than last week's was.

put the comma after 'game' rather than 'win', preferring the core-unit 'we win the game'—perhaps treating 'whether [. . .] game' as an indirect question in the main subject slot. Only 10% were misled by:

(280) When I tried to run the store detective tackled me.

into putting the comma after 'store'. Such placement, which leaves the rest of the sentence structure unaccounted for, indicates that unskilled writers process phrasing in a fuzzy way like their speech (cf. I.4.11.2; III.2.30; IV.3.45; V.2.18; V.3.2, 8, 10). Even when context resolves ambiguities, considerate writers use punctuation for additional control and clarity.

3.35 The same point can be made for improbable, but noticeable ambiguities (cf. III.3.40). Though the unintended reading is easy to discard, it may be interesting and salient enough to draw processing resources away from the intended one, as in (278). Less than half the students tested put a comma after 'dusting' to close off the dependent clause (cf. IV.3.28) and preclude 'brother' as an object of 'dusting':

(281) While my girlfriend was dusting her brother and his pals walked in.

Writers who neglect to foreclose incoherent, whimsical alternatives risk diverting readers' attention away from a serious purpose. Unless planned as a means to amuse (cf. IV.2.68), ambiguities work against the writer by suggesting a lack of care and consideration for others.

3.36 Very subtle disambiguation can be carried out with punctuation. For instance, a comma can distinguish different senses of the same word. The junctive 'as' is preceded by a comma when introducing the reason for some event or state (= 'because') (282), but by no comma in a comparison (= 'in the same way as') (283):

(282) Jane looked after the clothes, as she was the eldest.
(283) They hunted him as a tiger stalks his prey.

The "reason" sense is closer to mentioning someone's knowledge (284); the "comparison" sense is closer to relating a characteristic to an instance (285):

(284) The Smiths, as you know, are going to America.
(285) Unaccustomed as I am to public speaking, I beg your indulgence.

This distinction illustrates a complex interaction of punctuation with gram-

mar to disambiguate similar surface structures.[35]

3.37 The LISTING PRINCIPLE yields this strategy:

> *Use comparable punctuation to set off each element within a list of three or more.*

The preferred termination for recursion is three items (cf. IV.2.13, 70), presumably due to limits on the buffers of working memory. Commas do not normally separate the items of a "doubling" (a list of two) joined by 'and' or 'or' (e.g., two subjects with one verb, or one subject with two verbs, cf. IV.3.6), unless required by one of the other linear principles, such as heaviness (IV.3.4), pausing (IV.3.16), look-ahead (IV.3.28), or disambiguation (IV.3.35). The junctive already signals the doubling. *Appositives,* however, appear as doublings without junctives: two elements are equated via simple juxtaposition. Commas are therefore helpful in marking off the second element. Appositives are an intriguing case where an application of the core-and-adjunct principle is formatted as a list. They resemble relative clauses in that, conceptually and pragmatically, both structures are not placed in focus (cf. II.3.41; IV.2.63).[36] Syntactically, most appositives assign core-status to the first element and adjunct-status to the second. We could take out the second element in all these statements, but the first only in (286) (cf. Quirk et al., 1972: 621f):

(286) An unusual book, a volume on ethics, was given to him for his birthday.
(287) Norman Jones, at that time a student, wrote several best-sellers.
(288) The reason he gave, that he didn't notice the car till too late, is unsatisfactory.

Evidently, only one element in an appositive, preferentially the first, participates in the core structure of the clause; the other, usually the second, is processed like a relative clause adjunct. Appositives show the same distinction between identifying (289) vs. descriptive (290) that relative clauses do (IV.3.31) (Quirk et al., 1972: 622f):

(289) Mr. Carker the junior [. . .] returned with him to the room of Mr. Carker the manager.
(290) Casey Stengel, the great baseball manager, has his own room in the baseball hall of fame.

Dickens' *Dombey and Son* has to sort out two 'Mr. Carkers' with different jobs; there was only one Casey Stengel.

3.38 A list of three or more typically has a junctive before the last item.

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[35] 'As' has still other uses that are not distinguished by commas. In a pattern like 'He is an avid art collector, as were his predecessors', the comparison is marked instead with subject-verb inversion.

[36] Appositives resemble relative clauses more than they do predicates without linking verbs. The content of the appositive is asserted more with the milder force of the former than with the stronger force of the latter (cf. II.3.41).

It helps to include a comma before that junctive, and to omit the comma before any junctive inside a doubling (two-part list item) (cf. IV.3.37). This usage, though not accepted everywhere as a "rule," is a considerate distinction to make for the reader. Student writers sometimes create confusing lists (IV.2.71), partly because of comma placement. The 'salt and pepper' of (291) should be either two items (291a) or else a doubling (291b):

(291) My job included restocking napkins, straws, salt and pepper.
(291a) My job included restocking napkins, straws, salt, and pepper.
(291b) My job included restocking napkins, straws, and salt and pepper.

The tendency of some writers to omit the comma before the final list item may be related to the lack of a pause at that point in speech.

3.39 The listing principle operates best if the items are unified on the levels of both phrasing and conceptual development (IV.2.71). Non-parallel, diffuse lists seem confusing:

(292) After lots of journalism lessons, a couple of bad printing companies and bad issues, the paper got rolling.
(293) The counter help can cook potato cakes, turnovers and put the meat in the oven.

These student passages obscure the listing by placing commas unwisely, and by trying to make some words ('a couple of', 'cook') apply to only two of the three items. These words either should apply to all three (293a), or should be varied for each item (293b):

(293a) The counter help can cook potato cakes, turnovers, and meat.
(293b) The counter help can cook potato cakes, bake turnovers, and put the meat in the oven.

These revisions integrate the listing with the core-and-adjunct principle.

3.40 In another usage, the core-and-adjunct principle is overridden by listing. Normally, the unity of subject and verb is not broken by the insertion of a comma (IV.3.6). This tendency does not apply if there is a list of three or more subject heads or agreeing verbs:

(294) Pirx did an about-face, grabbed the red pennon, bumped against the railing but regained his balance in the nick of time, and marched down the narrow gangway like a zombie.

Note that 'bumped/regained' acts as a doubling, so that the contrastive junctive 'but' is not preceded by its usual comma (cf. IV.3.4)—listing has won out over heaviness as well as over core-and-adjunct.

3.41 Whole core-units can function as large-scale, complex list items. The semicolon can then mark off the items, so that commas can be used inside an item without danger of confusion. The semicolon takes the same role as the comma, but higher up in the hierarchy; the semicolon also signals a longer pause to process lengthier, heavier stretches of text. The elaborate

list of 'images' in (295) is chunked with semicolons according to time and location; several chunks have internal lists marked off with commas. The result is to impose order even on a disarray of reminiscences concerning 'his' arrival on the moon:

> (295) His mind was aswarm with images: Luna Base, with its chilly basements, narrow hotel corridors, elevators, and bouncing, basalt-swapping tourists; the flight to Tsiolkovsky station, their visit with the Russians, the silver grid of the radartelescope strung between ridge and black sky; Pnin's lecture; the second flight; and finally that eerie trek through a landscape of extremes, of icy cold and blinding heat, and those abysslike gorges staring into his visor.

3.42 Since the *colon* expressly looks ahead to materials that elaborate, qualify, and justify (IV.3.26), it makes a strategic choice to announce a list, e.g. in (295). The more complex the list, the greater the need to make it explicit (IV.2.72). Hence, the colon is less crucial to announce a listing tightly integrated into the phrasing, such as a series of direct objects for one verb (293a), or a series of verbs for one subject (294). At the other extreme, if a listing is not at all integrated, it can be placed in dashes (296) or in parentheses (297):

> (296) we walked fast along the big indoor midway—shooting galleries, tattoo parlors, money changers and cotton candy booths—then out through a bank of glass doors.
> (297) Actors need to be told how great (moving, memorable, incomparable) they are.

These marks show where the list ends better than a construction with a colon could do. Hence, the colon works best if the list items come at the end of a sentence as appositives depending on some integrated element, e.g., the object of a preposition ('images') in (295) or the direct object ('degrees') in (190) in IV.2.69.

3.43 I have now outlined how punctuation follows the same principles as linear processing in general. An account the latter would, if valid, be *antecedent* to an account of the former (cf. I.1.12). This approach helps to describe the systematic motivations for punctuating that guide and respond to the organization of the text. Such a system allows considerable freedom for individual contexts and writers. Punctuation may be sparse or frequent, depending on (a) preferences for complex or simple phrasing; (b) size and complexity of chunking; (c) difficulty of materials; (d) proximity to speech patterns; (e) concern for precluding ambiguities; and so forth. A writer may modify or overstep the system for special effect (IV.3.16, 27). The seeming disunity of punctuation in professional writing (IV.3.2) results nonetheless from a fairly unified range of motivations.

3.44 Accordingly, the teaching of punctuation to student writers should emphasize motivation and leave them the freedom to choose for themselves (IV.3.2f). The alternatives can only be to enforce the instructor's choice in

each case as the only "correct" one; or to invent "rules" tied to specific words, e.g., "Always put a comma before 'and', but never after it." Both alternatives impede proficiency, self-reliance, and cumulative learning. The teacher's dilemma is whether freedom of choice will seem believable to a biased public, or even to our own students (cf. I.2.18).

3.45 Unskilled writers are aware that punctuation is partly related to speech rhythms, but do not apply this insight very well. Their attempts to devise novel systems, though a sign of inherent intelligence, easily miscarry (cf. IV.3.2). Speech units themselves are often *fuzzy,* i.e., with provisional, indistinct boundaries (cf. III.2.30; V.3.8). Students may fit their punctuating to their speaking habits, for example, put a comma between subject and verb because they pause there (IV.3.4, 16). They may pick one or two marks to be used for every purpose (cf. Shaughnessy, 1977: 28), as this rural Florida ninth grade writer did when depicting a Christmas party ('pattery'):

> (298) My best day of christmas was Dec. 25 1973. win my bother got of the Army, in he borth a lot of christmas toney home to us. and we hard a big Dinner. and we patterys, hard and we patterys.

Other difficulties related to the fuzziness of units in speech are fragments, splices, and run-ons (V.2.33f, 38, 44). These "errors" are commonplace precisely because they involve subtle, complex distinctions among the types and constituents of English clauses. Processing itself has certain tendencies that encourage these constructions (V.2.30-45). Unless the notions of "sentence" and "clause" are effectually operationalized—stated in terms of procedures any speaker of English can perform—these errors will continue to appear (V.2.4).

3.46 Learners need to know how speech rhythms relate to punctuating, and what other factors must be considered. I sometimes record the speech of students who have a serious problem with punctuation. They are given an unmarked transcript and asked to identify pauses that ought to signal punctuation. They also read normal texts aloud, and consult their own recordings in order to punctuate an unmarked version of the same texts. The motives for punctuating, as outlined in IV.3, are continually explained, first by the instructor and later by the student, to justify the marks chosen. Texts are geared to focus on these motives one by one. Usually, this approach is very helpful for unskilled writers, though extremely time-consuming. At least they learn that punctuating is neither a deep enigma nor arcane game-playing, but a rational method of helping both writer and reader organize a message.

V

Writing vs. Spelling, Grammar, And Speech

1. SPELLING: RULES, REGULARITIES, OR RANDOMNESS?

1.1 The conditions under which the two modalities of speech and writing operate profoundly affect their organization. We saw in IV.3 how punctuating offers a subsidiary signal system whose correspondence to speech patterns is quite complex and variegated. The same state of affairs confronts us in SPELLING: a set of conventions for recording language in a graphic medium. Languages have adopted a range of possibilities. Taylor (1981) distinguishes: (a) *logography,* based on whole-word units (e.g. Chinese); (b) *syllabary,* based on syllable units (e.g. Semitic); and (c) *alphabet,* based on phonemes (in the sense of II.1.5) (e.g. Latin). Most alphabets employ a small number of symbols in a large number of patterns. Most logographies employ a large number of symbols, such as the approximately 3,000 characters regularly used in Chinese and Japanese (Taylor, 1981: 9f, 20). Syllabaries fall in between these two proportions.

1.2 The view that English spelling is *irrational* (rife with entrenched inconsistencies and contradictions, III.3.15) has a long history (cf. survey in Venezky, 1976, 1980). In 1789, Noah Webster proposed a "reform" of spelling to fit speech sounds. Some versions from his *Compendious Dictionary of the English Language* (1806) have become the American standard, such as the endings '-or', '-ic', and '-er' for the older '-our', '-ick', and '-re',[1] while others like 'ake', 'crum', 'ile', and 'spunge', are long forgotten. Later reform attempts had even less success. In 1906, Congress forced President Roosevelt to rescind his order that government printing offices adopt 300 reformed spellings. A "Simplified Spelling Board," funded by Andrew Carnegie and responsible for Roosevelt's list, lost its subsidy in 1917, and in

[1] Hyphens indicate where word-parts are left off.

1921, the National Education Association withdrew its support from spelling reforms.

1.3 Reform efforts encountered strong resistance for several reasons. Spelling proficiency is a cherished benefit of middle-class or upper-class schooling. A reformer writing 'ake' for 'ache' or 'ile' for 'isle' is easily dismissed as an anarchist or an ignoramus (cf. I.2.11). Printing is an immense, influential industry that shuns the initial effort and expense of a major reform, regardless of long-term benefits. Beyond public attitudes and costs, English poses a still more forbidding obstacle which had defeated Webster himself (cf. Venezky, 1980: 15f): how to find convincing, workable principles to supplant tradition. Society can hardly be asked to replace one inconsistent system with another.

1.4 Webster advocated the principle of ETYMOLOGY: the historical source and derivation of words. But English sounds have evolved over time much more profoundly than spelling, e.g., the silencing of final '-gh' or the simplification of initial 'kn-' and 'wr-'. English vocabulary was borrowed from a maze of languages, often preserving their spelling conventions, e.g., initial 'ph-' or 'ps-' from Greek. All these trends undermined the correspondence between spelling and speech sounds. Today, etymology offers no unifying or consistent basis for spelling reform.

1.5 Another principle advocated by Webster was ANALOGY (in the sense of III.1.15): spelling a word like other words with similar sounds . But the growing divergence between spelling and sounds also undercuts analogy (V.1.8). A person who hears the word 'rheum' for the first time might conceivably spell it to fit many analogies: 'room' ('doom'), 'rume' ('plume'), 'rom' ('whom'), 'romb' ('tomb'), 'ruem' ('rue'), etc., and never hit upon the real version. Even some of the most common words, e.g. 'one' and 'two', defy analogy. Webster's reform was doomed from the start.

1.6 Recently, the rationality of English spelling has been reasserted in terms of *rules*. In line with the mentalist approach (cf. II.3.6), Chomsky and Halle (1968) argued that the spelling of surface words is determined by a more abstract "underlying" lexical level of form in a "near optimal" way. Gibson and Levin (1975: 172) postulated a set of "rules" that acts as a "higher-order invariant" despite inconsistencies. Henderson and Chard (1980: 89) proposed an "abstract graphemic code" that "is invariant over changes in particular visual form." Morton (1980: 124) pleaded for "a system of phoneme-grapheme rules" that operate when a processor initiates a spelling action. All these proposals suggest that the failure of English spelling to represent spoken sounds reliably is offset by further functions. If print had to record sounds faithfully, other factors would be blurred. For example, spelling records the grammatical information that '-s' signals a plural and '-ed' a past, though their pronunciation varies according to context (cf. Chomsky & Halle, 1968; Key, 1969; Murrell & Morton, 1974). If spelling had to be a faithful trace of sounds, these other unities would be

clouded (cf. V.1.9). Spellings like 'resign/resignation' preserve lexical relations no longer obvious from the sounds (cf. C. Chomsky, 1970; V.1.8).

1.7 Yet these proposals offer no complete set of rules, but only a few that have convincing illustrations. Empirical support for those rules stated by Chomsky and Halle (1968) has failed to emerge (cf. Simons, 1975; Smith & Baker, 1976; Trammel, 1978; Groat, 1979). Nor could the average writer give a list of spelling rules, aside from a few "rules of thumb" (like "'i' before 'e' except after 'c'") that work for a tiny portion of the language. For the vocabulary of six-to-nine-year-olds, Berdiansky, Cronell, and Koehler (1969) needed 166 rules to predict the pronunciation of words of one or two syllables from their spelling. Hanna, Hanna, Hodges, and Rudorf (1966) aimed at a larger vocabulary of 17,000 words, but even 300 rules were less than 50% accurate, below the level of fourth-graders (Simon & Simon, 1973). Rules for going from sound to spelling are often not reversible (Gould, 1979). Apparently, the search for rules in an inconsistent system is not paying off.

1.8 Operationally, a *rule* is an *analogy* that succeeds over a noticeable set of instances. Whether this process engenders a limited set of reliable rules depends on the amount of *asymmetry* and *redundancy* in the system (cf. III.2.27). Since English spelling frequently offers one symbol for several sounds, or several symbols for the same sound (either within one word or within the whole repertory), these two factors run quite high. Therefore, such lexical relations as cited by Carol Chomsky (1970) (V.1.6) are helpful for some cases ('resign/resignation'), but harmful for others ('space/spatial' vs. 'face/facial'), and fairly infrequent anyway (Simon & Simon, 1973; Frith, 1980). Moreover, the freezing of spelling over centuries (V.1.4) has stopped the power of analogy to promote unity. Thus, most "rules" of spelling narrow down the plausible options, but don't dictate the exact form of the word.

1.9 If text production is a multi-phase operation (cf. III.2.5-32), spelling should reflect the interaction of levels (cf. J. Baron, 1973; Meyer, Schvaneveldt, & Ruddy 1974; Smith & Baker, 1976; Coltheart, Davelaar, Jonasson, & Besner, 1977; Barron, 1980; Cohen, 1980; Ehri, 1980; Morton, 1980; Wing & Baddeley, 1980). The diverse pressures exerted on the subsystem of spelling foster a disunity of rules. To spell a word, people work not just with individual phonemes, but also with word shapes, letter patterns, phrase formats, derivations, and meanings. Spelling would have different regularities, depending on how the system is operated (P. Smith, 1980: 42; cf. Albrow, 1972; V.1.24, 38). People soon learn that associating sounds with letters is far more efficient than memorizing by rote a sequence of letters for each word. But sound/letter associations may lose out in conflicts with other motives. For instance, spelling could be harder, not easier, if the plural ending had to be written '-s', '-z', '-ez', etc., depending on how each noun is pronounced (V.1.6).

1.10 Until recently, spelling research was sparse, because, like writing

and text production in general, spelling is hard to control via experimental procedures (cf. III.1.1, 3ff). The diversity of the system eludes simple theories decidable via external observation. The act of spelling is itself complex, hard to measure in clock time (Sloboda, 1980: 241).[2] The sophisticated instruments available to phonetics have no counterpart for gauging handwriting or print. Still, spelling research is now well under way.

1.11 One basic requirement for research is a *typology of words* such as the following. REAL WORDS are found in a standard dictionary, while NON-WORDS—also called *nonsense words*— are not. The so-called *word superiority effect* (that real words are processed better than non-words; cf. Polf, 1976) has been found for nearly all experimental tasks (cf. survey in V.1.13-29). Among the real words, REGULAR words approximately fit the common correspondences between sounds and letters and yield groups of analogous spellings, e.g., 'bloom', 'broom', 'doom', 'room', 'zoom', etc. IRREGULAR words do not, because some letters are either *silent* e.g., 'w' in 'two' or 'gh' in 'fight', or *non-typical,* e.g., 'o' in 'one' or 's' in 'sure'. On another dimension, PRONOUNCEABLE words can be handled with the speech conventions and articulatory habits of the language, whereas UNPRONOUNCEABLE words cannot (cf. Rubenstein, Richter, & Kay, 1975). All real English words ought to be pronounceable, though people have trouble with *indeterminate* letters, more often vowels than consonants (Henderson & Chard, 1980: 110f), or with *long* words of many syllables (cf. V.1.42, 47). ("Hard words" is sometimes a cover term for irregular, indeterminate or lengthy spellings, particulary in England.) FREQUENT words are statistically common in the overall language, while INFREQUENT words are not (cf. Kučera & Francis, 1967). FAMILIAR words are well-known to a person, whether or not they are frequent in the language, while UNFAMILIAR words are the opposite. BORROWED words are imported from other languages and reflect the latter's conventions, e.g., 'Iraq', 'muu-muu', and 'Hawaii'. NATIVE words are accepted as the basic stock of vocabulary.

1.12 This typology is necessarily fuzzy. The classes overlap and vary from speaker to speaker, according to vocabulary, pronunciation skills, writing experience, and strategies (cf. V.1.26). Children vary in their skill at inventing rules, and thus in their opinions about what counts as regular or irregular (cf. Read, 1975). Someone with no knowledge of Latin wouldn't recognize Latinate borrowings or realize they can't contain 'k' or 'w' (Frith, 1980: 505). A rare Greek borrowing like 'phthisic' is a real English word many people would consider nonsensical or unpronounceable.[3] Therefore, a

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[2] To obtain a "unitary response," Sloboda (1980: 242) had people figure up the number of letters in a word and then press a numbered key.

[3] Trammel (1978: 83) tested for rules with real words like 'acaleph' and 'elenctic' he assumed his subjects wouldn't know; real words were processed as non-words.

provisional word typology like that in V.1.11 only outlines general classes that need to be specified for individuals and groups via empirical research.

1.13 Like many other domains, spelling research is divided between *natural* writing (done spontaneously in everyday settings) vs. *experimental* writing (done on cue in controlled situations) (cf. III.1.1). How far the latter can reveal the former is hard to determine (cf. Wing & Baddeley, 1980: 256). The tighter the controls, the more the activity tends to depart from its customary operation (III.1.3). This reservation applies to many of the trends surveyed below.

1.14 One research direction is to collect *spelling errors* and to explore the conditions that favor or impede them. Natural writing offers sparse samples: error rates average slightly over 1% of the words (Chedru & Geschwind, 1972; Wing & Baddeley, 1980). Apparently, *feedback* catches errors in writing that go unchecked in speech, especially because of the slower time rate (Hotopf, 1980: 296f; cf. IV.2.22). An erroneous letter is often corrected before the next is written down—a sign that feedback is *open-loop* (cf. III.3.2.2). We should therefore compare error rates from experimental writing. On a paraphrase task, my students had to write in their own words the content of a sentence they heard. When we speeded up the presentation rate to make the students work faster, the proportion of spelling errors rose dramatically, about 50%. This finding shows we must distinguish overload from ignorance as sources of spelling errors (cf. I.3.3; V.1.15).

1.15 Once errors are collected, they can be sorted into a taxonomy based on *writer type* or on *word position,* or on some mixture of these. The *writer type* taxonomies are concerned with *dialect* (Briggs, 1969; Cronnell, 1973, 1979; Harrison & Trabasso [Eds.], 1976); or with dialect plus *IQ* and *school attitudes* (Desberg, Elliott, & Marsh, 1980); or with the writer's *reading skills* (Frith, 1980; cf. V.1.30ff). These studies reveal that, despite popular attitudes about literacy (V.2.1), spelling errors do not indicate low IQ (if IQ is a sensible notion, cf. I.3.2ff) or poor reading skills. Overload and inattention cause errors just as much as ignorance of the real spelling. Though it is sometimes suggested (Hotopf, 1980: 289; Wing & Baddeley, 1980: 268), consistent, repeated misspellings of a word need not be an ignorance-based error—my writers produced them in spite of other evidence that the correct spelling was known. This discrepancy between knowledge and performance might mean that anxiety regarding an error, especially on in a shallow phase like sound/letter linearization, makes it happen despite all exertions to suppress it. So much resources are focused on the expected error that the execution of the correct action is blocked.

1.16 The *word position* taxonomies make it clear that errors are not equally likely throughout a word or a passage. Errors are more frequent (a) in the middle of a word than at the end; (b) at the end of a word than at the beginning; (c) in longer words, though not in longer sentences; and (d) toward the end of a sentence, though not toward the end of a whole text

(Hotopf, 1980: 303f; Wing & Baddeley, 1980: 259, 261, 266f, 270). Only at sentence end should processing load be increased by planning out the next stretch of text (cf. IV.2.30). Conversely, attention seems strong at word beginnings; the initial letter is seldom omitted, and if so, its omission is almost always detected (Hotopf, 1980: 303). This finding concurs with speech perception studies where a word-initial phoneme was the most likely to be correctly perceived (R. Cole & Jakimik, 1978); with "tip of the tongue" studies (III.3.12) where the first letter of the reluctant word was immediately recovered in 57% of the cases (R. Brown & McNeill, 1966); and with reading studies where the letters at the beginning or end of a word were the best cues in early reading for tasks like recall and comparison (cf. Timko, 1970; G. Mason & Woodcock, 1973; Rayner & Hagelberg, 1975).

1.17 From a procedural standpoint, error types should reflect the conditions and limitations of processing (Hotopf, 1980). According to Hotopf, *pre-activations* (III.3.32; IV.2.47) ("anticipations") span approximately 6.5 syllables, both in speech (with its rate of 6 syllables a second) and in writing (at only .075 syllables a second) (cf. III[31]); but my data show a large number of spelling pre-activations over only two or three syllables—an important issue for memory spans (III.3.35ff). Hotopf found errors due to selective contamination to be rarer in writing than in speech, perhaps because they are normally detected via look-ahead and feedback before they can be expressed. Errors in function words remained unnoticed in 64% of the time, but in content words only 44% of the time—an effect of the core-and-adjunct principle for allotting resources and control (IV.2.6; V.1.46).

1.18 The position of errors is only one way to classify them. We could also inquire whether they violate conventions of sound or of script (H. Nelson, 1980: 480f); whether they reflect the rules and conventions for segmenting words into "phonemes" and "morphemes" (Cromer, 1980: 412); whether sound-based errors are affected by their contexts (Dodd, 1980: 429f); and so on. All three studies concur that such taxonomies are fuzzy and contestable (cf. V.1.12). Still, if the researcher is consistent and discards doubtful cases, a taxonomy can be helpful for both theory and educational practice. In theory, we might speculate that adjacent letters interfere with each other because of a confusion in execution programs (V.1.35 42, 45), like the interference of memory traces for adjacent items in list-learning experiments—the "serial position effect" (IV.1.9) (Wing & Baddeley, 1980: 254, 262). Or, we can try to account for errors in sound patterns (Frith, 1978a), among both children and adults (Frith 1979; Bryant & Bradley, 1980), and especially among poor readers (Barron, 1978b; Frith, 1980), by noting how spellers tend to bring the printed form into a more regular correspondence with the sound (Baron, Treiman, Wilf, & Kellman, 1980). In practice, we can warn writers what sorts of errors to anticipate and watch for (V.1.49).

1.19 Experimental writing allows us to vary the conditions of a task.

On *dictation tests,* people must spell the words they hear. We can compare the test with the people's abilities to read the same words on another occasion (Bryant & Bradley, 1980). We can dictate a list and ask subjects to find one item that differs from the others (Bradley & Bryant, 1978). We can focus on commonly misspelled words (Baron et al., 1980); regular vs. irregular words (Barron, 1980); or non-words (Secrist, 1976). Test persons only have sounds to guide their spelling of non-words, while real words can be checked against some entry in mental storage. Whether this storage really resembles a "lexicon" of words is still unclear (cf. I.4.6; III.3.10; V.1.28). Surprisingly, dictation tests show that some people can spell words they can't read, e.g., children (Bryant & Bradley, 1980) or alexics without aphasia (Beauvois & Derouesne, 1978).

1.20 We can dictate a word and ask people to decide *the number of letters* it has. This task elicits a single unitary response and is easier if a mental image of the word is formed (Sloboda, 1980). The image seems to assist the *segmentation* of words (cf. V.1.34)—a task that troubles unskilled readers and spellers, as demonstrated on tests where children were taught to tap once for each phoneme (Liberman, Schankweiler, Liberman, Fowler, & Fischer, 1977; Marcel, 1980).

1.21 On *multiple choice tests,* spellers must select the correct alternative (Baron et al., 1980), an easier task than dictation (Tenney, 1980: 218). An error is far more likely for phonologically similar alternatives than for dissimilar ones (Sloboda, 1980; cf. III.3.33). A standard experimental method is to elicit *same-different judgements,* where people must quickly decide if two presentations are spelled the same (Seymour & Porpodas, 1980; cf. II.1.10). This tactic can be done on real words or non-words, or on a mixture of the two.

1.22 We can have people perform *proofreading,* either on words or on whole texts. This line of inquiry proves the relevance of reading skills for spelling (Baron et al., 1980: 166; cf. III.1.9; V.1.30ff). Fewer errors are detected (a) among words with similar sounds (MacKay, 1972); and (b) toward the end of the sentence, where they are also more likely to occur (V.1.16). Proofreading evidently runs on a shallower depth of processing than normal reading for coherent comprehension (cf. Bobrow & Bower, 1969; III.1.13). Extra resources must be expended on the surface text during its brief contact with short-term sensory storage (cf. III.3.7; V.1.34); attention is diverted to otherwise automatic tasks (III.2.31). If processing is heavily loaded, e.g., at the end of a sentence (IV.2.30), or in scrambled texts (Cohen, 1980),[4] error detection degrades. Frith (1980: 506ff) suggests that

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[4] According to Cohen (1980: 147), errors in normal texts are easier to find if they sound right but look wrong; in scrambled texts, errors are easier to find if they both sound and look wrong. Evidently, scrambledness weakens visual expectations formed in coherent contexts, so that sounds become a crucial aid.

some readers habitually use a full sampling of the text and therefore spell better than those who read only from a partial sampling.

1.23 We can ask people whether and how they would *reform* spellings (Baker, 1980), e.g., so as to yield only one correct spelling for a given word sound (Baron et al., 1980: 180; cf. V.1.2). Baker's test persons chiefly followed sound-letter correspondences, except to preserve the unity of plural and past affixes (cf. V.1.6, 9) and to avoid spelling two distinct words the same way.

1.24 We can probe *learning* for transfer effects (II.2.6) from a pre-training to a testing session (Winnick & Daniel, 1970; Murrell & Morton, 1974). For example, Murrell and Morton found that the recognition of 'sees' could be primed for the test by having 'seen' in the training session, whereas 'seed' had no effect: grammatical relatedness was more influential than sound similarity alone. This finding, like those on proofreading (V.1.22), demonstrated the multi-level nature of spelling within a complex, interactive system (V.1.9).

1.25 We can present words with *case alternation* between capital and small letters, e.g. 'DEvELopInG' (Frith, 1980: 509). This tactic can measure how far the processing of written words relies on visual uniformity. For example, the *word superiority effect* (real words processed better than non-words, V.1.12) was also found with case alternation on a letter-detection task (McClelland, 1976); and on a same-different decision task (Pollatsek, Well, & Schindler, 1975; G. Taylor, T. Miller, & Juola, 1977). Word recognition was not impaired by alternating cases, but was by zig-zagging print up and down (Tenney, 1980: 223).

1.26 We can *compare different types of spellers,* using some classification like those V.1.15. Spellers apparently differ in their knowledge of spelling-sound regularities (Boder, 1973); in their reliance on single sounds vs. on whole syllables or words (Baron et al., 1980); in their sampling of cues from print (Frith, 1980; cf. V.1.22); and in their use of mental images of word shapes (Sloboda, 1980; cf. Titchener, 1909; III[19]; V.1.20, 33, 48). Training and age also make a difference. Ehri (1980) found that after a year of instruction, children increased greatly in their use of graphic images to symbolize sounds; Marsh, Friedman, Welch, and Desberg (1980) showed a rising use of analogy for spelling from second grade to fifth grade to college. Still other ways to group spellers into types can be devised, though we need a clearer account of what causes the differences. The reliance on sound-to-letter regularities, for example, may result from instructional methods (Marsh et al., 1980: 352f); or from a more general disposition toward or against learning via rules (Baron et al., 1980: 184); or even from the organic development of the two brain hemispheres (Baron et al., 1980: 186; Frith, 1980: 513f; cf. II.2.4). Clinical studies of brain separation suggest that the right hemisphere does not use sound-to-letter correspondences (cf. Gazzaniga & Sperry, 1967; J. Levy, Nebes, & Sperry, 1971). Spelling

performance can be observed among people with language dysfunctions such as aphasia (Cromer, 1980; Marcel, 1980); deafness (Dodd, 1980), and dyslexia (Nelson, 1980; Seymour & Porpodas, 1980). However, neurological evidence needs a process model in order to be significant (II.2.3ff).

1.27 We can block some aspect of processing by imposing *distractor tasks* (II.2.6; III.1.28), such as shadowing a message (cf. III.1.2.1; III.3.4.10). Silent reading brought lower comprehension if combined with shadowing an acoustic presentation (B. Levy, 1975). Saying a word over and over hindered children on conversion from print to sound, but not on conversion from print to meaning (Barron & Baron, 1977): given a picture of a shirt, the children had trouble recognizing a rhyme (like 'hurt'), but not a word naming a conceptually associated object (like 'trousers'). Repeating non-words interfered with memory for spelling less than copying them down, whether or not test subjects were deaf (Dodd, 1980). Intriguingly, defects due either to dysfunction or to interference tasks can be overcome with proper motivation and practice. The deaf children studied by Dodd derived a sound-based strategy to spell non-words via lip-reading, so that their hearing defect was bypassed.

1.28 This broad sketch of spelling research in V.1.14-27 illustrates the special status of an emerging field of research. No consensus obtains as yet about how issues should be categorized and adjudicated. The role of *non-words* is a good illustration. Because people can't consult a mental lexicon for a non-word, they presumably must apply their general knowledge and strategies for spelling on tasks like dictation, learning, and recognition (V.1.19, 24ff). The spelling of non-words was recalled better if complete printed units were presented rather than letters or syllables spoken individually in a sequence (Farnham-Diggory & Simon, 1975; Ehri, 1980). But the superiority was not merely one of *visual* over *acoustic* processing: printed letters presented in a sequence were an even worse aid than spoken letters (Henderson & Chard, 1980: 108f). The superiority was rather one of *parallel* processing of whole units over *serial* processing of either sounds or letters one by one. These non-word studies thus helped narrow down hypotheses about the roles of *language modalities* (visual/acoustic) vs. *processing modes* (parallel/serial).

1.29 A theoretical account of non-words remains to be found. Non-words are only rarely encountered in natural communication, e.g., when people (especially young children) meet real words for the first time (cf. Trammel, 1978); or when advertizing creates novel brand names to grab attention[5] (see survey in Praninskas, 1968). Moreover, non-words, like real

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[5] Conventions of spelling (e.g. 'Duz' and 'No-Doz' with a rare final '-z'), grammar ('Winston tastes good like a cigarette should'), and coherence ('I smoke facts') are emphatically defied, partly for salience, and partly to harness public resentment against purist usage (cf. I.2.11ff).

words, do not constitute a single type: the artificial system inherits the diversities of the natural one (cf. V.1.12). *Pseudowords* resemble real words enough to be easily read and pronounced (cf. Rubenstein et al., 1975), e.g. 'clasty' and 'grilts',[6] and can be easily made by slightly altering real words, e.g. 'rekind' made from 'remind' (Frith, 1980: 500). *Regular* non-words, e.g. 'scrute', follow the general strategies for mapping between sounds and letters. Children can spell regular non-words just as well as regular real words, and better than irregular real words (Marsh, Friedman, Desberg, & Saterdahl, 1981). Adults do better on real words of any sort (D. Brown, 1970), probably because of visual familiarity. However, even children were seen to depart from sound-letter regularities to preserve the uniform plural '-s', though not other endings such as for the past tense (Read, 1971; cf. V.1.6, 9, 23). *Pronounceable* non-words may be treated either by regular strategies, e.g. 'belmor', or by analogies to irregular real words, e.g. 'kneep' from 'knee' (Baron, 1977; Marsh, Desberg, & Cooper, 1977; Marsh et al., 1980; Frith, 1980). Regularity and pronounceability enable people to agree on how non-words should be spelled (cf. Frith, 1980: 501); Morton (1980: 126) even speculates that the notion of the "word" is not essential for sound/letter rules. *Unmanageable* non-words are those most people can't read or pronounce, usually because of consonant clusters, e.g. 'clmpst', 'sprnth', and 'nmdlbf'. The latter type impedes both spelling and matching up two samples as same or different (Barron & Pittinger, 1974; Chambers & Forster, 1975), even if people only have to match initial letters (Barron & Henderson, 1977), or to search for a specified letter (Krueger, 1970).

1.30 Spelling research could also profit from the large literature on *reading, perception,* and *learning*. Children clearly apply to their reading some spelling-related knowledge, such as letter familiarity (Speer & Lamb, 1976; Richek, 1977-78), sound-letter correspondences (Venezky & Johnson, 1973; Mason, 1976; Guthrie & Seifert, 1977), and sound segmentation (Fox & Routh, 1976; Liberman et al., 1977). Experts disagree about how far the reception of script in reading corresponds to the production of script in writing—the operations can't be simply *reversible,* i.e., mirror images of each other (cf. III.1.9), because the required actions differ markedly. Another point of comparison could be *associative symmetry* (reversible access between knowledge you had before and knowledge you just learned as an experimental task), with reading as the learned association and spelling as its reverse. The learned direction seems to be more reliable (Asch & Ebenholtz, 1962) and rapid (Waugh, 1970), just as reading consumes less effort and time than spelling. Still another point of comparison could be *memory processes,* with reading based on *recognition,* and spelling on *recall*

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[6] Except for the Frith example, these non-words are taken from from Henderson & Chard (1980: 99); but the classification here is my own.

(Gibson & Levin, 1975: 335; cf. III.3.5.4). Or, reading could be more heavily *automatic,* and spelling more heavily *attentional* (Henderson & Chard, 1980; cf. III.1.21). At least, reading can be done with a smaller portion of the letters than spelling, and on a more abstract and general plane (see also Marsh et al., 1980). Most people read better than they spell; and practice in the one skill does not necessarily improve the other (Frith, 1978b, 1980; Marsh et al., 1981).

1.31 Like spelling research, reading research must deal with the contribution of *visual* processing for the *graphic* aspect of a text; and with that of *acoustic* processing for the *phonological* aspect (cf. reviews in Bradshaw, 1975; Perfetti & Lesgold, 1979). Some researchers claim that reading always recodes the graphic version into a phonological one (e.g. Rubenstein, Lewis, & Rubenstein, 1971; Gough 1972). Others say the visual modality is primary (e.g. Bower, 1970; Goodman, 1970; Baron, 1973; Smith, 1973; Green & Shallice, 1976; Barron 1978b); the acoustic one is consulted only if more evidence is needed (Sloboda, 1980: 235). Marcel (1980: 401f) even speculates that "for each learner today, the concept of the phoneme (tacit if not explicit) comes from rather than leads to the particular alphabetic system with which he or she is confronted" (cf. also Templeton, 1981)—a position linguists since Bloomfield (1933) would strongly reject (cf. II.1.5f; V.3.1). This conflict in views matches a curious disparity in experimental findings. On the one hand, speech muscles were observed to become more active during silent reading of unfamiliar or complex materials (Hardyck & Petrinovich, 1970), as if acoustic reconstruction were going on, at least for hard words (cf. V.1.32f). On the other hand, miscuing while reading aloud (cf. IV.2.18, 48) often substitutes words that are visually rather than acoustically similar to the words on the page (Bryant & Bradley, 1980). Distractor tasks indicate at least some cases where people go straight from print to meaning (V.1.27). Apparently, phonological recoding is normal, but not universal, and serves as an aid to difficult tasks.

1.32 The disparity between visual vs. acoustic should therefore vary to fit reading conditions and reader abilities. Children taught to read without heeding meaning, as Noah Webster advocated, naturally concentrate on converting print to sounds—even today, the most prominent focus of early reading instruction (Kintsch, 1979: 329). Kleiman's (1975) study with distractor tasks suggested that phonological recoding is more necessary for extended, meaningful texts than for single words: the acoustic modality may support a carry-over from short-term sensory storage into short-term memory and thereby promote comprehension (cf. also Levy, 1978; Cohen, 1980; III.3.7). *Unskilled* readers, apparently favoring the visual modality (Frith, 1978), might lack an efficient system for the acoustic modality (Ehri, 1980: 321), as indicated by their slowness in accessing it (Barron, 1980); and by their difficulties in reading irregular words or non-words aloud (cf. Perfetti & Hogaboam, 1975; Frederiksen, 1978), in judging the correctness of a sample (Baron & McKillop, 1975), and in categorizing the sounds common

to a list (Bryant & Bradley, 1980). *Skilled* readers, in contrast, divide up their processing between the acoustic and the visual (Frith, 1980). Presumably, they overcome any visual bias as their skills improve.

1.33 In spelling, the situation appears to be the reverse (Ehri, 1980; Frith, 1980). *Unskilled* spellers rely quite heavily on the acoustic modality (Bryant & Bradley, 1980; Marsh et al. 1981), and commit errors on irregular words by trying to match sounds against letters.[7] *Skilled* spellers use visual mental images more prominently alongside acoustic patterns (cf. V.1.20). Thus, there should be a progression from an early imbalance, where reading is heavily visual and spelling acoustic, toward a more mature stage where both activities freely consult both modalities (Barron, 1980: 211; Bryant & Bradley, 1980: 365). Ehri (1980: 321) claims that the decisive shift occurs between the first and second year of reading instruction. Children learn that, in English at least, reading and spelling both work best by operating in two modalities, provided memory is reliable for both sounds and images of vocabulary items.

1.34 These conclusions are reasonable in terms of linear processing, if we suppose that the immediate execution of the written word runs from one of the *buffers* maintained in working memory, one most likely based on short-term sensory storage (of one to two seconds' duration) (cf. III.2.29; III.3.5.4; III.3.33; IV.2.12f), and containing a dual-modality representation of the word (Sloboda, 1980: 246; Wing & Baddeley, 1980: 253). Sound is more *temporally* oriented, and images are more *spatially* oriented (cf. IV.1.6). The acoustic modality offers a *continuous* representation, whereas the visual modality offers a *discrete* one. In exchange, the components of the visual configuration are *simultaneously* available, while those of the acoustic one are *successively* available (cf. LaBerge & Samuels, 1974; Doggett & Richards, 1975; Terry, Samuels, & LaBerge, 1976). Therefore, visual knowledge guides *segmentation,* whereas acoustic knowledge guides *sequential ordering*. Skilled spellers could tell from the buffer if the correspondence between sound and image is conflicting, or at least indeterminate, so that a compensatory effort is made—particularly for commonly misspelled items (cf. V.1.39, 42ff). Unskilled spellers, relying too heavily just on sounding out the word (V.1.20, 33), overlook conflicts and resolve indeterminacies haphazardly.

1.35 Let's imagine a writer entering a word in the memory buffer and setting out to spell it. The main thing is to extract enough cues from the buffer before the representation decays too far—rapid decay being a possible reason for the higher frequency of spelling errors at the end of a word (V.1.16). A visual scan of the buffer provides spatial, discrete, and segmental instructions; an acoustic scan provides temporal, continuous, and sequentially ordered instructions. Both sets of instructions are passed on to

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[7] Sloboda (1980: 241) opposes "phonemically transparent" words to "phonemically opaque" ones.

largely automatic execution programs that translate them into motor actions (cf. III.2.31; III.3.33; IV.1.11f). Ideally, the proper information is ready when and where it's needed—otherwise, errors occur without the awareness or intention of the writer, e.g., the linear contamination of adjacent letters (V.1.18, 42ff)—and the word is now successfully spelled. Next, the writer becomes a reader, getting feedback about the goodness of fit between the intended word and the actual result. Here also, errors creep in if visual and acoustic information isn't brought to bear as it should be. Feedback may be rapid and incomplete, especially if resources are heavily engaged in other phases with concepts, expressions, etc. Then only salient errors would be detected, e.g., in initial position (V.1.16). Sounding out long, uncertain, or unfamiliar words appears to enhance feedback (Ehri, 1980: 316f), perhaps acting as good rehearsal to keep the word in the buffer (cf. Sloboda, 1980: 246).

1.36 As we see, the question is not whether spelling is either acoustic or visual, but rather how much the two modalities contribute to an interactive process. The current consensus appears to be that the acoustic dominates, and the visual is consulted as a support—just the reverse of reading (Barron, 1980: 212; cf. V.1.31). Simon and Simon (1973) propose that a speller generates acoustically possible alternatives and then uses visual cues to make a selection. Meyer and Gutschera (1975) present a model where visual and acoustic analysis race in parallel, and the first one to finish is used. Barron (1980: 210) speculates that visual memory entries have no procedures for producing spelling, but only for checking after the fact whatever the sound-to-letter strategies have done. Even repeated misspellings could result from a checking failure, not from mere ignorance (cf. V.1.15). Regularity would assist spelling better than familiarity (Marsh et al., 1980: 346), since sound-to-letter correspondences enter earlier and more actively into the operation.

1.37 However, the visual aspect in spelling is still important, even if only for making a visual judgement about the correctness of a word. At one extreme, Ehri (1980: 315f) claims that memory stores "a fairly exact copy of the printed form" whose "appearance deviates very little across instances." But this view suggests that variations in print or handwriting should have greater effects than they do (cf. V.1.25). At the other extreme, Frank Smith (1971, 1973) claims letters are only patterns of distinctive features (an old structuralist notion, II.1.5) needed for perception and recognition. But this view implies an unrealistically large catalog of features in place of the twenty-six letters (Rozin & Gleitman, 1977). Moreover, visual features would not correlate with acoustic ones well enough to assist phonological recoding (V.1.31).[8] In between these extremes, we could postulate that visual

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[8] Smith (1973) is in fact forced to argue that sound doesn't mediate the relationship between print and meaning. His extrapolation from "psycholinguistics" impels him to adopt a vastly uneconomical model design (cf. III.1.31.3)—a huge catalog of features, and, by implication, separate systems of visual vs. acoustic processing.

word memory is integrated with acoustic, and varies in its detail and clarity so as to fit context. Under normal conditions, the image is kept abstract and sketchy enough to adapt to print, handwriting, text mutilation, poor lighting, and so forth. But in doubtful cases, the image could be *enhanced* by a special reconstructive effort such as imaging and comparing alternatives (cf. Seymour & Jack, 1978). Or, there may be no stored image as such, but a knowledge pattern that can be accessed either acoustically or graphically (Coltheart, 1978) as needed to compute immediate motoric, acoustic, visual, and conceptual representations of the word (Simon, 1976; cf. Ehri, 1980: 323; Morton, 1980: 120).[9]

1.38 Whether the multi-level representation is stored or computed, spelling would have the versatility to interact with the other processes in text production as a whole (V.1.6, 9, 24). Though executed on the shallow level of sound/letter linearization, spelling could accept input from the deeper levels of phrase linearization, expression, and conceptual development—a possibility already documented for word perception (III.3.6). Skilled spellers can co-ordinate the shallow levels with the deep ones and allot resources appropriately. Unskilled spellers suffer overload and make errors.

1.39 The future exploration of these larger issues requires a unified theoretical framework. We might undertake to model spelling in terms of the general *linear principles* set forth in IV.2. Sound/letter correspondences could fall under the *listing* principle: say the letters you see, and write the sounds you hear, one by one. Sequences of syllables and words could also be construed as lists to be spelled. The mutual ordering of letters could be a matter of *look-back* and *look-ahead,* with the sound sequence providing additional ordering cues (V.1.34); errors due to pre-activation and reactivation (V.1.17, 44) would result when these two principles are degraded. The *pause* principle would be one basis for segmentation into syllables or words, especially if the speller deliberately sounds them out. In line with the *core-and-adjunct* principle, a stressed syllable is the core of the word, and a vowel is the core of a syllable; adjuncts would be the unstressed syllables or the consonants, respectively. The misspelling of short function words (adjuncts) also fits here (V.1.17, 46). *Heaviness* would go to the salient features of a word, such as letters that protrude above or below the line (V.1.41), or that are marked as trouble spots for being irregular, silent, or indeterminate (V.1.11, 34, 42). Such trouble spots would receive special focus, e.g., by stressing normally unstressed syllables—a common tactic among children (Blumberg, 1976; Ehri, 1980). *Disambiguation* is required wherever sound/letter correspondences are indeterminate. However, these principles would have to be worked out in much more detail to account for the whole system of spelling.

1.40 In educational practice, spelling presents an unusually severe di-

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[9] It might thus be possible to go straight from meaning to motoric action without passing through all the other levels (cf. D. Simon, 1976; III.3.6).

lemma for literacy programs. Spelling errors can disturb communication disastrously by interchanging similar-looking words:

> (299) Giant roaches set fall practice [coaches] *(Highland Park News,* July 30, 1981).
> (300) AN ITALIAN SINNER will be served at 5:30 p.m. at the Essex Center United Methodist Church. [dinner] *(The Vermonter,* Oct. 16, 1977)
> (301) FORMER PRESIDENT ENTERS DINAH SHORE [entertains] *(The Desert Sun,* March 28, 1980)

Poor spellers are popularly judged low in literacy and even in intelligence (I.2.8.1; V.1.3). Yet spelling skills are hard to maintain in a culture where reading is not a popular pastime, and the spelling system itself is complicated and flagrantly inconsistent. One of my tests mainly intended to explore mental maps asked Gainesville fourth-graders to list the 50 states of the U.S. Some of the children devised ingenious sound-spellings: 'Colrado', 'Indeana', 'Mane', 'Mishigun', 'Missasippy', 'Oakalahoma', 'Pencilvayna', etc. Others created versions with only a vague visual or acoustic resemblance to the actual names: 'Albemba', 'Alksa', 'Arozna', 'Ieerandna', 'Ielllnoy', 'Keinteyk', 'Morxko', 'Soth Carealinen', 'Wist Vurginupp', 'Wastason', 'Calflfurya'/'Callfga' (California), 'Coneiteit'/'Kuneckcen' (Connecticut), 'calroda'/'Crittordo' (Colorado), etc. Familiarity did not protect Florida from becoming 'Florda', 'Froida', 'Florside', etc., nor Georgia from becoming 'Gogioa', 'Goerge', etc. A dyslexic college freshman came up with equally bizarre vocables, such as 'cupple', 'exicuesas', 'reskue', 'jaz', 'man' for 'main', 'new' for 'knew', 'tring' for 'trying', and so on. After she devoted a paper to a bowling 'turniment', I urged her to use a dictionary, and was treated next to a visit at the 'tournoment'.

1.41 English teachers are expected to remedy such obstacles as a matter of course. But to do so requires extensive expertise on defects in vision and reading—not the usual professional training in English degree programs. The students feel discouraged and stigmatized by the popular distortion of misspellings as signs of ignorance and low intelligence. In reality, spelling is, as I have tried to show, naturally error-prone. A complex, multi-level system has to be operated with precise timing of memory and actions, yet without much resources (V.1.6, 9, 24, 38). Some errors are due to dysfunctions in vision (Marcie, 1982) or in reading (Nelson, 1980; Seymour & Porpodas, 1980). Some are side-products of the mechanics of handwriting (cf. Wing, 1978) or of typing (MacNeilage, 1964; Rumelhart & Norman, 1981).[10] Some letters are less conspicuous than others; those which do not protrude above or below the line are more like to be omitted than those which do (Hotopf, 1980: 305). These various factors lead to errors that

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[10] Two-finger typists like myself get a whole new chance for extravagant typos on a computer keyboard, where mistyped command keys can move the cursor accidentally: 'singihgyst' ('insight'), 'smiktunmaoies' ('simultaneous'), etc.

misrepresent one's true intelligence or literacy.

1.42 Most of the samples I have gathered suggest two important error factors (compare samples in Cromer, 1980: 416ff; Frith, 1980: 498ff; Hotopf, 1980: 291ff; Wing & Baddeley, 1980: 274ff). One is the *buffer scan:* the writer has trouble getting the needed visual or acoustic instructions from the memory buffer (cf. V.1.35). The other is the *execution programs:* commands to inscribe a letter one or more times in a given location get confused, disordered, or lost altogether (cf. III.2.31; III.3.32; V.1.35, 45). *Indeterminate sounds,* quite common in the unstressed syllables of English words (V.1.11), seem to impede buffer scan. An unstressed vowel can be displaced by a stressed one from the same word ('geneus', 'obselescence', 'seperate'), perhaps as an effect of heaviness. Or, the vowel 'a' is used as a general "schwa" sound /ə/ resembling that in the indefinite article ('differance', 'machinary', 'definate'). On occasion, an indistinct syllable disappears ('basicly' 'invaluble', 'continous'). *Silent letters* are similarly omitted ('hussle', 'morgage', 'goverment', 'likly'). Sometimes, though, a special effort is made to watch for them (V.1.39). The silent 'e' is aided by its functions in lengthening a preceding vowel ('wine' vs. 'win') or allowing certain consonants in final position ('v' in 'give', 'z' in 'freeze') (P. Smith, 1980: 35ff).

1.43 Clusters may suffer both in buffer scan and execution programs. If sounds are continuous (V.1.35), the segmentation of adjacent letters might be a special problem (V.1.18). Segmentation errors, both between syllables ('mispell', 'wondeful', 'dissappear') and between whole words ('alot', 'atleast', 'allover', 'a cross', 'with out', 'never the less'), suggest that the spelling buffer can hold several words, at least if they are closely associated in standing phrases. Errors across words are common only among unpractised writers who probably rely on sounds. Smaller-scale segmentation is a more widespread problem. Consonant clusters suffer persistently (Bryant & Bradley, 1980: 364; Frith, 1980: 503; Marcel, 1980: 378). They get rearranged ('exist' for 'exits'), simplified ('exeption') or elaborated ('excercise'). Vowel clusters are misspelled if their sounds are indeterminate ('aercraft', 'wating'). *Resonants,* that is, the liquids /l/ and /r/ plus the nasals /m/ and /n/, have the most confusing impact on clusters (Ehri, 1980: 344; Marcel, 1980: 381), probably because their ambivalent status between vowels and consonants hinders both order and segmentation. They are frequently omitted ('unabiguous', 'aswered', 'inteference', 'wondeful') or doubled (ammount', 'irrationallity'). They seem to blend with nearby vowels, so that spellers are uncertain about what comes first ('lible', 'titel', 'perscribe', 'preticular'). A nearby vowel may be omitted ('bachlor', 'refrence', 'instrments'), sometimes leaving the resonant as the only syllable nucleus ('untl', 'manknd', 'helpfll'); or inserted ('lightening', 'wonderous', 'tackeling').

1.44 *Pre-activations* are clearly a slip in the execution programs. Usually, the speller anticipates a letter from a later part of the same word. The

mistake is oftentimes caught and corrected at once:[11] '<fl> fuel', '<st> scientific', '<nowd> nowdays', '<surl> surely', '<encourg> encourage'. The anticipated letter may be either proximate ('encourg') or remote ('st'), sometimes even from a later word ('and handful' for 'a handful', 'slowing counting' for 'slowly counting'). Pre-activations are less likely to be detected, e.g. during proofreading, if they preserve the word sound, as in the tenacious misspelling 'reasearch'. Interestingly, *reactivations,* where an earlier letter reappears, are less common; probably, the visual trace on the page, or the memory of having produced it, confirms that the action has already been done.

1.45 However, the reactivations entailed in *doubling* consonants is a conspicuous error factor. These cases may be due to confusions about the number of iterations an action should have. This account could explain why doublings are (a) performed on incorrect letters ('affraid', 'habbit', 'slick-boddied'); (b) suppressed on correct letters ('acessible', 'dilema', 'posible'); (c) displaced from one letter to another ('neccesity', 'parralel', 'personell'); (d) performed on both correct and incorrect letters ('assymmetry', 'dissappear'); or (e) dropped in one position and retained in another ('mispell', 'acommodate', 'embarassed'). There is evidently an independent doubling program that can come loose from the intended letter and be shifted or lost (Rumelhart & Norman, 1981: 14). Similar syllables suffer comparable effects. One may be dropped (a "haplology") or blended with the other ('indivual', 'scienfic', 'bycle', 'possibity', 'imaging' for 'imagining'). Conversely, a syllable may be proliferated ('censorsored', 'creatitivity', 'sententences'). Such confusions are rarer than letter-doubling errors, probably because larger changes in word shape are easier to detect and suppress. Many letter-doublings hardly affect either shape or sound.

1.46 *Short function words,* whose pronunciation in a phrase resembles that of unstressed syllables in a word, are vulnerable to substitutions: 'is' for 'in', 'that' for 'than', 'of' for 'or', and so forth. Although rare in speech (Hotopf, 1980: 297), these substitutions frequently go undetected in writing. Though out of place, the interpolated word is registered as a legitimate item. Sometimes the word comes again in a correct slot within the neighboring context ('*the* satellite will *the* [then] communicate'), so that the error could be in the representation, provided the buffer holds several words (V.1.44). Other times, the word is not anywhere near ('it follows than [that] only a small'), so that the error must be in the execution programs that are doubtless automatic and unsupervised for such frequent words. Either way, these function words get less resources than content words (IV.2.6; V.1.17, 39).

1.47 But these accounts for short words don't say why errors occur on *long words* (cf. V.1.16). The latter may be hard to fit into the available

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[11] Pointed brackets are for cross-outs (IV.2.25).

buffer space, or to keep there very long (cf. Dodd, 1980: 433). Their disadvantage may relate to their lower frequency (cf. Zipf, 1935); and to their greater difficulty for pronunciation (V.1.11). They are often built up of word components that naive spellers wouldn't recognize as such (cf. C. Chomsky, 1970). An error is hard to see because it makes a small difference in the total visual shape of a word being shortened ('bronchopulmory', 'commucate', 'convient') or lengthened ('availiable', 'surpisered', 'feelableness' for 'feebleness'). Confusion of similar syllables (V.1.45) is most likely in long words.

1.48 We can easily see how the inscription of words misfunctions even when the correct spelling is known. The question is how writers can apply what they know. Radakar (1963) claimed that salient mental images of words make children's spelling dramatically better (cf. also Sloboda, 1980). Carol Chomsky (1971) wanted spelling taught before reading, whereas Frith (1980) recommended thorough reading as a prerequisite for spelling. Tenney (1980: 228) advocated writing alternative spellings down and comparing them; or breaking hard words down into parts. Barron (1980: 212) warned that too much emphasis on the "look-say" method (converting print to sound) or the "phonics" method (sounds alone) might cause learners to adopt one-sided strategies and spell badly. Even the traditional spelling bee may hinder good performance because the spoken series of letters obscures the spoken shape of the word (cf. Brooks, 1968; V.1.28). Desberg et al. (1980: 80) felt that words should be spelled in contexts rather than in lists to rule out ambiguities.

1.49 I have been experimenting with an approach where errors are predicted and made the center of focus. I give unskilled spellers large numbers of samples to proofread, focusing on the trouble spots described in V.1.42-48. The goal is to narrow down the set of probable misspellings so that these spots will be given particular attention. The students are also made aware that spelling errors are natural, rather than stigmatizing. Unskilled spellers are advised to use dictionaries continually; to proofread a paper once for spelling only; and to keep a conspicuous list of frequently misspelled items in a visible place in their homes, so that a clear mental image of each word is gradually acquired.

1.50 Many kinds of misspellings are already obsolete for writers who use a word processor. In 1981, Sensible Software (West Bloomfield, Michigan) released a program that checks the spelling of every word in a text written on an Apple Microcomputer (a popular school model) against a dictionary of more than 30,000 words. The writer can add about 7,000 more words, make multiple dictionaries for different purposes, or even create a new dictionary from scratch. Every misspelled word is displayed on the screen and marked in the text for easy searching and correcting. However, if the misspelling forms a known word (e.g. 'that' for 'than', V.1.46), the program has no way to discover it. A program that could check both spell-

ing and context is not currently feasible, least of all on a small computer. Thus, for the near future, advances in school practice still depend on corresponding advances in theoretical research. Better models of how memory runs and how reliable feedback can be gathered will lead to better methods to control spelling, along with other complex, error-prone domains of human performance.

2. GRAMMAR MADE OPERATIONAL

2.1 GRAMMAR designates a vast, elaborated corpus of conventions about language forms and formats.[12] Together with punctuation and spelling, grammar has been a traditional concern of writing programs. Proficiency in these three areas is the conventional basis for judgements of *literacy* (I.2.8). Yet despite this obvious social relevance, the fundamental operation of these three sub-systems of language has widely remained obscure. They have been generally acquired more via force of example than via explicit, workable principles. Surveys indicate that traditional grammar instruction does not seem effective for today's students (cf. Braddock, Lloyd-Jones, & Schoer, 1963; Postman & Weingartner, 1966; Memering, 1978; Mellon, 1981). But a less traditional approach might have a more significant effect on writing skills (cf. Kolln, 1981).

2.2 Whereas spelling attracted little research until recently, and punctuation even less, grammar was the dominant concern of American linguistics for decades (cf. II.1; II.3). However, the main priority of this research was not to improve literacy education. School grammar was decried by linguists (e.g. Roberts, 1958) as inaccurate, biased, and subjective. The surveys of usage linguists undertook (e.g. Leonard [Ed.], 1932; Kurath, 1949) dispelled some myths about the language Americans really used. But the linguistic grammars pursued an entirely different intention from school grammar. The descriptive, formalized approach gave little heed to the *decision-making* involved in the active use of grammar within communication. By discounting evaluation, linguistics lost sight of communicative motives for selecting grammatical options.

2.3 Composition teachers were caught in yet another dilemma. They could either retain school grammar despite documented ineffectiveness and linguists' censure; or, they could go in search of a new grammar not found either in tradition or in linguistic research. Neither recourse was attractive, and forced compromises usually ensued. Some schools phased out grammar instruction; others tried teaching linguistics itself instead; and still others

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[12] The derivation of the word from Greek 'grammatikos', meaning 'of letters', shows how strongly the notion was originally allied with writing rather than with speech (cf. V.3.1; Robinson, 1976: 174f).

adopted textbooks with an ornamental sprinkling of fashionable linguistic terminology ("kernels," "right-branching/left-branching sentences," etc.) for an otherwise traditional framework. Predictably, these tactics did little to improve the active use of grammar.

2.4 The ideal qualities of a learners' grammar are not hard to specify. First, it should be *accurate,* i.e., should reflect the organization of good prose by skilled writers. Second, it should be *workable,* i.e., should be stated and learned in such a way that the average student, regardless of background, can acquire and use it. Though hardly abstruse, these two standards are frequently not met by instructional materials that embark on a strangely mixed attempt to define grammatical categories partly in terms of content, and partly in terms of structure. Picture a naive, unskilled writer trying to find out what "subjects" and "predicates" are. Here's some typical advice from recent textbooks:

> The subject tells who or what the sentence is about, and the predicate tells something about the subject. (Mills, 1979: 2)
>
> A subject group ordinarily names persons, things, or ideas that perform the action or exist in the state described by the predicate. (Broderick, 1982: 117)
>
> A subject is a noun or noun equivalent that performs an action or is in a particular state of being; it usually appears before the verb and determines the number (singular or plural) of the verb. The verb signifies the action or state of being of the subject. The predicate is the verb and all words related to it. (Corder, 1979: 463)
>
> We are aware of the noun-like quality of the subjects and the verb-like quality of the predicate, whether we can explain them or not. If you are asked to divide a sentence into two parts, you will invariably divide it between "subject" and "predicate." (Moody, 1981: 310)
>
> The subject is whatever the verb agrees with in person and number. [The] predicate [is] whatever follows the subject. (Williams, 1981b: 213ff)[13]

For all their diversity, these definitions have one thing in common: they hardly help a naive student locate the "subject" and "predicate" in a sentence. The content-based approach (e.g. Mills, Broderick) is too vague. "What the sentence is about" could be any of its content, not just that expressed in the "subject"; nor is "the predicate" the only thing that can "tell something about the subject"—participial modifiers or relative clauses can too. The structure-based approach (Corder, Moody, Williams) is less vague, but only for people who already command a secure knowledge of grammatical terms, e.g., who can pick out "whatever the verb agrees with in person and number." A "noun" doesn't "perform an action," but only

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[13] In fact, Williams (1981b: 215) does hit upon the 'who/what' question-technique for finding subjects, but fails to apply it to predicates (see V.2.21).

the agent referred to by the noun. The implication that subject and predicate form two neat blocks in a row, as Moody and Williams appear to suggest, is not even true of common, simple sentences (cf. V.2.21). The people who "are aware of the noun-like quality of the subject and the verb-like quality of the predicate", and who "invariably divide" a sentence "between subject and predicate," are more likely composition teachers than students (cf. V.2.6).

2.5 The naive student who needs to identify a *sentence* is no better served. Again, there is a forced choice between the forbiddingly technical and the unworkably vague:

> Defined by form or pattern, a sentence is a basic unit of language, a communication in words, having as its core at least one independent finite verb with its subject. In addition to being a basic unit, the sentence is a natural one. It nearly always contains two pieces of information the listener is conditioned to expect from it: who or what is involved, and what does he, she, or it do or feel. [. . .] We speak of sentences in general as complete units, capable of standing alone without the support of supplementary comment. (Willson, 1980: 29)

Either the students must know how to identify the "independent finite verb with its subject." Or, they can puzzle over poorly definable notions like "a communication in words," "a natural unit" (the really natural unit is the "stretch of text," III.2.28), "pieces of information," and "supplementary comment"—all of which can apply to utterances not formatted as sentences, e.g. fragments (V.2.32-37). Such definitions take the "sentence" as a given, rather than as one among several possible language formats that needs to be constructed and recognized. Therefore, students get no clear tactics to distinguish between a sentence and a non-sentence punctuated as one.

2.6 The merits of individual textbooks are not the issue here. The point is that they all rely on terms quite natural to English teachers, but not at all transparent to the unskilled writers we are supposed to be helping. These books are addressed not to their real users, but to the people who decide what textbooks to buy (VI.3.26)—teachers who share the same ways of thinking as the textbook authors. Quite conceivably, many students can't handle grammar precisely because textbooks expound its basic notions in terms students can't understand or apply, like a ladder you can't climb because the lower rungs are missing. Many writing handbooks don't even attempt to define "subject," "predicate," or "sentence," as if everybody must already have mastered these subtle notions—which is at present not even true for middle-class white students, much less for minorities. Or, textbook authors feel that such matters should be explained with condenscension (cf. criticism in Lanham, 1974). In this light, traditional grammar instruction *has* to be ineffectual (V.2.1).

2.7 An accurate and workable grammar for the average learner needs a

different design. Grammatical categories must be made transparent enough that contemporary students can handle them without the formal and metaphysical expertise presupposed by most textbooks and reference works. If, as mentalist linguistics claims, speakers of English have acquired and "internalized" a grammar, grammatical categories can be expounded and understood in terms of what someone *does* with the language. Student speech manifests a considerable store of linguistic knowledge. The question is how to tap that knowledge and consciously apply it to the tasks of writing.

2.8 These premises stipulate the design of a grammar not provided either by linguistics or by traditional schooling. The grammar has a stated *purpose:* supporting the goals of literacy education. Hence, the grammar must be *tailored to the user:* the naive student experienced in casual talk, but not in writing. Plainly, such a grammar could not be designed from some abstract "theory of competence" intended as a vehicle for "pure research." Indeed, such theories fail exactly because they lack any recourse to application, and hence have no way to define their own object of inquiry. Nor could such a grammar be a vehicle for English teachers to converse with their colleagues via obscure, or condescending edification of the naive students that inhabit average classrooms. This approach defines its application, but not adequately enough to be a useful instructional tool.

2.9 The first step is to explore how much grammatical knowledge is enacted by average speakers of English. A major problem posed by the English language is the *fuzziness of word classes.* A word like 'last', for example, can belong to any of the four classes of content words (nouns, verbs, adjectives, adverbs) without changing its form. Whereas many languages reshape a word to fit each class, English has dropped off most inflections and now shows many grammatical distinctions by patterns of phrase linearization. Thus, the technique is not to classify the words themselves, but the positions they occupy in utterances. Many linguists have remarked on the ease with which even young children form grammatical utterance patterns long before they have any contact with school grammar.

2.10 I shall describe one probe that illustrates these issues. A test was administered to about 150 school children from Gainesville, ranging in age from 8 to 17 years; later, a replication was done among rural school children in Macclenny, Florida, a little town near Jacksonville.[14] The following grid was presented:

(302) The _____, _____, _____, _____, _____ man
The _____, _____, _____, _____, _____ lady
The _____, _____, _____, _____, _____ airplane

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[14] I am indebted to Carolyn Cook, Reba Dean, Gail Kanipe, Mamie Kelsey, Mary Sharp, and Jane Harper Yarbrough for overseeing these tests. Some of the teachers omitted commas between the blanks, and students put them in only some of the time (see samples below). On the replication (V.2.15), commas were provided in advance. The integration and heaviness of modifiers can affect the need for commas between them (IV.3.27)—an issue we didn't want to confront in these tests.

The _____, _____, _____, _____, _____ word
The _____, _____, _____, _____, _____ city

The children were told to "fill the blanks with adjectives that sound good." I assumed that most of the children would be grammatically naive and have no explicit definition for the notion of "adjective." Their teachers confirmed that grammar instruction had been uncommon, or at least not emphasized. However, the position between article and noun would naturally be filled by most English speakers with words that are, ipso facto, adjectives.

2.11 The task actually implies two other tasks we didn't announce. The announced task was the easiest: to make sure that every blank contains an adjective. Here, most of the children were quite successful. Their spelling, which I had found on other tests to be uncertain (V.1.40), occasionally obscured the data, e.g., whether 'the experience man' is an error in spelling or in grammar. Significantly, even made-up words were formed to look like adjectives, usually via their endings: 'the bobochous lady', 'the mustacheous man', and the 'businesy', 'unordinating', 'love-obtained', and 'inexistencing' 'city'. The evidence was overwhelming that fourth-graders with known literacy problems nonetheless demonstrated an operational understanding of the grammatical category "adjective." Less than 1% of the data contradicted this finding, for example:

(303) The big black ugly dub with ploted air city
(304) The big wite loud zoomed with anger airplane

In fact, the author of (304) went back and inserted 'plane' in the proper slot after 'loud'.

2.12 A harder task was to make the adjectives plus their noun form a coherent configuration. The vast majority of the data also met this criterion. Unexpectedly, the children typically displayed negative attitudes about men, words, and cities, vs. positive ones about ladies and airplanes, e.g.:

(305) The bow-legged, emptyheaded, knock-kneed, stupnosed, extremely grotesque man
The slim, willowy, graceful, courteous, attractive lady
The gigantic, metallic, bird-like, shining, silver airplane
The obscene, dirty, bad-mouth, fowl, 4-letter word
The bustling, overcrowded, grimy, crime-filled, smelly city

Especially the 'word' was a target of aggression, perhaps because of teachers' adverse comments on the utterances and papers of children. In acrimonious disregard for its holy origin proclaimed in the New Testament (John 1:1), the 'word' was denounced as 'misspelled', 'illegible', 'illiterate', 'uncalled-for', 'silly', 'boring', 'trite', 'overused', 'tedious', 'exasperating', 'rambling', 'confusing', 'incomprehensible', 'outlandish', and 'meaningless'. Small wonder if children learn little from language instruction that so berates them.

2.13 The age of the children affected their tolerance for doubtful coherence. The youngest children ably created configurations that would do credit to a surrealist:

(306) The big medal fat mean bad airplane
(307) The fat ghosty scarry long squared city
(308) The long hard to say blue fat little word
(309) The strong, surprising, shaking, long, scarey word
(310) The great pulsating, secreteing throbbing pink word

Contradictory configurations were also found, though more rarely:

(311) The handsome monstrous intelligent colossal stupid man
(312) The very little kind of big word
(313) The German mispelled mispronounced scientific French word

The fact that the children had a firmer grip on the grammatical category "adjective" than on the demands for coherence is important. It suggests that the tradition of defining grammatical notions in terms of content (V.2.4) may be both unnecessary and confusing. Children are more likely to learn what an "adjective" is from their language experience than from definitions like: "in general, adjectives modify, or in some way change the meaning of, nouns and pronouns,"[15] where "nouns" (you guessed it) "name persons, places, things, or ideas" (Moody, 1981: 346, 311).

2.14 The hardest task was to get the five adjectives into an acceptable order—an issue still far from explained in theory (cf. IV.2.74). Adjective sequences, like most recursions in language, are normally no longer than three (IV.2.13, 70). As expected, the children were often uncertain about the best order. Sometimes they would draw arrows on the paper to rearrange their sequences. One child improved (314) by making it into (314a):

(314) The blue and white American fast huge airplane
(314a) The huge fast blue and white American airplane

Not all such changes brought a clear improvement, however:

(315) The shiny metalic wonderous large flying airplane
(315a) The shiny wondrous large metalic machine airplane

Even my research group and I had a hard time figuring out the best order for some sequences. It was much easier to rearrange (316) than (317):

(316) The cargo, war, green, powerful, long airplane
(316a) The long, powerful, green war cargo airplane
(317) The large, noisy, crowded, fast white airplane
(317a) The large, fast, white, noisy, crowded airplane

We had to break cases like (317) down into shorter versions we could agree

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[15] Adjectives with pronouns are so rare (e.g. 'the living I', 'the real you') that I wonder why the option is mentioned here.

about: 'the large white airplane', 'the large, fast, white airplane', and finally, 'the large, fast, white, noisy, crowded airplane' (where 'noisy' and 'crowded' could be interchanged).

2.15 Later, we did a comparison study with whole sentences containing only three blanks for adjectives in each of two positions, e.g.:

(318) The _____,_____, _____ man used _____, _____, _____ words.
(319) The _____, _____, _____ lady lives in the _____, _____, _____ city.

The instructions were the same as before (V.2.10); yet this condition improved both the coherence and the order of the results. The children produced very few incoherent statements, and almost no disordered sequences. Greater coherence was encouraged by using the format of normal complete statements. Greater order came from limiting recursion to the customary threes (cf. IV.2.13, 70; IV.3.37). These two factors elicited language knowledge that the less natural format of the earlier tests had failed to tap. Grammatical knowledge as such is generally fuzzy, but comes into sharp perspective when applied to a specific task such as formatting an everyday statement (cf. I.4.6).

2.16 This straightforward demonstration has useful implications. The further grammar is removed from natural communication, the more likely ordinary people are to lose control of it. Instruction that drills students on *grammar alone* is therefore unnecessarily arduous, and its transfer over to spontaneous writing is doubtful. The specialized drill-setting apparently interferes with the grammatical system in discourse processing, because the loss of context makes the grammar much less well-defined. Hence, learners need to reorganize their system of grammatical routines at the expense of those already devised and practiced in everyday communication. This reorganizing in turn draws a heavy load, so that performance is further degraded below one's actual knowledge of the language (cf. I.2.8.2; I.3.3, 25). It is unrealistic to hope the effects of such drills will carry over when processing reverts to normal. More likely, the whole stressful reorganization of the system will be set aside as soon as the drill is over, especially by nontraditional learners (I.2.23.10). In contrast, familiar, natural uses help people make the best of their grammatical knowledge.

2.17 Further research of this kind may refute a commonplace assumption of conventional linguistics since Saussure: that the "grammar of a language" is, or can be treated as, an idealized, uniform abstraction with clear borders. The postulate that language can be separated from language use (II.1.2; II.3.7) may prove to be so fundamentally misconceived that a large part of linguistic research cannot support the theoretical claims based on it. Grammar appears to be a body of fuzzy knowledge that assumes clear forms when put to everyday uses, but tapers off when applied to less familiar and controllable patterns (e.g., five modifiers in a row). If so, grammar doesn't exist, except as a derived construct of grammarians, until it is used

in some language event (I.4.6, 10, 14; IV.1.1). As speakers of English, students have a kind of grammatical knowledge that is more secure, but less explicit, than the decontextualized grammar of textbooks or teachers. The former kind of knowledge is the only realistic basis for attaining the latter. Writing instruction need not (and cannot) teach grammar from scratch; but it can and should identify from student papers those categories which everyday language experience has not clarified sufficiently for the demands of writing. Then, we can seek to harness that same experience such that these categories are manifested in simple actions the students already know how to perform. Of course, these actions, when done as exercises, depart from their natural spontaneous context of communication; but at least, they are closely derivable from such contexts and sufficiently habituated via daily experience that they should not encumber or distort processing as much as old-style grammar drills.

2.18 The *sentence* is one problematic category. Many *statements* of everyday speech are not expressly formatted as a sentence: either something is missing, or their boundaries are fuzzy (cf. III.2.28, 30; IV.3.45; V.3.2, 8).[16] Here is a portion of a transcribed passage spoken by a freshman student. As usual, a short pause is indicated with "/," and a long one with "//" (IV.2.25); a hyphen marks where a word was broken off.

> (320) first I rented a steam cleaner // and um / I steam clean-ned / steam cleaned the roof // by attaching a hose / and plugging the machine in the wall / didn't take much // and // um I can / you can th-the machine's light enough that you can put it up on the roof // and uh // you walk around with the spray handle to the pressure cleaner / or a steam cleaner whatever // and um // walk slowly back and forth on the / on the roof / um / applying the pressure / you know to the tile on the roof to get off the loose dirt and paint

The entire passage could be structurally analyzed as one long sentence linked with 'and' and 'that', and broken more by pauses and shifts than by distinct clausal boundaries. The content and intonation of the recording, however, suggest a division into several statements: renting; cleaning with the rented equipment; getting to the roof; moving around; taking off impurities. The phrase 'didn't take much' reads like the predicate whose subject is 'plugging the machine in the wall'; on tape, it comes across as a general comment on making the machines work. Thus, the phrase hovers in a grammatical limbo, but is conceptually and pragmatically well-defined.

2.19 Unlike speech, writing normally conforms to "the conventional expectation that a sentence begins with a capital letter and ends with a period," as Corder (1979: 203) observes; but he cautiously goes on:

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[16] The determination of linguistics to make the sentence the obvious structural framework upon which all formal definitions depended has its counterpart in pedagogy, e.g. in a textbook opening with: "you speak in sentences" (Mills, 1979:1).

> Fortunately, no one has successfully dictated what shall go in between. To be sure, most English sentences do contain a subject and a verb, and most make some kind of statement that can be read and understood by itself. But [. . .] both the content of your sentences and the form of your sentences are yours to determine.

Most textbooks are less enlightened than Corder's on this point—so much so that a paradox has arisen. Skilled writers have far more freedom from worrying about grammatically proper sentences than do unskilled writers, who could profit more if they worried less. Sentence errors are a frequent occasion for excessively punitive grading practices (cf. Harris, 1981). The sharp reactions toward "sentence errors" (fragments in particular) reported in Hairston's (1981: 797) survey of professional people in 63 occupations are probably an after-effect of composition classes. In real life, such "errors" are most apt to become acute when needed as leverage in social or institutional conflicts (cf. I.2.11; V.2.31; VI.1.13).

2.20 Social factors make it all the more urgent to experiment with easy methods for tapping everyday language experience to define the sentence. One way to tell what something is, the mentalists had argued, was to "transform" it. Though such operations need not constitute normal text production, they could be selectively performed on already produced samples for strategic purposes (cf. II.3.15ff)—the basic idea behind "sentence-combining" (II.3.17-47). The operations can be straightforwardly classed as *addition, deletion,* and *conversion* (cf. van Dijk, 1972, 1977). In a procedural methodology for grammar, learners could carry out one or more such operations and contrast the results with the original sample. The contrast should make the desired grammatical category immediately transparent as a *language event*. Though the setting differs from everyday communication, the operations should be ones people commonly perform during the latter (V.2.17).

2.21 Imagine now some naive students learning to recognize some stretch of text as a sentence (cf. Beaugrande, 1982a).[17] First, they are given two interlocking definitions: (1) "every sentence must have at least one independent clause"; and (2) "every clause must have at least one subject and predicate." But instead of explaining these notions in terms of formal structures or vague content (V.2.4f), I ask the students to do something they already know how to. They see simple examples such as:

(321) Her father owns the market.
(322) Sometimes one of the dogs runs away.

and convert them according to this strategy:

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[17] What follows is the version that eventually emerged after much designing. The effort proved, at least to me, that the teacher must work very hard to create a method that students will find very easy (V.2.27; VI.3.5).

Make up a 'who/what' question about the statement made in the sentence. The PREDICATE of that sentence is all the words you used again in the 'who/what' question; the SUBJECT is the rest.

The strategy is immediately and easily applied to the examples. Students devising a 'who'/'what' question about the main statement conveyed by the sentence should most naturally replace the subject of the sentence (or of its main clause) with the 'who' or 'what'. The question is then placed alongside the original sentence and the words that got used again are counted up. The others are reckoned as the subject.[18] For the two examples, the students obtain:

(321) Her father owns the market.
(321a) Who owns the market?
(321b) *predicate* = owns the market
subject = her father
(322) Sometimes one of the dogs runs away.
(322a) What sometimes runs away?
(322b) *predicate* = sometimes runs away
subject = one of the dogs

As we see from (322), having a part of the predicate before the subject is no obstacle: the question conversion moves such a part out of first position. Methods where sentences are sliced like salami, as in immediate constituent analysis (cf. II.1.13), or where subject and predicate are defined by position (cf. V.2.4), render these formats unnecessarily hard.

2.22 This operation is rehearsed by the class, and possible mix-ups are clarified. The question must ask 'who' or 'what' do/does/did something, not 'who' or 'what' something is/was done to. The question words can be only 'who' or 'what', not 'when', 'where', 'which', etc. And, if there is a choice, the shortest question should be used, e.g. (323a), not (323b):

(323) My friend at the college gave out the figures.
(323a) Who gave out the figures?
(323b) Who at the college gave out the figures?

Pre-tests and post-tests were conducted to measure the usefulness of this technique. On each test, the students had ten sentences in which they were to underline all parts of the subject once, and all parts of the predicate twice. On some test runs, I started by asking the students to indicate whether or not they "felt confident about grammar and sentences." Many

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[18] Sentence-modifiers that qualify the whole utterance act are not strictly attached to either subject nor predicate, e.g. 'in my opinion', 'frankly', etc. This nebulous status is shown by the ability of these modifiers to be either used or omitted in the 'who/what' question. Note also that the tendency to replace the subject with the 'who' or 'what' is only a preference easily modified in a context of expectations about what is interesting or important (cf. R. Posner, 1980).

answers did not agree with the evidence of the pre-tests. Some students expressed low confidence, but performed quite well; some thought themselves better prepared than the results suggested. Apparently, estimates of one's own grammatical expertise reflect attitudes formed during positive or negative experiences in prior English classes—and are thus not very reliable predictors.

2.23 I ran each session within a single 50-minute class period. Ten minutes went to each test, so that 30 remained for the entire presentation and the exercises based on a worksheet of samples. The pre-test was given before any grammatical explanations. Each sentence was scored as either right or wrong (since the definitions of "subject" and "predicate" depended on each other), so that the paper would score between 0 and l0 errors. In my first trials, the post-test showed improvements over 500%. To see if these results could be obtained by the average teacher, a group of teaching assistants at the University of Florida replicated the method with a larger sample. Four assistants gave the tests to a total of 96 students, mostly freshmen, again within a single class period. The total errors came to 602 on the pre-test and l2l on the post-test: an improvement of 495%, almost five times better. If we set aside the "special services" section for students with known literacy problems, the improvement was 898%. 73 students improved, 13 stayed the same, and 2 got worse. The statistical significance of our results is obvious.

2.24 An equally simple teaching module is used to define the clause. To see whether a clause is *independent,* and hence a useable core for a sentence (V.2.21), a similar conversion operation is carried out. This time, the strategy is:

> *Make up a 'yes/no' question about the statement made in the clause. If the question works, the clause is INDEPENDENT.*

As it happens, only an independent clause makes a question that can sensibly be answered with 'yes' or 'no'. For instance, speakers of English would make (324) into (324a), but not (325) into (325a):

(324) He works too hard.
(324a) Does he work too hard?
(325) Because he works too hard.
(325a) Because does he work too hard?

This technique catches the dependent clause punctuated as a sentence, e.g. (325)—a widespread type of fragment (V.2.36). Comma splices, on the other hand, make two yes/no questions (V.2.42).

2.25 These techniques specify the minimum requirements for a clause or sentence, but do not yet describe the more elaborate formats of "compound" and "complex" sentences. Those require an understanding of how *junctives* (or "linking words," as I say in class to sound less technical)[19] link

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[19] Traditionally, all junctives are imprecisely called "conjunctions," despite the inclusion of disjunction and opposition. In IV.2.52, I offered a more exact terminology.

up clauses—another formidable issue for naive writers. The most compact approach I found is to start with the definition:

A clause not preceded by any linking word is independent.

Samples at this stage include simple sentences like (326), and complex sentences like (327) with the independent clause after the dependent one. Clauses are separated by commas to make the clause boundary obvious (a later punctuation module along the lines presented in IV.3 takes care of comma placement).

(326) The lady over there is taking her time
(327) Whenever he works so hard, he looks exhausted.

In an early pilot, I included a module specifically devoted to telling apart "simple," "compound," "complex," or "compound-complex" sentences. Students disliked this terminology, and had trouble using it. They said it sounded confusing and technical, especially "complex," which reminded some of "complicated" and others of a neurosis, and "compound-complex," which seems to short-circuit opposite notions (or to compound the neurosis). I soon found that the terms could be discarded by working entirely with "independent vs. dependent clauses"—the constituents which make up these sentence types. The approach became more compact and, at the same time, dropped some undesirable terms from the traditional repertory (cf. V.2.28f).

2.26 Next, the students memorize only the list of common linking words that do *not* create dependencies, rather than the much longer list of those that do. In current usage, the list contains four principal items, 'and', 'or', 'but', and 'so'; 'for' is fading away, and 'either', 'neither', and 'nor' go along with 'or', but have some peculiar effects. I therefore concentrate on the main list of four. The next definition is:

Any linking word on the list of four makes the clause after it equal to the clause before it.

If the clause to be classified is at the start of the sentence, the definition can't be applied. If there is an independent clause before, as in (328), or a dependent clause before, as in (329),—the "yes/no" question helping to identify which is the case—the linking word makes the next clause into another of the same. This approach blocks the misconception that any clause introduced by 'and', 'or', or 'but' is necessarily independent.

(328) The moon rises among the stars, *and the town sinks into silence.* [independent]
(329) When the moon rises, *and the stars come out,* the town sinks into silence. [dependent]

The students examine a series of samples, circling independent clauses and underlining dependent ones. Common sentence patterns up to three clauses are practised.

2.27 These brief modules should suffice to illustrate the principles of the method (cf. Beaugrande, 1982a). First, the students learn to work with intricate grammatical categories by doing simple, familiar actions on language samples. Expertise in traditional grammar is not required. Second, attention centers on the categories most essential in going from speech to writing. Third, these operations are meticulously streamlined by the instructor before reaching the student. The trade-off at stake here—if the student's task is to be easy, the instructor must work all the harder, and vice versa (VI.3.5)—must not be resolved at the student's expense. Since the average teacher is already overloaded, textbooks and computer adjuncts must be developed that reflect this streamlining; and hide-bound publishers must be persuaded to distribute them (cf. VI.3.26). For all three reasons, simplicity, compactness, and brevity become top standards for designing instructional materials and methods. Increasing numbers of students need to get a grasp on grammar. But those with the greatest needs are the least likely to profit from drills in diagramming sentences and naming "parts of speech." As we saw from the findings on adjectives (V.2.10-16), most word classes are anchored in everyday language experience. We can tap that experience just enough to clarify the issues that trouble untrained writers.

2.28 Admittedly, instructional design from this standpoint is arduous. There is no principled way to know if the current version is the most compact one. Later, it may emerge that the work of two operations can be done with just one. For example, I devised the following means for finding the *agreeing verb* of the predicate, since agreement is a difficult issue for naive writers with certain dialects. Two steps, sometimes three, will do the job. First, insert a so-called *denial word* into the statement, namely, 'doesn't/don't', 'didn't', or 'won't'. Second, the "agreeing verb" of the original statement is the one now located *after* the denial word.[20] One example was:

(330) Our boss wants to call a meeting.
(330a) Our boss *doesn't* want to call a meeting.

If you can't insert a "denial word," a third step is done. Insert 'not' or '-nt', and the agreeing verb is the one *before* this insertion; or, if the statement already has a 'not' or '-n't', the verb is the one before that, and no insertion is necessary. This technique exploits the peculiar English constraint of attaching negation in declarative sentences to the finite verb via an auxiliary that is either already present or else added for the purpose. By using contractions as denial words, I preclude confusion with any other positions that 'not' by itself can occupy in a sentence.

2.29 In another module, I was struggling with *tense* by testing insertions of time expressions like 'right now', 'next year', etc. This classic text-

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[20] Black English has some inverted forms where the denial word comes at the start of the utterance, but usually only if the subject is 'nobody', 'no one', or the like.

book problem comes from the asymmetry between tense and time, so that both content and structure can be confusing or conflicting (cf. V.2.4f).[21] You explain past, present, and future tense in terms of when something happens, and then turn right around and admit that the present tense can be for both past or future time (Quirk et al., 1972: 86). Or, you stress changes in verb forms, and get stuck on verbs like 'set', 'put', 'fit', and so on, which don't alter their forms for tense. I finally realized that the whole dilemma could be effortlessly resolved with the denial-word insertion I had previously invented for working on verb agreement. The "past" is the tense that takes 'didn't'; the present takes 'doesn't/don't', and the future takes 'won't'. These words are either already present or can be mentally inserted to decide the tense of any finite verb in a sentence. Sample sentences become manageable as soon as the student supplies any context. Some samples were:

(331) Our kids set the table
(331a) Our kids *don't* set the table. [= *present*]
(332) Our team just set a new record.
(332a) Our team *didn't* just set a new record. [= *past*]
(333) The sun will set before 7:00.
(333a) The sun *won't* set before 7:00. [= *future*]

No lectures on the nature of time and perspective are needed; nor is an unchanging verb form an embarrassing exception. A speaker of English naturally gets the desired results, simply because language experience guides the action that in turn defines the category (V.2.16f). In tests run by Barbara Stephenson and Michael McCoy, 45 college students made less than half as many errors on recognizing agreeing verbs and tenses after learning this technique than they had made before. 35 students improved, 5 stayed the same, and 5 got worse.

2.30 Easy operations for identifying sentences and clauses are a good basis for clarifying and resolving common sentence problems, such as fragments, splices, and run-ons. These formats are popularly called "sentence errors," though this classification has seldom been carefully defended. The fragment is to be eschewed because it "doesn't really say anything" and "leaves the reader wanting something more" (Glazier, 1981: 67, 44); and because it "does not communicate a grammatically complete thought" [22] (Moody, 1981: 363). The comma splice is condemned on the grounds that it "makes two complete statements that should not be run together in one sentence" (Glazier, 1981: 44). These claims overlook the communicative motives that lead to fragments and splices. These patterns are straightforward by-products of the asymmetry between statements and sentences

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[21] Greenbaum and Taylor (1981: 173) found that 5 of the 27 English teachers they surveyed changed 'was' to 'is' in 'I told them my daughter was now a doctor', "under the mistaken impression that 'now' required the present tense."

[22] On the confusion between thoughts and sentences, cf. I.2.16.7; II.3.42; IV.2.18, 32f.

(V.2.18, 37). For the writer, the fragment does convey a "complete thought" of some kind (V.2.32ff); and the comma splice invariably joins components the writer feels belong together in one statement (V.2.39ff). Besides, these patterns may be repaired with mechanical changes (e.g., replacing a comma with a semicolon) that have no effect on "thoughts." Recently, textbooks have attained enough tolerance to discuss cases where fragments are motivated (Corder, 1979: 230ff; D'Angelo, 1979a: 573ff; Tibbetts & Tibbetts, 1979: 366; Willson, 1980: 201f; Mills, 1981: 241).

2.31 Again, the composition teacher is caught in a dilemma between coercive rules and free expression, between language attitudes and language realities (cf. I.3.13). Severe persecution of fragments and splices intimidates students about producing any sentences; or alienates them when they find such formats in competent professional writing and conclude that the teacher is unreasonable or uninformed. In turn, anxieties and loss of motivation degrade writing performance (cf. I.2.10; III.2.12). On the other hand, some readers may be excessively intransigent toward "sentence errors" in important situations, above all when the writer is at a social disadvantage (cf. V.2.19). My own solution to the dilemma is a delicately balanced compromise. I explain to the students that certain "errors" can be used against them in a school or career setting; but my role is to diagnose and assist, not to evaluate and punish. I try to be a chronicler of public attitudes rather than their enforcer (cf. I.2.19; V.3.26). Accordingly, I have been studying the motives, causes, and effects of the troublesome sentence patterns. The sentence is a unit whose demarcation leads processing to predict certain components in standard formats (III.2.28). A "sentence error" is registered if a pattern either lacks some components (fragment), or has a poorly integrated surplus (splices and run-ons). Whether these deviations are disturbing depends on situation, text type, and reader focus. Like most conventions, sentence patterns can be creatively violated, provided the result leads to a convincing, insightful new order (cf. I.3.7,10).

2.32 The SENTENCE FRAGMENT can illustrate the approach advocated here (cf. Kline & Memering, 1977; Harris, 1981). Its creative use is common in good writing. A critic who disdained T.S. Eliot's 'Rhapsody on a Windy Night' because it opens (334) and closes (335) with sentence fragments

(334) Twelve o'clock.
(335) The last twist of the knife.

would only be ridiculed. The context of the poem, and of many like it, calls for the juxtaposition of brief, fragmentary statements among which 'all clear relations' are 'dissolved' in 'a crowd of twisted things'. These motives justify overriding the *core-and-adjunct* principle in favor of *listing*. Prose can also deploy fragments to good effect, such as listing brief impressions or thoughts (Corder, 1979: 231; Willson, 1980: 202):

(336) There are other things that affect me the same way. Blue-and white striped sheets. Vermouth cassis. Some faded nightgowns which were new in 1959 or 1960 [etc.] (Joan Didion, "Farewell to the Enchanted City")
(337) Sam Clark's Hardware Store. An air of frankly metallic enterprise. Guns and churns and barrels of nails and beautiful shiny butcher knives. (Sinclair Lewis, *Main Street)*

Also, fragments can assign *heaviness* to word groups by making them autonomous stretches, rather than adjuncts of something else. All the resources that normally get distributed over a whole sentence are focused on just a few words. The heavy fragment can be a direct *recurrence* (IV.2.37) of an element from a preceding sentence (Corder, 1979: 231) (or less often, an anticipation, cf. IV.2.58):

(338) Many have never been taught the pleasure and pride in setting standards and then living up to them. Standards! (John Gardner, *Excellence)*

Heavy fragments can suggest the importance and style of a telegram, as in the NCTE "tel-a-message":

(339) Contacted you last month about membership in National Council of Teachers of English (NCTE).

But must reach out to you again.
Response to current membership drive tremendous; English/language arts educators joining NCTE in record numbers. Association membership growing. [etc.]

This quasi-telegram (sent letter rate) signed by the NCTE executive director contains 32 stretches punctuated as sentences: 20 fragments, 10 imperatives (whose lack of a subject aligns them with fragments), and 2 complete sentences. The short statements and paragraphs draw attention (cf. IV.2.69; IV.3.17) and evoke the hurried urgency of telegram situations (e.g., sudden requests for money). The NCTE leadership knows better than most textbook authors how fragments can very well convey "complete statements" or "thoughts" and "really say something" (cf. V.2.5, 30).

2.33 Purposeful sentence fragments usually correspond to perfectly good conceptual chunks ("thought units") (cf. IV.2.18, 32f; V.2.30; V.3.8). This correspondence also contributes to fragments that report or imitate *speech rhythms,* since many non-sentence phrasings are uttered as separate units, with a pause before and after (cf. I.4.11.2; III.2.28; IV.2.17; V.2.18; V.3.7). Spontaneous answers to questions are often fragments (cf. Kline & Memering, 1977; D'Angelo, 1979a):

(340) GRACIE: My poor brother Willie, he was held up last night.
GEORGE: Your brother was held up?
GRACIE: Yeah, by two men.
GEORGE: Where?
GRACIE: All the way home.
(Burns, 1980: 70)

To make every answer a complete sentence (e.g., 'My poor brother Willie was held up last night all the way home') would destroy the effectiveness. For similar motives, writers use fragments in a conversational prose style, as in (341) and (342). Only one word in (342) is an actual quote of speech; the rest suggests internal speech ("Erlebte Rede") of someone on a bad LSD trip trying to figure out what's going on.

(341) I notice Harding is collapsed beside McMurphy and is laughing too. And Scanlon from the bottom of the boat. At their own selves as well as at the rest of us. (Ken Kesey, *One Flew Over the Cuckoo's Nest)*

(342) Jane in front of his face, a foot away, then way back over there on the sofa, then zooming up again, all of it rocketing back and forth in the hulking heat.—"Sandy!"—somebody is in the house looking for him, Hagen? who is it?—seems Babbs wants him in the movie. (Tom Wolfe, *The Electric Kool-Aid Acid Test)*

Advertizements are fragmented for both reading ease and focused attention (cf. V.2.32). Contrast (343) with (343a), or (344) with (344a) (after D'Angelo, 1979a: 571f):

(343) Each is a masterpiece. Realistic, yet delicate.

(343a) Each is a realistic, yet delicate masterpiece.

(344) I guess that's what makes a classic a classic. The ability to look completely different depending on how it's used.

(344a) I guess the ability to look completely different depending on how it's used is what makes a classic a classic.

The reader is more likely to focus on the individual pieces of the message, especially if processing is casual (e.g., skimming a newspaper or a magazine). (344) elicits brief suspense with a dummy place-holder ('that') to make readers curious (cf. IV.2.63).

2.34 Speech rhythms and conceptual chunking are typical causes for fragments in student writing. The issue is whether the fragments are motivated, like those in V.2.32-33, or accidental and disruptive. We can explain to students why a fragment might be written and leave them to decide by themselves what dangers or benefits are involved in a given case. A naive student naturally marks off as a sentence what would constitute a separate stretch of speech, as in:

(345) We wandered off looking for something to steal. Little kids' toys in particular.

Structurally, the most common fragment is formatted as an adjunct whose core is in an adjacent sentence, generally the preceding one (346-348) (Harris, 1981: 177), but sometimes the following one (349):[23]

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[23] Nystrand (personal communication) has students proofread their sentences backwards; the fragment is then easy to find if it comes after the sentence it belongs to.

(346) You see I'm trying to avoid another scrambled egg breakfast. Basically because I hate them.
(347) Coming off the bench, Junior Mickey Mastics performed superbly for the gators. Averaging in the double figures with consistent outside shooting.
(348) I like to wear a pants outfit. Maybe a pair of pleated slacks, a silk shirt, and a jacket to match.
(349) Once an emergency has been established. The trip down to Aigle is quite cheap.

The fragmentation might result from time lags as conceptual or phrasal chunks are returned by memory search. In *post-activation,* the chunk comes too late and is expressed after the slot it would normally occupy (III.3.32; IV.2.11; V.3.30f). Closely-knit phrasal chunks, such as a dependent clause (346), a long modifier (347), or an appositive list (348), might be processed with just enough delay that their relation to the foregoing structure is blurred and the latter is closed off as a sentence. Another explanation could be in terms of *reactivation.* The text producer can intentionally restart a suspended statement (cf. IV.2.50, 67; V.3.20f, 30). A fragment that repeats the last word of the sentence before it resembles a reactivation, e.g.:

(350) We are waiting. Waiting for someone else to solve our energy problems. (D'Angelo, 1979a: 571)

From the readers' standpoint, fragments due to reactivation and post-activation would be easy to process via look-back.

2.35 Some accidental fragments in student writing occur because their format roughly resembles a sentence. A non-agreeing verb form, e.g. a participle, may get confused with a main verb:

(351) These objects being the mountains.

Long or complex adjuncts are easy to mistake for complete sentences:

(352) Not even an extremely educated man will react positively to a wordy, tiresome opening statement. Because, as a whole, people do not feel ads are that important and will not take the time to read on if their interest is not caught right away.

The student who wrote (352) was misled by a fragment with three subject-predicate cores in complicated subordinations. Complex modifiers pose a similar danger:

(353) Captured in her spell-binding look and knowing every second he stood there risked her seeing him.

The writer of (353) demonstrated considerable fluency and vocabulary, and made few mechanical errors. But his striving for syntactic variety and complexity led to fragments he wouldn't have written if he'd been content with a simpler style (cf. II.3.46; V.2.41).

2.36 In V.2.24, I outlined a technique for recognizing independent

clauses by converting them into "yes/no" questions. A sentence fragment fails this test, either because it lacks the needed subject or verb, or because it hinges on a dependent linking word. For long modifiers with no verbal participle, both subject and verb would have to be supplied to make a question:

(345a) Little kids' toys in particular.
(345b) *Did they look for* little kids' toys in particular?

Modifiers with past participles need a subject and finite verb:

(353a) Captured in her spell-binding look.
(353b) *Was he* captured in her spell-binding look?

A modifier whose present participle was misjudged as a finite verb forces us to warn against dropping off the '-ing' for the question:

(351) These objects *being* the mountains.
(351a) *Are* these objects the mountains?

Dependent clauses have both subject and verb, but don't make sensible questions (V.2.24), e.g:

(352a) Because people do not feel ads are that important.
(352b) Because don't people feel ads are that important?

Naturally, these conversions become harder when the fragments are quite complex, as in (352) and (353). Students whose desire for complexity engenders numerous fragments should simplify their style. Or, they can practice doing sentence-combining on the patterns of sentence + fragment, or fragment + sentence, until complexity becomes more tractable (cf. II.3.47). Realistic samples can readily be gathered from student papers.

2.37 Sentence fragments are a less serious problem if student writers understand causes, motives, checking procedures, and remedies. Fragments naturally arise from asymmetry between statements and sentences (V.2.30). Conceptual and pragmatic chunks need not emerge as complete syntactic chunks (V.2.18, 33). Thus, nothing is accomplished by telling students that fragments are devoid of meaning and purpose (V.2.30). Instead, the students should appreciate what tendencies lead to fragments, and what conditions justify or discourage their use in good writing. Then, workable techniques for finding and fixing fragments would be more efficient and reliable. Anxiety and inhibition are lower because the errors aren't denounced or penalized, rather than explained (V.2.31). This approach can work, and has worked in several pilots I designed. Like any "error," fragments are easiest to control if treated as natural events that can be detected and repaired whenever they might put the writer at a disadvantage.

2.38 Another by-product of chunking can be called the SPLICE: the joining of two independent clauses without a junctive or appropriate punc-

tuation in between. I coined this non-traditional term to subsume both simple juxtaposition (sometimes called a "run-on") and the well-known "comma splice." Just as a fragment occurs when a conceptual chunk does not map onto at least one independent clause, a splice occurs when such a chunk maps onto two independent clauses without proper means to combine them inside a sentence. The outcome reflects the fuzzy borders of spoken statements. Shaughnessy (1977: 18) suspects "a psychological resistance to the period—perhaps because it imposes an end on a unit the writer usually had difficulty beginning." Such anxiety would drain away attention from sentence boundaries that don't match statement boundaries. The plain splice has nothing at all between the clauses, e.g., after 'starts' in:

(354) All basketballs game are started with a jump ball unless a technical foul is called before it starts then the team that shots the technical takes the ball out at the beginning of the game.

Leaving a major pause boundary unmarked is fairly conspicuous and can create an unmanageably large chunk (cf. V.2.44). My samples suggest that plain splices are more common when a writer is young or inexperienced, or is trying to build a confusingly complex sentence like (354). Otherwise, fragments or comma splices, which at least mark pauses and boundaries, appear in greater proportions in both professional and student writing. Nor can I find any textbook willing to tolerate plain splices.

2.39 COMMA SPLICES, where a comma alone joins independent clauses, are much more frequent because they are less noticeable and disruptive. The comma indicates a pause and identifies the boundary between two main cores (cf. IV.3.6). Moreover, a comma between clauses is standard if one of them is dependent. Naive writers uncertain about clause types would thus be very prone to making comma splices out of closely related statements, e.g.:

(355) Melvin couldn't get in, he didn't look old enough.

Readers also seem less disturbed. In Hairston's (1981: 797) survey, comma splices were not judged as serious a failing as fragments (cf. V.2.19). Professional writers working for a conversational style produce comma splices

writers working for a conversational style produce comma splices freely, e.g.:

(356) Today marriage is old-fashioned, it's like getting your spats cleaned. (Burns, 1980: 5)

Willson's textbook (1980: 209f) describes comma splices in an "antithesis," and in a pattern of 'it isn't this, it's that' as "legitimate":

(357) It was more than an annoyance, it was a pang. (Winston Churchill)
(358) To allow the Madhi to enter Khartoum would not merely mean the return of the whole Sudan to barbarism, it would be a menace to the safety of Egypt itself. (Lytton Strachey)

Though noted writers like Churchill and Strachey presumably command the sentence, most textbooks, even those willing to admit justified fragments (V.2.30), either don't mention these splices or else condemn them. D'Angelo (1979a: 567) calls the 'it isn't this, it's that' pattern "unacceptable" (as does Moody, 1981: 372):

(359) The process isn't really hard, it just takes patience.

Whereas Willson (1980: 209) allows lists of three independent clauses—in which *listing* should apply more than *core-and-adjunct* —such as:

(360) The shrubs were leafy, the walks had been carefully raked, and the fountain shone in the sunlight.

Moody (1981: 372) rejects the same construction and wants a period in the place of the first comma. My colleagues in the English department disagreed whether a pattern with 'so/such' in one clause counts as a comma splice, e.g.:

(361) I was so mad, I just left.

The point of contention is whether a 'that' must be inserted, or whether it is optional, as it is at the start of an indirect statement (362), and of a relative clause depending on a noun acting as the object of a verb or preposition in that clause (363) (Quirk et al., 1972: 788, 215):

(362) He said (that) they might be wrong.
(363) This is a man (that) you should know

There is no obvious reason to insist on the 'that' in formats like (361) only, unless we're nervous about comma splices.

2.40 As I argued for fragments, comma splices should be remedied in view of their causes and motives. One cause already noted is the relatedness of the two statements. The second statement usually gives support or elaboration to the first, as in these student passages:

(364) The journalism class was a very good one, we all worked together and got along with the advisor.
(365) The school didn't financially support the paper, all costs were raised by the journalism class.

My tapes of students reading their papers aloud showed a shorter pause at the comma than at the period in such cases. Another cause is the confusion between clause-linking junctives vs. adverbials which, though conceptually and pragmatically similar, do not have the same syntactic function. 'And' is confused with 'also', 'moreover', 'too', 'besides', or 'in addition'; 'but' with 'however', 'only', 'still', 'nevertheless', or 'all the same'; 'or' with 'otherwise'; and 'so' with 'therefore', 'thus', 'hence', or 'consequently'. The result is a splice, e.g.:

(366) Becoming an attorney is often difficult, *however,* it is a very rewarding occupation.
(367) The letter had to arrive the next day, *otherwise* it would be too late.
(368) A stage can swallow up one person, *therefore,* the actor's objective should be to fill up the entire stage.

To the grammatically naive student, such a pattern seems unobjectionable. The privileged status of junctives over transition words of comparable meaning is a subtle distinction easy to miss.

2.41 Like fragments, splices are harder to detect if the student works for complex phrasing (V.2.35). For example, a dependent clause may be put between two independent ones, so that either one of its boundaries or the other is technically a splice:

(369) They talked for a while on their pasts, even though they had geographic differences they shared many common interests.

This sentence came from the same student whose elaborate phrasing entrained him in sentence fragments like (353) in V.2.35. *Reported speech* can also obscure sentence formats. A declarative quotation is usually set off from the main verb by a comma. But usage is unclear about having two such boundaries in one sentence; we find that format in the writings of Lewis Carroll (1960: 100), who was emphatically careful about punctuation,[24] e.g. the Dormouse's reply:

(370) "I wasn't asleep," it said in a hoarse, feeble voice, "I heard every word you fellows were saying."

Yet some textbooks (such as Willson, 1980: 210) class that usage under comma splices. This diagnosis is less contestable if the writer shifts from direct to indirect quotation. (371) is more objectionable than (371a):

(371) "A casual escape," Keith said, he didn't see any reason to breed rumors.
(371a) "A casual escape," Keith said, "I don't see any reason to breed rumors."

2.42 Ordinary comma splices are easy to detect because, being two independent clauses, they yield two 'yes/no' questions (V.2.24). (365) gives us (365a) rather than (365b):

(365) The school didn't financially support the paper, all costs were raised by the journalism class.
(365a) Didn't the school financially support the paper? Were all costs raised by the journalism class?
(365b) Didn't the school financially support the paper, all costs were raised by the journalism class?

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[24] He even wrote 'sha'n't', 'wo'n't', etc., with an apostrophe for each position where letters were omitted.

Or, the components of the comma splice can be recognized as independent clauses because they are not introduced by a linking word (cf. V.2.25).

2.43 The conceptual and pragmatic relatedness of the two spliced parts counsels against the old schoolroom remedy of replacing the comma with a period. The writer intended the parts to go together in one statement (V.2.30, 38). One student explained, "I felt it wasn't clear yet, so I added something." A semicolon would keep the statement unified, but might be noticeably overused by unskilled writers, thanks to its the dual function for pausing and look-ahead (half a comma, half a colon, IV.3.26) (cf. Shaughnessy, 1977: 33f). The most satisfying solution is a junctive that makes explicit the conceptual relationship the writer intended, e.g.:

> (364a) The journalism class was very good, *because* we all worked together and got along with the advisor.
> (365c) The school didn't financially support the paper, *since* all costs were raised by the journalism class.

A pause at the boundary, if needed, can be indicated with the comma. An adverbial mistaken for a junctive can be replaced with the latter:

> (366a) Becoming an attorney is often difficult, *but* it is a very rewarding occupation.

Practice with sentence-combining could be designed to help students recognize the difference between splicing clauses vs. linking them with junctives (cf. II.3.47).

2.44 Though occasionally used for the splice, the term RUN-ON is an easy designation for an awkwardly long series of independent clauses that "run on and on," such as:

> (372) I'm on the university swim team and I can swim well, but I'm not the one to get involved, so I hope I don't have an emergency situation, or I won't know what to do.

It mimics the tendency of spontaneous speech to bridge over boundaries with junctives (cf. V.2.18; V.3.13), partly to keep from losing one's speaking turn. Especially if the writer steers away from punctuation, the run-on may be employed to fit the whole message together, as in Shaughnessy's (1977: 31) sample:

> (373) The paragraph says that children like to see other birds sing and they want to know the names of different kinds of birds and then they don't hear or see the birds and the father comes to the son and says that one of the birds is a sparrow and the other one is a jay

Splices and run-ons are possibly symptoms of the same hesitation to break up a conceptual chunk, since they appear in the same papers. This student treated the whole reported conversation as a chunk without marking off either sentences or speakers' utterances:

(374) Lennie has killed a girl up at the ranch in Weeds thats why they came to the barley ranch. [. . .] I got four dollars to pay for my half of the farm and George says all we need is mine and Lennie month pay and I can write the lady and maybe we can get the farm for four hundred dollars.

Normally, objections to the run-on are not supported by grammar, since junction by itself is a legitimate clause-linking device. The problem is rather one of overloading processing by an excessive accumulation of junction, such that pauses are not provided to consolidate the components of the message (cf. IV.3.12). A writer should not place this strain on a reader except for special effect, such as evoking a rush of almost simultaneous images (375) or a rambling association of thoughts (376). Note that the splices in the Joyce passage make it less readable than the Wolfe passage with junctives at all clause boundaries (cf. V.2.38):

(375) He came back to the house at dark, into the yard, and there were a million stars in the sky, like tiny neon bulbs, and the bus, it broke up into a sculpture of neon bulbs, millions of them massed together to make a bus, like a whole nighttime of neon dust, with every particle a neon bulb, and they all vibrated like a huge friendly cicada universe. (Wolfe, 1969a: 87)

(376) Mulveys was the first when I was in bed that morning and Mrs Rubio brought it in with the coffee she stood there standing when I asked her to hand me and I pointing at them I couldn't think of the word a hairpin to open it with [etc.] (Joyce, 1934: 743).

Without such motives, the writer should be considerate and break the sentence apart with periods or at least semicolons.

2.45 Incomplete, confused, or oversized sentence formats, I have tried to show, appear naturally in writing. The sentence itself is a subtle, somewhat artificial notion compared to the free flow of statements in spontaneous speech. However, readers who expect sentences and use them as a guide for efficient processing deserve consideration. Exceptional formats should be reserved for occasions where they serve an express purpose (V.2.32f, 39, 44). Students should be aware of these formats enough to recognize and amend them, preferably via simple procedures, such as 'yes/no' questions (V.2.24, 36, 42), that make speech habits work in favor of sentence control rather than against it. Like any potential writing troubles, sentence problems should be seen in their communicative contexts which clarify the motives the writer should respect in the solution.

3. SPEAKING VERSUS WRITING

3.1 Ferdinand de Saussure (1916: 45) averred that "the only reason for the existence" of writing is to "represent" speech. Bloomfield (1933: 21) insisted that "writing is not language, but merely a way of recording lan-

guage by visible marks." These authoritative pronouncements, which in effect reduce all of writing to spelling alone (cf. V.1.1), had the effect that "many linguists consider all forms of writing outside the domain of linguistics" (Gleason, 1955: 408). Probably, this bias was reinforced by the impressive success of phonology in classifying speech sounds (II.1.6).[25] Although syntactic approaches such as immediate constituent analysis and transformational grammar worked on written sentences (II.1.13; II.3.14), the primacy of speech was not questioned until recently (e.g. by Householder, 1971; Vachek, 1973).[26] Once quite rare, collections of both theoretical and empirical research on writing are now appearing frequently, e.g., those edited by Gregg and Steinberg (1980), Frith (1980), Hairston and Selfe (1981), Frederiksen, Whiteman, and Dominic (1982), Martlew (1982), Mosenthal, Tamor, and Walmsley (1982), Nystrand (1982), Tannen (1982, 1984), Matsuhashi (1984), and Pellegrini and Yawkey (1984).

3.2 It is now recognized that writing and speech are distinct systems: the norms and functions of each system fit a given situation better than those of the other (Vachek, 1973: 16). The two modalities differ along many important dimensions, such as: motor control of actions (van Bergeijk & David, 1959; Smith McCrary, & Smith, 1960; MacNeilage, 1964; Rumelhart & Norman, 1981; Nystrand, 1982b); rate of production (Blass & Siegman, 1975; Gould, 1979; Chafe, 1982; Scardamalia, Bereiter, & Goelman, 1982); pauses and hesitations (Matsuhashi, 1979, 1981, 1982; Flower & Hayes, 1981; Spittle & Matsuhashi, 1981); length of texts (Horowitz & Newman, 1964; Blass & Siegman, 1975; Hidi & Hildyard, 1980; Tannen, 1982); proportions of linguistic and grammatical options (Green, 1958; Fraisse & Breyton, 1959; DeVito, 1966; Gibson, Gruner, Kibler, & Kelley, 1966; Mos-

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[25] As remarked in Note 12, the word "grammar" is derived from the Greek word for "letters." The recent suggestion that the "phoneme" is defined so easily because of our habits in recognizing the corresponding letters (V.1.31) would not be accepted in conventional linguistics.

[26] Olson (1977a, 1977b) undertakes to salvage logic-based sentence linguistics and psycholinguistics by arguing that they really apply not to speech, but to writing of a certain kind. This striking maneuver may be a novelty in the history of science: claiming that a theory or approach is adequate, but that its originators somehow applied it to the wrong object domain all along. Olson's "text" (actually, a series of sentences) is "best represented by formal, written, expository prose statements," for which, he avers, "the meaning is in the text" (1977a: 262). This "text" is to be interpreted in terms of a logical "truth" based only on "the correspondence between statements and observations" and with no "ties to wisdom and to values" (1977a: 277). Olson claims that "written texts" allow people "to entertain sentence meaning per se, rather than merely using the sentence as a cue to the meaning entertained by the speaker" (ibid.). This hypothesis is not even true for Olson's own paper. My reading of it is guided not by what is made explicit, but by my supposition that its author wants to justify research that discounts communicative contexts, attitudes, beliefs, world-knowledge, and all the other complex frameworks that guide discourse processing, both spoken and written (cf. I.4.11.2, 4; I.4.6; III.2.33; III.3.14ff; III.3.24). For example, the active enrichment of meaning with mental imagery and cultural assumptions for the Pike story (III.3.25ff) was found to be exactly the same, whether the students heard or read the text. Evidence of this kind is legion, whereas there is no shred of evidence for Olson's disembodied "sentence meaning per se."

covici, 1967; O'Donnell, Griffin, & Norris, 1967; O'Donnell, 1974; Danks, 1977; Harris, 1977; Einhorn, 1978; Danielewicz & Chafe, 1981; Chafe, 1982; Beaman, 1983; cf. VI.1.10); organization and integration of ideas (Horowitz & Newman, 1964; Horowitz & Berkowitz, 1967; Olson, 1977a; Caccamise, 1981; Collins & Williamson, 1981; Chafe, 1982; Glatt, 1982; Scardamalia, Bereiter, & Goelman, 1982); degree of redundancy (Horowitz & Newman, 1964; Horowitz & Berkowitz, 1967; Sunshine & Horowitz, 1968); ease of comprehension (DeVito, 1965; Durrell, 1969; Oakan, Wiener, & Cromer, 1971; but cf. Sticht, 1972); spatial and temporal situationality (Goodman & Goodman, 1979; A. Rubin, 1980); degree of involvement (Chafe, 1982; Tannen, 1982); social diversity (Hartwell, 1980; Stubbs, 1982); social interaction in discourse (Britton et al., 1975; Tierney & LaZansky, 1980; Kantor & Rubin, 1981; M. Cooper, 1982; Nystrand, 1982a; Shanklin, 1982; Steinmann, 1982; Tannen [Ed.], 1982, 1983); and so forth. There is hardly a dimension of textuality or text processing that does not reflect some significant differences between the spoken and the written modalities.

3.3 Children normally acquire speaking skills before writing skills (cf. J. Taylor, 1973; Britton et al., 1975; Lundsteen, 1976; Smith, Goodman, & Meredith, 1976; Olson, 1977b; Kroll, 1981; Pellegrini & Yawkey [Eds.], 1983). The vital question is therefore how much the former skills support vs. impede the latter. Whatever linguistic features are characteristic of the two modalities must be related to the convergences or divergences in their respective processing. At least some specific writing problems are influenced by speech habits: speech pauses confusing punctuation (IV.3.4, 16); word sounds interfering with spelling (V.1.42); fuzzy boundaries of speech statements encouraging sentence "errors" (V.2.30-44); and so on. These traditional stumbling blocks in the classroom can be better overcome if we understand the complex organization of discourse processing enough to get at the essential causes of malfunctions and errors.

3.4 An analogy between learning to write and acquiring a second language has been suggested (R. Allen, 1966; Reed, 1973). This approach has the advantage of not stigmatizing or intervening in the learners' spoken dialect—all too common practices in older approaches (cf. Marckwardt, 1966; D. Baron, 1975; I.2.23.4; VI.1.12). But there are disadvantages to consider as well. On the practical side, second-language instruction is in no better a state than composition instruction (cf. Beaugrande, 1982g). On the theoretical side, Hartwell (1980: 105) objects that people who regularly use two dialects equally well are rarer than those who speak two languages with the same fluency; moreover, the written modality is neutral regarding such dialect features as intonation and articulation.

3.5 Nonetheless, children apparently undergo an early stage during which their writing resembles their speaking more than is the case for adults (cf. C. Rosen & H. Rosen, 1973; Britton et al., 1975; Wilkinson & Hanna, 1980; Hidi & Klaiman, 1981; Kroll, 1981). My own data suggest a related

tendency among unskilled college-age writers. I have been recording students speaking on the same topic they had written on or were about to write on. I varied the conditions: which activity came first, how much time elapsed in between, and the estimated difficulty of the topic; yet in all cases, no written text came out as a facsimile of the spoken. Indeed, even writers who habitually vocalize (talk out the text as they write) often put down on paper something quite different from what they said just seconds before (III.2.27). There was an overlap in the selection of words and phrases, but no perfect match. Another consistent finding has been that one's writing skills need not be reflected in speaking. Speech transcripts of English professors bore many traits also common in those of unskilled freshman writers. This finding indicates that trying to improve literacy by tampering with people's speech is not only tedious, but irrelevant.

3.6 A demonstration of speech vs. writing can be taken from one of my diagnostics that gauge students' writing skills by creating contexts where *content* is made easy, namely, retelling the story of a silent film just viewed (cf. III.1.2.5; III.3.24; Irmscher, 1979a: 83ff). When the phases of ideation and conceptual development are supported and guided, the phases of expression and linearization should be more open to examination (cf. VI.3.8). *Caught in a Cabaret* (1914, 14 minutes) is an early Chaplin silent that foreshadows running themes of his later work: the downtrodden, moneyless man who is yet ineffably graceful, talented, noble-hearted, and valiant against overwhelming odds. He portrays a lowly cabaret waiter struggling against a host of irascible people and inanimate objects. On a walk, he rescues a beauteous society lady (Mabel Normand) from a mugger who had frightened away her escort. On beholding her elegant villa, Charlie passes himself off with a fake calling card as 'Baron Doobugle, Prime Minister of Greenland', despite his shabby exterior. Mabel invites him to her afternoon party, which (after a brief interlude at the cabaret) he attends in a borrowed, ill-fitting top hat and frock coat. Profuse liquor renders him flirtatious, jovial, musical, and, finally, incoherent. Any future bliss is shattered later when the lady's friends, urged on by her jealous escort, come to Charlie's cabaret and discover his true social status. The traditional mass combat erupts, and, at the end, Charlie's attempt to reconcile Mabel is requited with a slap in the face.

3.7 Here is the spoken version of this story from a proficient freshman writer, recorded ten days after the writing task:[27]

> (377.1) Okay it starts with / Charlie Chaplin working in // a cabaret / and / he's just a common waiter / who's always getting pushed around and harassed by the owners and everyone else who works there and the customers / (377.2) and then one day / um accidentally he bump- he / has the opportunity to save a damsel in

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[27] This transcription has the usual "/" for a short pause, and "//" for a long one. The numbering is strictly for reference.

distress whose lover / doesn't / whose lover can't help her when she's being robbed / a rich damsel in distress / (377.3) and um // so Charlie Chaplin saves her and she discards her previous lover and goes off with Charlie Chaplin who tells her who / gives her his card and says that he's the Baron of Greenland *[undertone:]* something like that // (377.4) and she's very impressed by this and she introduces him to her parents (377.5) and then / all this time he's just on a in a an hour's break say from his job and he comes back late and he gets harassed more and beaten more and kicked all over the place like he always does when he comes back / (377.6) and she had invited him to her party so he goes to the party in his // oversized / topcoat or whatever it is that they wear tuxedo coat with the cuffs that are always falling down (377.7) and / he is introduced to everyone at the party and they all greet him with enthusiasm because they think he's the Baron of Greenland / and which shows they don't have too much intelligence either / (377.8) and uh // he gets intoxicated at the party // (377.9) and her previous lover is on the side the whole time trying to reveal his true identity because he was he's been spying on him / and he knows that he really works in the bar (377.10) so Charlie Chaplin again was just on a break and he goes back to the bar / and to work and he gets harassed and kicked around some more // (377.11) and / meanwhile uptown all the people at her party decide to go slumming and they coincidentally come to // to the cabaret where he works (377.12) and he covers it up by says that he's slumming too that's why he's there // (377.13) but then his boss reveals his identity to all the people (377.14) and / they everyone starts fighting and he ends up winning the fight but losing the woman

3.8 Again, we can see the fuzzy phrasing of spoken utterances (cf. III.2.30; IV.3.45; V.2.18, 38; V.3.2). Boundaries are conceptually and pragmatically determined, reflecting the topical chunks and pausings arising from ongoing processes. Readers are, I have found, amused by transcribed speech. Put in writing, such samples appear to readers to be fraught with disorder and error. Evidently, people judge writing by standards of organization everyday speech wouldn't meet. Perhaps minor disturbances go unnoticed in speech—listening having much the same limitation as speaking—and suddenly surprise or embarrass the speaker when documented in a transcript. Or, they are noticed but ascribed to a personal lack of skill; language insecurities are thus aggravated (cf. I.2.10f), such as a student of mine revealed by asking me, before starting his protocol: "Is this supposed to be grammatical?"

3.9 Now compare the spoken version (377) with the written version from the same student. As usual, crossed-out materials are shown in pointed brackets, and later insertions in curly brackets.

> (378.1) Charlie Chaplin, who is an ordinary waiter at a local dive, gets a taste of the good life.
> (378.2) Although he seems to do everything wrong, one day he gets lucky. (378.3) He has the opportunity to save a wealthy woman from being robbed, a task that her lover cannot accomplish.
> (378.4) Chaplin saves the woman from the thief and is rewarded with her affection. (378.5) Her affection is immensely enlarged when he shows her his card,

which falsely identifies him as the Baron of Greenland. (378.6) She introduces him to her parents and invites him to a party at her home. (378.7) Meanwhile, Chaplin's boss at the bar is impatiently (to say the least) waiting for his return. (378.8) Charlie Chaplin departs from his newly found love and returns to work, where he is beaten and harassed. (378.9) On his next break, he goes to the party. (378.10) He arrives at the party in <an ove> his regular clothes (including his falling cuffs) but now they are mainly concealed by an over-sized <over> <dinner> {tuxedo} jacket. (378.11) <The guests greet him enthusiastically. He is introduced as the Baron of Greenland.> (378.12) He is introduced as the Baron of Greenland. (378.13) The guests greet him enthusiastically. (378.14) He wanders off with his new love. (378.15) He then proceeds to become intoxicated. (378.16) While this is all taking place, her ex-lover is <in> on the side lines trying to reveal Chaplin's true identity (which he has discovered through spying). (378.17) His attempts are feeble. (378.18) Chaplin departs. (378.19) He stumbles back to work, late again. (378.20) <The same> He enters to encounter more harassment and beatings.
(378.21) On the other side of town his girlfriend and her jet-set friends decide to go slumming. (378.22) Coincidentally, they come to <Chaplin's> the <bar> {cabaret} where Chaplin is employed. (378.23) He tries to cover up by saying he is slumming also. (378.24) This approach works until his boss reveals his true colors. (378.25) A fight breaks out. (378.26) Chaplin <losses> loses his love and chance to be a part of the upper crust but he wins the fight.

3.10 Several speech factors account for the impression that (377) looks inferior to (378) as a sample of writing: (a) bridging over moments where the the flow of new materials is retarded; (b) fuzzy units due to asymmetry between statements and sentences, i.e., between syntactic units and conceptual/pragmatic ones (V.2.30, 38); (c) provisional decisions inconsistent with contingencies elsewhere in the discourse; (d) redundancies that help the speaker and hearer keep track of cohesion and coherence when the surface text is not preserved; (e) comments and asides on the discourse itself, e.g., 'something like that' (377.3)—what Schiffrin (1980) has described as "meta-talk"; and (f) the additive, more than hierarchical, organization favored by spontaneous, continuous production with little revision (cf. V.3.13). Spoken discourse accepts these factors as normal consequences of the situation. The speaker has to keep going somehow; during a long silence, the mental representation of the text could decay from short-term memory; or the speaking turn could be lost to somebody else. Inconsistencies or redundancies are tolerated because the hearer's processes are subject to the same factors (V.3.8). Although no time limits were imposed, the student used 370 words for the spoken version (377) (excluding non-words), and 308 for the written version; yet she gave more detail, not less, in the latter (cf. Collins & Williamson, 1981). Writing encouraged her to take stock of her knowledge in order to organize and integrate it (cf. I.2.23.5).

3.11 Samples (377) and (378) can help to categorize some speech tendencies that influence writing. Some of these categories were classified for

different reasons in typologies of speech disruptions (e.g. in Mahl, 1956; Maclay & Osgood, 1959: 26ff; Blankenship & Kay, 1964: 360ff; H. Levin, Silverman & Ford, 1967: 561). FILLERS are elements whose *dominant,* though not necessarily *exclusive,* function is to bridge over or reduce pauses or silences between stretches of discourse. Fillers support a steady flow of articulation and attention, and alert the audience that more is coming.[28] Brief delays due to difficult memory searches or output actions (cf. III.3.32; IV.2.27; V.3.30) can be covered with materials that require no effort or attention to execute. The more frequently a filler appears in one text, the easier it is to produce and disregard; whatever content it might convey becomes steadily less relevant (cf. V.3.13f). The frequency itself may be meaningful though, as an indication of anxiety, deceitfulness, doubt, and so on (cf. IV.2.19).

3.12 Some fillers are NON-WORDS: sounds like 'um' in (377.2, 3) or 'uh' in (377.8) that aren't counted as expressions of content. The quality of the sound should make it easy to articulate and to prolong for gaps of various durations, e.g., the vowel /ə/ or the resonant /m/. These fillers proliferate under the influence of anxiety (Feldstein, Brenner, & Jaffee, 1963); or task difficulty (Lay & Paivio, 1969). They happen more in dialogues, where the danger of losing your speaking turn is acute, than in monologues (cf. Rochester, 1973); if the audience is passive, silences may be preferred (H. Levin & Silverman, 1965). Maclay and Osgood's (1959: 41) data on respective positions of silences vs. non-word fillers led them to speculate that a speaker "receives a cue of his own silence" and fills it with a signal that "says in effect, 'I'm still in control—don't interrupt me'. "This account also fit the findings of O'Connell, Kowal, and Hörmann (1969: 64), but not those of Boomer (1965: 154f).

3.13 Besides non-words, the most common type of filler is the *junctive:* usually 'and', and less often 'but', 'or', 'so', 'which', 'because/cause', and so on. Junctives plainly signal that the utterance is not completed, though the speaker may not have decided what to say next. 'And' is the most frequent filler-junctive, being the *default*—an additive signal with the vaguest indication of how the next stretch will relate to the one before it (IV.2.52).[29] Also, its vowel and resonant are easy to prolong. In (377), 'and' occurs 32 times, 19 of them to introduce an independent clause; in (378), not one of the 7 'and's has this function. Sometimes, an 'and' in (377) is paired with another junctive, as if the speaker felt a need to narrow down relations to more than simple addition: 'and so' (377.3), 'and which' (377.7), or 'and meanwhile' (377.11). The high frequency of 'and's, plus these pairings, indi-

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[28] Compare the "utterance incompletors" in the work of Harvey Sacks (cited in Coulthard, 1977: 57).

[29] One speaker in my files habitually places 'but' (with vowel prolongation) at the end of each stretch of discourse, as if to say: 'somehow it'll all work out anyway' (cf. VI.2.5).

cate that the function as filler dominates that as junctive. Transition words that look ahead in time, e.g. 'then' (377.2, 4), or causality, e.g. 'so' (377.3, 10) and 'because' (377.7, 9), are less obviously fillers; but, since a narrative is normally linked in time and causality (III.1.29; IV.2.8), they could be omitted, e.g. in (377.2, 3, 10, 13). Clauses can also be tacked on with relative junctives like 'who' (377.1, 3), 'whose' (377.2), 'that' (377.6), 'which' (377.7), and 'where' (377.11), yielding stretches that would seem rather long as written sentences, e.g. (377.1, 3, 7). These relatives typically appear in the written version in fairly short sentences (378.1, 5, 8, 22). The fact that a written version has no clause-linking 'and's but numerous relatives accords with the hierarchical more than additive character of writing (cf. V.3.10; Chafe, 1982). Sentence-initial 'and's are proscribed by some composition teachers (I.2.14; VI.1.12), no doubt to squelch a conversational habit. Relative junctives, though less often prohibited, may also entrain unskilled writers in long, awkward sentences (379) or in unrecognized fragments (380):

(379) The movie deals with a man who in societal class-wise, is considered middle-lower class who attempts to portray 2 different types of people.
(380) Medical technology, which through new drugs and other techniques, has provided a powerful impulse to the increased population.

3.14 FEEDBACK SIGNALS serve partly to fill gaps and partly to reassure communicative participants of continued attention and understanding. In conversation, a speaker may signal agreement or attunement by saying 'well', 'yes', 'yeah', 'sure', 'anyway', 'okay', and so on. My test persons typically started off a recording with the same 'okay' we see in (377.1)—a kind of spoken paragraph marker (cf. III.2.28; VI.2.12). Feedback signalling can also request a reaction from the audience: 'you know', 'you see', 'if you know what I mean', 'if you see what I'm saying', and so on. I try to react non-verbally (nods, gestures) during recording sessions, so as not to interrupt or intervene. Some speakers insert this signaling so frequently that they couldn't really expect a reaction unless the material is really doubtful: again, the filler function is dominant (cf. V.3.11). The written version (378) has no feedback signals, but on the same assignment, other students wrote:

(381) Well, his boss didn't appreciate that. [. . .] Well, all the people attending the party decided to go slumming.
(382) Anyway, the woman invited Charlie to a party later that day.

These all occur at the start of a paragraph, as if they too correspond to spoken paragraph markers (cf. Beaugrande, 1983a).

3.15 HEDGES signal approximation: that the speaker is not fully responsible for the content, accuracy, or force of a statement. Hedges are tolerated in speaking partly because there is not usually the opportunity to go check out facts, and partly because details or clarification can be imme-

diately requested if need arises. These conditions don't apply to writing; unskilled writers hedge because they are anxious or fear challenge (cf. Shaughnessy, 1977: 72). They insert 'about', 'approximately', 'more or less', 'sort of', 'kind of', 'basically', 'something like', and so on. In (377), the speaker hedged with 'on an hour's break say' (377.5), though the time specification was correct and readily inferrable anyway. Other hedges included: 'the Baron of Greenland something like that' (377.3); and 'whatever it is they wear' (377.6). Her written version has: 'the Baron of Greenland' (378.5); and 'an over-sized <over> <dinner> {tuxedo} jacket' (378.10). Where she hedged in the spoken version, she felt impelled to clarify the concept in the written one, whence the cross-outs among conflicting expressions for Charlie's odd 1914 dress coat ('overcoat', 'dinner jacket', and 'tuxedo jacket'). Conscientious writers try to finalize their knowledge (V.3.10). The only item in the written version (378) that might be a hedge is 'to say the least' (378.7) (a mild depiction of the kicks and blows the boss has ready for Charlie). Less skilled writers hedged unnecessarily, e.g. the understatement:

(383) The movie was *basically* centered around comedy.

Students may hedge even when the exact specifications have been checked:

(384) There are *approximately 58,262 jobs* in the federal government defined within the legal and group series.

Evidently, too much stress on "correct facts" (I.3.18) can make students apprehensive about asserting anything specific.

3.16 HEDGING VERBS are common in developmental writing. Verbs which normally indicate that an event or action is begun but not finished ('start', 'begin', 'attempt', 'try'), or that an event or action is difficult, doubtful, unwise, or involved ('proceed', 'decide', 'tend', 'end up', 'wind up', 'turn out') become habitual fillers for any event or action. In speech, this usage is common, but not troublesome, e.g. (377.14) rather than (377.14a):

(377.14) and everyone *starts* fighting and he *ends up* winning the fight
(377.14a) and everyone fights and he wins the fight

Note that the written version has no such hedges:

(378.26) A fight breaks out [. . . .] he wins the fight.

Again, less skilled writers hedged disturbingly on the same assignment:

(385) he *proceeds* to try to impress the ladies [. . . .] he *proceeds* to try to get the beautiful girl's valuables [. . .] he *proceeds* to get drunk
(386) he *attempts* to dress formal and tries to impress the lady [. . .] he *attempts* to act as though he too is slumming and *tries* to act as though he works there.

These verbs aren't needed unless the action or event was really interrupted (387), or resulted from a long, involved process (388), and so on:

(387) I finally got a Bass Lake-Washington connection and *began* outlining what was about to happen [. . .] while I was talking, Don Mohr pulled up [. . .] I could see that he needed the phone, so I agreed with my man in Washington that first things would always come first, and hung up. (Thompson, 1971: 173f)
(388) When everybody started wearing the Afros, it was hard on a lot of older men who were losing their hair. They would grow it on the sides anyway and they would *end up* looking like that super-Tom on the Uncle Ben Rice box, or Bozo the Clown. (Wolfe, 1970: 121)

More elaborate phrases like 'it seems that', 'it just so happened that', 'it turned out that' are also more appropriate to fill out speech than writing. One student wrote:

(389) *It just so happened that* the bar they chose was the same one where the poor man worked.

where a simple statement of the event would have sufficed.

3.17 OPINION HEDGES include 'in my opinion', 'I think', 'as far as I'm concerned', 'if you ask me', 'I'd say', and 'for all I know'. Students wouldn't use them in a story, but they do in essays:

(390) It's my personal belief they lost my application.

If you write something, it's normally assumed you believe it. Opinion hedges are motivated only if the statement is truly controversial, e.g.:

(391) As far as I'm concerned, life is a waste of time.

A similar quandary is posed by 'needless to say', 'it goes without saying', and the like. If you say it in writing, there must be some need, or you're wasting time. (392) thus seems less sensible than (392a):

(392) Needless to say, Charlie's conduct offended the guests.
(392a) Naturally, Charlie's conduct offended the guests.

In general, hedges are symptoms that the writer has been vague, evasive, or unclear. Revising the passage and checking the facts is more strategic than just cutting out the hedges.

3.18 MODALITY-SPECIFIC EXPRESSIONS are language variants recognizably more appropriate for speech than for writing, or vice-versa. Non-word fillers like 'um' and special variants like 'a whole nother matter' (a tmesis caused by a conflict of two sound environments for the article 'a/an') are spoken, but not written unless for reporting or imitating speech. Beyond such cases, the demarcation between spoken and written variants reflects a range of disputable attitudes about dialect, social status, formality, and so on. College writers often place suspected speech variants in quotation marks, as if to excuse the inappropriate usage (cf. IV.3.29), e.g.:

(393) A "stud" comes in and bosses everybody around.

Our spoken sample has 'pushed around', 'kicked all over the place', and 'kicked around' (377.1, 5, 10); the written sample has 'beaten and harassed'

(378.8, 20) instead. Also, the student tended to nominalize events in writing where she used verbs in speaking—a common distinction between the two modalities (Danielewicz & Chafe, 1981; Freeman, 1981; Chafe, 1982; cf. II.3.26, 33; VI.1.28). Contrast 'he's been spying on him' (377.9) vs. 'through spying' (378.16); 'he gets harassed' (377.10) vs. 'harassment' (378.20); and 'starts fighting' (377.14) vs. 'a fight' (378.25). In the spoken version, adverbials are less often at the beginning of an utterance, e.g. 'coincidentally' in (377.11) vs. (378.22); or 'the whole time' (377.9) vs. 'while all this is going on' (378.16). Speech may be inclined to put the subject in the opening slot to establish a point of orientation before giving detailed circumstances (cf. IV.2.63f). Finally, the written version prefers more specific, differentiated expressions. Contrast 'goes back' (377.10) and 'people' (377.11) against 'stumbles back' (378.19) and 'jet-set friends' (378.20). Writing can pack in more detail, even in fewer words (V.3.10), because memory search has the time needed to find less commonplace items (cf. III.3.2, 17). The spoken cliché 'damsel in distress' (377.2) corresponds to the neutral 'wealthy woman' (378.3). Other students in the class used the clichè (many times in quotes to excuse it)—and were generally less careful about vocabulary, e.g.:

(394) Charlie Chaplin is known as a great pickpocketer
(395) his boss gives him hell

3.19 Frequently, however, the wordings in (377) and (378) are much the same, e.g., 'he has the opportunity to save' (377.1, 378.3); 'she introduced him to her parents' (377.4, 378.6); 'intoxicated' (377.8, 378.14); 'trying to reveal [. . .] true identity' (377.9, 378.16); 'decide to go slumming' (377.11, 378.21); etc. Or, they are stylistically equivalent (cf. VI.1.3), e.g., 'he gives her his card' (377.3) vs. 'he shows her his card' (378.5); 'they all greet him with enthusiasm' (377.7) vs. 'the guests greet him enthusiastically' (378.13); 'they coincidentally come to the cabaret where he works' (377.11) vs. 'coincidentally, they come to the cabaret where Chaplin is employed' (378.22); etc. These similarities come partly from the inclination of literate students to align their speech with their writing (e.g., to say 'intoxicated', where most of my students said 'drunk'); and partly from the stylistic neutrality of many expressions in regard to the speech/writing distinction (cf. I.2.8.5; V.3.27).

3.20 In RESTARTS (sometimes called "false starts"), the speaker backs up and re-executes a stretch of text (cf. Maclay & Osgood, 1959; Lay & Paivio, 1969; III.3.33; IV.2.36). The *reactivation* in producing the restart may be balanced against a *pre-activation* that originally brought some item out too soon; or, conversely, against a *post-activation* that brought other items out too late (cf. III.2.30; IV.2.11, 45, 47,50; V.1.17, 39, 44; V.3.21, 30f). In SIMPLE RESTARTS, the stretch is repeated without alteration, as in:

(396) we had to take off to to to take out the engine

(397) all of them / all of us you know his his parents / and / George and me

In REVISED RESTARTS, the repeated stretch is altered, as in 'all of them' vs. 'all of us' in (397). In the Chaplin retelling, our speaker said:

(377.2) he bump- he / has the opportunity to save a damsel [. . .] whose lover / doesn't / whose lover can't help
(377.3) who tells her who gives her his card
(377.9) he was he's been spying

In revised restarts, the text producer has evidently reconsidered and decided in favor of a different option in phrasing ('he was he's been spying'), or in conceptual content ('he bump- he / has the opportunity to save'; 'who tells her who gives her his card').[30] Simple restarts, in contrast, seem more aligned with speech rhythms (though a decision might be reconsidered and then accepted again after all). A planned phrase tends to be uttered in a continuous unit. If the speaker pauses for some motive (e.g. those in IV.2.19), the whole phrase routine may get re-run from the start. If the phrase is output from a buffer representation by means of automatic subroutines, one could easily lose one's place during a pause (cf. III.1.21; III.2.31; III.3.34; IV.2.30; V.1.35, 45). Significantly, restarts of all kinds occur more in fast speech (Maclay & Osgood, 1959: 36) and on hard speaking tasks (Lay & Paivio, 1969: 31)—times when processing would be heavily loaded.

3.21 In writing, few restarts remain intact, e.g.:

(398) But I know *that* deep down *that* everybody knows nobody wants a nuclear war.
(399) it requires a great amount of keeping up with new laws as *well well* as old established ones

The re-activation is evidently not registered at all, either at the time or during later proofreading. More often, restarts are amended by crossing out the first part. On the Chaplin film, my students wrote:

(400) He saw a <bu> big bully
(401) The bully wanted <his> the man's girlfriend.
(402) He proceeded to break up this fight <and save> by beating up the man. He saved the day.

A writer may decide to insert a modifier (400), clarify indeterminate coreference (401), add details (402), and so on. If the crossed-out item appears again later (400, 402), its first use was probably pre-activated, or else the items between the first and second uses were post-activated (V.3.20). On my video-tapes, a written restart shows up as a stop, a crossing out, and then a resumption. Pausing and changing are slower and more deliberate than during a spoken restart.

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[30] In a silent movie, the card naturally served to make this announcement.

3.22 SHIFTS occur when an initiated structure is abandoned and another one is executed instead. In (377), the filler 'and' was sometimes disregarded in the following structure (V.3.13):

(377.7) they think he's the Baron of Greenland / *and which* shows they don't have too much intelligence

Like restarts, shifts can reflect a reconsideration of options in phrasing (377.12), reference (377.14), and the like:

(377.12) he covers it up by says that he's slumming too
(377.14) they / everyone starts fighting

My transcripts contain numerous contaminations among conflicting phrase options, e.g.:

(403) I started by / took off the air filter

In student writing, shifts appear both as omissions and as contaminations (cf. III.3.39):

(404) In direct lobbying there are some things in which lobbist must use to be effective.
(405) Education gives the student a sampling of each of the areas before making the decision is made on which area to pursue.

Omissions should occur if one option is discarded midway and another is abruptly begun. Contaminations should occur if both options are evenly matched and compete during execution. Possibly, different phases, such as conceptual development and expression, send conflicting requests to the linearization phase. Or, the surface text might become disordered or indistinct in the buffers of working memory (cf. III.3.7; V.3.30), especially during long stretches or pauses.

3.23 NON-AGREEMENTS form a sub-class of shifts in which a grammatical category, such as number, person, or tense, is inconsistently implemented. Non-agreement between subject and verb is a traditional sore point in the schools, less because it damages comprehension than because it is associated with non-prestigious dialects (cf. V.2.28). Untrained writers apparently either generalize one verb form across singular and plural, e.g., 'don't' (406), 'have' (407), and 'there is' (408); or else strive for hypercorrectness by adding the '-s' where it's not needed (409) (Shaughnessy, 1977: 114ff):[31]

(406) More education *don't hurt anybody.*
(407) My father *have* four brothers and three sisters.
(408) *There is* only 97,000 openings per year.
(409) advance to the position they *wants.*

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[31] The same hypercorrection seems to lead native speakers of Caribbean Spanish, which often drops final '-s', to add '-s' to the singular of English nouns.

Shaughnessy's students reported that 'there are' "seems stiff and distant." Certainly, 'there's' or 'there is' followed by a plural noun is widespread in speech, as if 'there' is considered a singular pronoun (like the dummy 'it', cf. IV.2.63) in the subject slot of the sentence (Quirk et al., 1972: 958). Collisions between language habits or intuitions vs. standardized grammatical categories are tricky problems for instruction (Marckwardt, 1966).

3.24 The same collision may contribute to a contamination known as ATTRACTION: a verb that agrees with the nearest noun, rather than with its grammatical subject, as in (Quirk et al., 1972: 365):

(410) Every member of that vast crowd of 50,000 *people were* pleased to see him.

In speech, attraction seldom draws notice—the listener's memory presumably doesn't persist much better that the speaker's (V.3.8, 10). Writing offers more chances to survey a clause and detect inconsistencies, yet attraction readily escapes proofreading. The intervening noun could prevent the distinct error feedback that (406) and (407) would elicit. I find attraction in students' final copy where most mechanical matters have been carefully checked, e.g.:

(411) One out of every three American *marriages end* in divorce.

3.25 An acute collision between language habit and school grammar involves pronouns that co-refer with 'everybody/-one', 'somebody/-one', 'nobody/-one', or 'a person'. Though logically singular, these words are operationally treated as plurals in everyday language (Quirk et al., 1972: 370):

(412) Everybody thinks *they* have the answer.

The further away the pronoun, the stronger the tendency toward the plural. In (413), the student switched number right in the midst of a compound predicate:

(413) Everyone *gets* excited and *tear* up the cabaret.

In cases like the following, the student's choice (414) is the only possible one; the grammatically precise (414a) is misleading or nonsensical:

(414) Everybody received Charlie very well, because *they* believed he was the man which the card announced.
(414a) Everybody received Charlie very well, because *he* believed he was the man which the card announced.

Similarly, a question-answer set like (414b) would never occur:

(414b) Did everybody receive Charlie very well? Yes, *he* did.

Besides, 'they' avoids the sexist usage of the masculine for the whole world (cf. I^{13}; II^{13}).

3.26 Student writers regularly shift pronouns when the referent is not well-defined. If one member of a group is mentioned, a later shift from singular to plural can result, e.g. from 'patient' to 'their' in:

(415) Sometimes after a stroke, the *patient* loses *their* ability to communicate.

Multiple shifts occur as well:

(416) A *student* will make more of an effort to make the highest possible grades when the major *they* have chosen is what *he* has chosen out of interest.

Students find it hard to maintain in writing the somewhat formal impersonal pronoun 'one' seldom used in their speech:

(417) Also, *one* has a better chance of getting into upper division college earlier when *you* begin with all the right prerequisites.

'You' is more habituated, and easily intrudes.

3.27 INDETERMINATE grammatical categories, as illustrated by pro-forms, are common in speech (cf. IV.2.17; V.2.18), and sometimes carry over to writing. Coherence is normally maintained well enough to resolve indeterminacies allowed by grammar alone (cf. IV.2.43, 66). Pronoun problems are among the "errors" most often marked by English teachers (Greenbaum & Taylor, 1981: 193) precisely because ambiguities are so easy to overlook. In speech, pro-forms are casually used when referents are recoverable from the situation. Hawkins (1969) studied five-year old children narrating a story from pictures and diagnosed indeterminate pro-forms as a feature of the lower-class 'restricted code'—a notion of Bernstein's (1964)—e.g. (418) rather than (418a):

(418) *They're* playing football and *he* kicks *it* and *it* goes through *there*
(418a) Three boys are playing football and one kicks the ball and it goes through the window

Children who see pictures right in front of them have no compelling motive to spell out all the referents. I had found the same usage when middle-class students described the Chaplin film, e.g.:

(419) She took him to her home and was introduced as Prime Minister of Greenland. *They* asked him over for a party and he accepts.

The referent for 'they' was in the film, but nowhere in the paper. (Notice also the shifts from active to passive and from past to present.) In conversation, pro-forms are typically used for items in focus (cf. Reichman, 1978: 290), since the latter are already firmly identified. Even literate speakers from middle-class backgrounds commonly use these indeterminate pronouns in their speech:

(377.9) her previous lover is on the side the whole time trying to reveal *his* true identity because *he* was *he's* been spying on *him* / and *he* knows that *he* really works in a bar

but not in their writing:

> (378.16) her ex-lover is <in> on the side lines trying to reveal Chaplin's true identity (which he has discovered through spying).

Plainly, the speech vs. writing distinction matters here more than social classes and their "codes." The notion of a "restricted code" makes sense only if one naively assumes that language systems must all be differentiated on the same level (cf. I.2.23.4). Traditional middle-class schooling favors the alignment of the spoken modality with the written standard in which, for example, referents are usually spelled out. Other dialects, such as Black English, use nuances of intonation and non-verbal signalling for distinctions the written standard indicates with grammatical patterns and inflections. Such dialects are not "restricted," but "elaborated" on their own levels (I.2.23.4).

3.28 Referents for indeterminate pronouns need not be visually present, but only established in the writer's mental representation (IV.2.43, 45). Students use 'they' for 'whoever is involved', e.g. in an institution:

> (420) Law school is highly competitive and difficult to gain admission to. *They* usually require a high grade point average.

In a paper on repairing an engine, a student wrote (421), even though the 'car' hadn't been mentioned so far:

> (421) Now we pushed *it* out under an overhanging tree and connected an engine hoist to a chain around the tree and just pulled *it* right out.

The concept 'car' was part of a main idea left implicit rather than made into a topic (cf. III.2.16). The second 'it' gets its referent from the highly topical modifier 'engine'. The modifier has the same form as the noun in (421), but need not do so in order to supply a referent:

> (422) Consenting to treaties is a *Congressional* privilege *they* are reluctant to surrender.

The notorious vague 'this' toward the beginning of a sentence (cf. II.3.47) often lacks a clear referent in the paper, e.g.:

> (423) PL/C has a few built in functions. *This* is a program condensed into one word.

where a singular looks back to a plural.

3.29 Indeterminate pro-forms, as we see, don't really block communication in everyday practice. The attitude that they are "errors" (V.3.27) reflects the situationality of written discourse. The writer must somehow negotiate the transaction with readers (Tierney & LaZansky, 1980; Shanklin, 1982); they must be interested and accommodated enough to accept the text without its producer there to present it and to supply background or commentary. Careless writing means arduous reading (III.3.16;

IV.2.67). They will not voluntarily read an inconsiderate or careless text. Indeterminacy that distracts attention is an unwise impediment, whether or not it can be resolved with extra effort:

(424) Joan told Sheila *she* couldn't come to *her* party.
(425) The difference between the avid golfer and the sandbagger is that *he* never practices.
(426) I hated grapes, but these people were so hospitable I had to eat *them*.

The point is not whether readers can puzzle out the intended sense; but that the writer can't afford to demand this extra effort from people who don't already have the context firmly in mind (III.3.17, 40; IV.2.68; IV.3.35).

3.30 POST-ACTIVATION is an inconsistency caused by implementing a word or phrase in a position past its normal linear slot (cf. III.2.30; III.3.32; IV.2.11; V.2.34). Input from the conceptual development and expression phases apparently reaches linearization too late. For example, modifiers follow a head noun they should precede:

(427) this big plate of grapes / these big purple [. . .] there were these eggs sitting on the table for me / scrambled

Modifiers are also furnished after the fact in restarts:

(377.2) he / has the opportunity to save a damsel in distress [. . .] a rich damsel in distress
(428) the bearing uh the rod bearing

The time lag is not easy to explain. A long, difficult memory search might not finish in time to supply a needed word (cf. III.2.29f; III.3.12; IV.2.27). But this account cannot be the only one. In the four examples just cited, the delayed items couldn't have been hard to think of. The types of 'grapes' and 'eggs' (427), the 'richness' of the 'damsel', (377.2), the fatally burned-out 'rod bearing' (428)—all these elements were crucial to the whole point of the respective stories (cf. Beaugrande, 1982c, 1982h). Moreover, we saw in V.1.35ff that letters can be executed at the wrong place even though the writer knows the correct spelling. It is therefore clear that items can be available in working memory and yet not be implemented at the moment they should be. The items evidently do not form a strict sequence in working memory, but a loosely ordered array annotated with instructions for linearization (III.3.32; V.1.35, 45). These instructions may be contaminated, displaced, or lost during the act of uttering or inscribing, especially if processing is heavily loaded. The core might come out before its adjuncts (e.g. head noun before its modifiers) because it acts as a control center, or heaviness tends to move items earlier (IV.2.57).[32] Or, some items are not

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[32] If so, the conflict between heaviness vs. core-adjunct again shows why the two principles should be kept distinct (cf. IV[3]; IV.2.53)

recognized in time as relevant to the current context, e.g., that the stranger in the park scene will later turn out to be a 'rich' society lady. Or, an element may get moved outside its normal slot in order to receive intense focus (IV.2.53; V.2.32).

3.31 In writing, post-activations rarely survive into final copy. The slower rate of inscription compared to utterance reduces the danger of time lags; and the surface text reveals order errors, provided the writer inspects it closely (cf. III.3.7; V.1.22; V.3.21, 24). Students sometimes notice the delayed item and set it in parentheses as displaced commentary:

(429) Most of us share certain needs and wants (psychological).
(430) The adenoid is the size of a pecan nut (in childhood).

Cross-outs may also be done to compensate for post-activation (V.3.21). But the clearest evidence for post-activation are the insertions above the line or in the margins (curly brackets shown here):

(431) Charlie takes his dog on a walk away from the {dirty and ugly} slums to a nice big {clean} park {on the better side of town} where he tries to impress the ladies.
(432) He stays long enough to impress the notables {and to lose a cuff} and returns to work {minus his dog} followed by the coward.

As the text evolves on paper and the writer takes stock of the topic, decisions about relevant materials become easier to make. Students have reported that getting their materials together too late is their worst obstacle to producing clean copy, even if there is no hurry. For the sake of good organization, I encourage last-minute editing and inserting on all papers except formally declared final copies. No advantages are served by omitting relevant materials, worrying anxiously about order, or distorting the sequence to force in late arrivals at the wrong place further on.

3.32 The factors surveyed in V.3.11-31 result from filling gaps or making provisional, approximative, and inconsistent choices. REDUNDANCY contributes another set of factors which, if projected over from speech, can hinder good writing. Aside from composition textbooks (e.g. Strunk & White, 1979; Williams, 1981b), these factors have been studied much less than speech disruptions because the events involved in redundancy are much less well-defined than the latter. The sum of different words vs. the total number of words (the "type/token" ratio, III[20]), though easy to compute, overlooks the substantial proportion of cases where the text producer presents new expressions for the same content, and new content in the same expressions (cf.IV.2.39; V.3.36). Speech is characteristically redundant because the traces of the surface text rapidly decay from memory. Speakers tend to remind both themselves and their audiences what the issues of concern are (V.3.10). Listening to a talk read from a prepared written text can be taxing because redundancy is lower than usual for spoken communi-

cation. The writer's elaborate organization, attained through lengthy deliberation, may be hard to discover and reconstruct as the surface text rapidly runs by in a stream of speech and is forgotten. The *informationality* of texts (I.4.11.7; III.3.2.9) differs significantly for the two language modalities.

3.33 RECURRENCE is the direct return of previously used expressions (IV.2.37ff), e.g. 'harassed' (377. 1, 5, 10), 'break' (377.5, 10), 'bar' (377.9, 10), and 'slumming' (377.11, 12). The first occurrence may be intentionally disregarded in spoken restarts (V.3.20), e.g.:

(377.2) *whose lover* doesn't / *whose lover* can't help her

or unintentionally overlooked in written restarts, e.g.:

(433) Speculations arose *that* in our zealous attempt to become president, *that* some were cheating.

Reactivation can produce recurrences that, unlike (433), don't disrupt cohesion, but still irritate the reader:

(434) There is *also* a large difference between the two *also*.
(435) Psychology is the science that studies *the way* human beings and animals behave *the way* they do.

If students are laboring to put an item in a hyper-correct slot, they may involuntarily repeat it in its habitual slot as well. Such is the case with attempts to keep prepositions before the relative junctive 'which'—another conflict between language habits and a classroom grammar prohibiting a form professional writers employ without hesitation (cf. Flesch, 1972: 24f; V.3.25f):

(436) a form of power *for* which the population will pay *for* with their lives.

Speech habits naturally favor recurrences that unskilled writers do not find tedious. Spoken passages like these are common and perfectly acceptable:

(437) they brought out this big plate of grapes [. . .] this big plate of grapes
(438) it wasn't the kind I liked [. . .] I don't like that kind

But in writing, comparable recurrences are more likely to be noticed and judged tautological (439) or wordy (440):

(439) Treatment of broken bones depends on the broken bone.
(440) This subroutine will be gone through after each move, and this subroutine is made so that any possible move will give the proper response.

3.34 In PARTIAL RECURRENCE, the same word-part appears in different forms or word classes (IV.2.37). Again, the result is normal in speech:

(441) I'm interested in *horror* / uh I'm interested in what *horrifies* us

but conspicuous in writing (cf. III.3.34):

(442) The reason for this is the *cutting* back of President Reagun's defense *cuts.*
(443) The logic in the game must be *programmed* into the *program.* The *programmer* must now *program* it so the computer gets the first move in one of the four corners.
(444) You mustn't fit the child with a shoe that has too *wide* a *width.* [. . .] when he or she gets older it might be hard for him to find shoes with that *wide* of a *width.*

Some spontaneous spoken narratives have a recurrent style in which the beginning of each new statement looks back at what was conveyed toward the end of the previous one:

(445) we uh / took off the heads // after we took off the heads then we took it out under the apple tree
(446) keep going down that street until you come to the intersection of Musuem Road // once you come to the intersection of Museum Road across the street you'll see two large brick buildings

The same pace of two steps forward, one step backward, is tedious in written narratives:

(447) Once there lived a hero named *Charlie. Charlie* was your average poor person and he *work* in a resterant. After *working* for a while Charlie was able to get a one *hour break.* On his *hour breack Charlie* took his dog and went for a *walk.* While *walking* he saw a man and a woman fighting.

3.35 Writing requires a more careful control of informationality. Skilled writers fit the ratio of recurrences to the occasion (IV.2.38). The word 'work' appears five times in our spoken sample (377.1, 9, 10, 11), but only three times in the written (378.8, 19, 20). On two occasions, the waiter's 'work' was asserted in speech (377.1, 9) where the writer assumes we can infer that an 'ordinary waiter' works (378.1), and can remember Charlie's 'true identity' (378.16). Here are further cases where the spoken version (377) shows more recurrences than the written (378):

(377.5) harassed more and beaten more
(378.20) more harassment and beatings
(377.5) he comes back [. . .] he comes back
(378.8) returns to work
(377.9, 13) reveal his true identity [. .] reveals his identity
(378.16) reveal Chaplin's true identity [. . .] reveals his true colors

Though the student was not a highly polished writer and had occasional lapses (e.g. 'her affection' twice, 378.4, 5), she had a good feel for the essential difference in recurrence ratios between the two modalities of language.

3.36 SELF-PARAPHRASE can designate instances where the text producer rehearses the same content, but in different expressions (cf. IV.2.39). Self-paraphase is common and innocuous in casual speech, e.g.:

(448) what horrifies us // what we [. . .] seek out to be terrified by
(449) brought it all up to the roof by you know brought it up the ladder put it all / put all my materials on the roof
(450) talk differently [. . .] varies his speech

Though less obtrusive than recurrence, self-paraphrase is a problematic trait of unskilled writers, both on a small scale and on a large one:

(451) I did not *start out* with much responsibility *at first*.
(452) Both young and old *go to* the Alachua county fair *to have fun*. People *attend* the fairs *to have a good time*.
(453) Lennie and George's *constantly moving about* has forced them to become *drifters*. They have *no permanent home* and no family. They *constantly move from town to town*.
(454) Stuttering is a common speech disorder in society today. It is still, however, the center of much *controversy*. The case of stuttering is still *in debate*. There are *many explanations*, and *not one explanation will fit every victim* of this unfortunate disorder. This is a *collection of answers* to stuttering.

In (454), the student was determined to milk a long opening paragraph from the thesis that the causes of 'stuttering' are controversial. The result is a pattern of redundancies that act out conceptual stuttering on a large scale. The extreme self-paraphrase is the full *tautology* whose parts necessarily follow from each other (cf. III.3.33):

(455) Computer games are so ever popular that almost everybody likes to play them.

These cases may be due to confusions in memory search and linear phrasing, e.g. reactivation (III.3.33). Another contributor would be the compulsion to compose essays of an arbitrary length on topics that bring precious few ideas to mind (cf. I.2.14; I.3.24; III.2.19).

3.37 The crucial question about redundancies such as recurrence and self-paraphrase is when they support clear, efficient communication, vs. when they waste time and effort. Most texts contain some needless wordage, but the threshold where the latter becomes a hindrance is one of the hardest issues for a writer to master. A recorded passage like (456) will do for speech, whereas (456a) would be much better for writing:

(456) bowling can be fun if it's done the right way and the way in which you bowl well the object of the game of bowling is to get all the pins down in one throw of the ball / aand // you need the right equipment in order to do this / and the equipment you use is a bowling ball and shoes (60 words)
(456a) Bowling can be fun if it's done right. The object of the game is to get all the pins down in one throw of the ball. You need the right equipment, namely, a bowling ball and shoes. (37 words)

In my experience, needless wordage is the most serious problem facing unskilled writers, both inside and outside the schools. Mental and physical resources are wasted for everybody:

(457) Increasingly, people are engaging in the practice of growing vegetable gardens for the home.
(458) I would like to specialize in tax and estate law. This type of law deals with tax laws, which change rapidly, thus meaning that it requires a great amount of keeping up with new laws as well well as old established ones [. . .] Since tax laws change every day, it is very important that a tax lawyer keep up with these changes. He must do a tremendous amount of reading, and be able to keep a running file on all new laws as well as already established ones [. . .] The job requires a great deal of keeping up with new laws, meaning that his after office hours are spent reading and researching these new laws.

Students may produce passages like (458) because they haven't done the necessary research on their topic, and want to hide thin content behind a thicket of verbiage, e.g. (459) rather than (459a):

(459) An accumulation of time periods has as its consequence an increase in the age factor.
(459a) As time goes by, people get older.

However, many students sincerely believe that quality writing demands a ponderous, redundant style, e.g., that (460) is genuinely better than (460a):

(460) He served in a lead software capacity over two other software specialists to whom he provided work direction.
(460a) He was the supervisor in a group of three software specialists.

This conclusion comes from reading samples written by administrators, officials, and scientists (cf. II.3.26; III.3.16; VI.1.26, 28). Students see little motivation to invest the hard work in good writing as long as convenient, bad writing apparently brings power and rewards.

3.38 Ideally, college should help students become habituated to expressing themselves concisely in writing. Our sample student, though writing extemporaneously about the silent movie, easily used fewer words to say the same things as her spoken performance (cf. V.3.10, 35) about the silent movie:

(377.1) it starts with Charlie Chaplin working in // a cabaret / and / he's just a common waiter
(378.1) Charlie Chaplin, who is an ordinary waiter at a local dive
(377.2) when she's being robbed
(378.3) from being robbed
(377.6) with the cuffs that are always falling down
(378.10) his falling cuffs
(377.10) so Charlie Chaplin was again was just on a break
(378.9) on his next break

But for most people, such habits don't come easily. Motivation is low when good writing seems mysterious, tricky, and unrewarding. And the effort involved in writing well is enormous, even when one's skills have finally

begun to cohere (VI.1.25). A writer is always haunted by an unholy host of commandments and taboos regarding style and usage (cf. I.2.11ff; VI.1.12ff).

3.39 Still, some hope seems justified by our results in training college students to recognize the influences of their everyday speech on their writing and to revise accordingly. Passages designed to illustrate such problems are presented for editing (cf. Beaugrande, 1982a). At first, each passage stresses just one problem: fillers, hedges, shifts, repetitions, needless words, and so on. Later, the demonstration passages raise several problems at once until finally, complete texts undergo general revision. In principle, actual student samples from past courses would be the best and most realistic materials to edit. In practice, though, manipulation is usually necessary to control the density and type of problems in a given sample. I try to determine from early diagnostics using films and tapes (cf. V.3.6; VI.3.8ff) which problems are most urgent for each class, so that I can tailor the training to the learners (cf. I.2.23.8). Individuals are assigned additional revision as seems warranted.

3.40 Some developmental writers make impressive strides toward reliably revising the same sort of clumsy prose they were writing themselves at the start of the course. One freshman's first paper opened like this:

> (461) Ever since the earth has been inhabited by people, snakes have had a bad reputation. From the era of Adam and eve to present day, snakes have been misconstrued.
>
> People always have and always will, think of snakes in the pesimistic way. They think that snakes are always out to hurt people. 80% of the population falsly beleive that snakes are slimy and disgusting. Snakes are *not* slimy. People refuse to accept the fact that they are not slimy, and that most of them are quite friendly.

Here are the inconsistencies, the vague pronouns allowing improbable, incoherent readings, the recurrent words, and the self-paraphrases so characteristic both of speech and of unskilled writing. I could tell from interviews that the student was knowledgeable and interested regarding the topic of 'snakes'; yet he couldn't manage to organize his statements. Ten weeks later, after much revision practice, he took an in-class quiz that included revising this passage:

> (462) One of the many things that are hard when you leave high school and go to college is the fact that your in college not high school any more. This being a major change. Untill now they treated you like a little tiny baby and your on you're own now and you have reponsibilities and you gotta be responsable about them.
>
> For example registering. You register by going to registration at the time they give you to register. So you start to go there and there are zillions of problems and no courses anyone would would want unless except their out of there mind or something, you know?

With no aids but a dictionary, the student made this revision in a few minutes:

> (463) One major change when growing up is the switch from high school to college. Unlike high school, the students in college have more responsibilities and are therefore treated like adults.
>
> One responsibility in college is registering. Each student is expected to register at the time that was assigned. One of the many problems in registering is the lack of wanted classes and the overabundance of unwanted classes.

Admittedly, (463) is not brilliant, polished prose to delight Steele and Addison. But it is reasonably well-organized in a way that the student's writing at the start of the course (461) was not. The gravest problems had been brought under enough control that his future progress in writing looked far less precarious.

3.41 In general, the "talking versus writing" approach has worked quite favorably. It doesn't stigmatize student language habits as "bad English," "illiterate," or whatever, nor cast aspersions on anybody's intelligence, ability, or social status. Instead, students become aware of the natural effects of moving from a well-practised activity over to a comparatively unfamiliar one. They already command English for numerous purposes, and can now expand that resource toward new uses. The steps along the way are clearly explained. The directions for revising are kept sufficiently specific and manageable for anyone willing to carry them out: removing needless wordage, combining the remaining sentences where appropriate, working toward a direct, clear style, and so on. Though writing never seems to get very easy, it at least ceases to be a mysterious game that many students are predestined to lose. When effective writing is required in their later lives, such as a letter of application for a career, they have some methods to help them attain the quality of text that will not harm their chances for success.

VI

Style, Stages, and Steps Toward Progress

1. STYLE

1.1 At present, the field of stylistics appears somewhat stagnant and disunified. So many definitions of style have been offered—Guiraud and Kuentz (1970: 4-15) listed 34 of them—that it is questionable whether different scholars are even discussing the same thing. Style has been variously explicated as: (a) extra ornamentation imposed on a message (cf. Enkvist, 1964; Lorian, 1970); (b) grammatical choices (Ohmann, 1964b; Hayes, 1969; but cf. Milic, 1971); (c) deviation from a norm (Enkvist, 1964; Levin, 1965; Marcus, 1968), specifically, from an abstract "grammar" in the sense of II.3.5 (Bierwisch, 1965; Thorne, 1965; Revzin, 1970; Abraham, 1972), or from a pattern established in the text itself (Riffaterre, 1959, 1960); (d) the reader's experience of meaning (Alonso, 1942; Fish, 1970; Mounin, 1971); (e) the habits and traits of the individual text producer (Marouzeau, 1959; Chatman, 1966; Winterowd, 1970b); (f) the function of the text in communication (Havránek, 1964; Beneš, 1975); and so on. Some explications were supported less by empirical discovery than by assertiveness (cf. I.1.2), ranging from the Count de Buffon's 1753 aphorism, "style is the man," over to Gray's (1969) denial that style even exists. Moreover, the main object of inquiry was not the text, but the literary text (VI.1.7f)—a special case acting as the general case (cf. I.1.3).

1.2 For a time, modern linguistics was considered the best candidate for reorganizing the study of style (cf. Spitzer, 1948; Sebeok [Ed.], 1960; Ihwe [Ed.], 1971; Ihwe, 1972; Enkvist, 1973; Sinclair, 1975). However, this enthusiasm has gradually abated as linguistics itself reached a point of diminishing returns and linguistic theories of style remained controversial and vulnerable (Spillner, 1976). If style is extra ornamentation, then many texts could have no style at all. If style is deviation, research must wait until

the norm or grammar is defined (cf. criticism in Riffaterre, 1959; Delbouille, 1960; Sayce, 1962)—a project that seems rather remote now (cf. II.3.14; V.2.17). In retrospect, it was probably naive to have hoped that a purely linguistic analysis of language artifacts can account for the rich communicative contexts that define style. Linguists who study style are supplying the context themselves, including the prior supposition that a given usage or passage is stylistically relevant. The activities of the analyst as audience (selection, focus, evaluation, motivation, etc.) would be the most interesting thing to investigate (cf. II.1.7, 11; VI.1.7; Wienold, 1972; Schmidt, 1982).

1.3 The existence of style is often argued on the grounds that you can convey the same content in different, but synonymous, expressions—i.e., that asymmetry obtains between conceptual development vs. expression and phrase linearization (cf. III.2.27). For example, Hockett (1958: 556) maintained that "two utterances in the same language which convey approximately the same information, but which are different in their linguistic structure, can be said to differ in style." In transformational grammar, style would result from applying different syntactic rules (Ohmann, 1964b). However, not all differences in "linguistic" or "grammatical" structure qualify as stylistically relevant (cf. I.2.8.5; V.3.19). For example, the manipulations performed during sentence-combining do not always improve the writer's style (cf. Hunt, 1965; Christensen, 1968; Mellon, 1969; II.3.25). At least some language options can be interchanged without materially altering the style of a stretch of text. For example, we could rework a passage by John Steinbeck (1978: 96) like this:

> (464) Americans are remarkably kind and hospitable with both guests and strangers; and yet they will make a wide circle around a man dying on the pavement. Fortunes are spent getting cats out of trees and dogs out of sewer pipes; but a girl screaming for help in the street draws only slammed doors, closed windows, and silence.
>
> (464a) Americans treat both guests and strangers with remarkable kindness and hospitality; and yet they walk in a large cirlce around a person who is dying on the pavement. Large sums are spent retrieving cats from trees and dogs from sewer pipes; but if a girl screams for help in the street, doors slam, windows close, and the rest is silence.

Most of these alterations in the surface text barely affect the style at all. A really conspicuous change, such as going from 'draws only silence' to 'the rest is silence', affects the style less via its linguistic structure than via its cultural context. Hamlet's famous dying words *(Hamlet,* V, ii, 369) to a vast, intensely involved public in countless theatres contrast starkly with the anonymous 'screams' of a 'girl' to a small, uncaring public in an urban neighborhood.

1.4 We can conclude that style, like the rest of language, should be studied in terms of human processes within society and culture. Style is above all something intended by a text producer or experienced by a text receiver. Conspicuous elements, the so-called "style markers," draw so much attention that it is easy to identify style with ornamentation or deviation (VI.1.1f, 7). But style actually results from the total selection, including all the background that makes the conspicuous elements meaningful. This background cannot be reconstructed with only the aid of statistical counts of items in the surface text itself, such as frequencies and proportions of nouns, verbs, modifiers, and so on (cf. Miles, 1967; Doležel & Bailey [Eds.], 1969). These measures are inconclusive unless they bear on human processes. A stylistic background often includes elements not selected in the text at all, but expected at certain points. These elements easily go unobserved during linguistic and statistical analysis of the text as artifact.

1.5 Style could be formulated in an empirical inquiry: how do text producers control style, and how do text receivers react to it? Milic (1971) proposed a distinction between selecting basic language options vs. making the conscious ("rhetorical") choices that mark the style; yet this distinction is more likely a gradation of interactive processing factors such as feedback, attention, goodness of fit, threshold of termination, complexity, familiarity, informationality, and motivation (cf. III.3.3). Evidence for these factors must come from a range of diverse sources. We can compare a text with a later revision of it, assuming that changes were deliberate (Cervenka, 1971). We can try to list the various alternatives the text producer might have used (Dupriez, 1971). We can ask readers to single out text elements they consider important for the style (Frey, 1970). We can delete elements and have readers guess them (Groeben, 1975)—the so-called "cloze procedure" (cf. IV[2]). Aside from the last-named one, these methods have been applied predominantly by European scholars to literary texts. American literary studies has been less favorable toward empirical research, mainly because the humanities and the sciences have been split by an unfortunate misunderstanding of each other's methods. The complex, creative contexts of the humanities have been wrongly judged chaotic and subjective, while the experimentally controlled contexts of the sciences have been given an unduly narrow, sterile interpretation (cf. I.1.2ff; I.2.23.7).

1.6 Operationally, style is presumably processed by SPECIALISTS: operational components assigned to regulate a particular aspect of production or reception (I.4.8; III.1.11, 14, 27; III.2.11). These specialized processes are usually on call, but become active only when triggered by relevant events and settings (e.g., if a writer wants a "formal" style for an official memo). During text production, style specialists would send appropriate parameters to memory search processes to influence the choice of options (cf. III.3.10ff). These parameters would not become active for stylistically neutral items (cf. I.2.8.5; III.3.13; V.3.19), but only for candidate expressions carrying style markers in memory. The same filtering procedure would

run during text reception. Obviously, the skill and training of communicative participants determines how active, dominant, and well-defined these specialist processes are. The latter may not enter conscious awareness or emerge distinctly from the vastly larger complex of processes wherein they function as components. Consequently, style can hardly be uniformly defined for all texts, but at best, described in terms of its applications and effects in particular contexts. Attempts to do the former merely lead to the stagnation and disunity surveyed in VI.1.1f.

1.7 LITERATURE can be defined as the domain of discourse where it is allowed, though not obligatory, to envision and present alternative models of reality. POETRY can be defined as the sub-domain of literature where this alternativity is extended to possible models of discourse itself. Literature is not forced to depart from reality, nor is poetry forced to violate normal language. These domains of communication simply open conventional reality and discourse to scrutiny and discussion as one alternative among others. Of course, attention centers upon marked departures and violations because of their high informativity, so that the analyst comes to consider them the sole determinants of style (cf. VI.1.2, 4). For the same reason, stylistics naturally gravitated toward literary and poetic texts. Important writers and readers of those texts are usually distinguished by the focus they devote to language selection. In most cultures, prestigious authors have developed a style that gives them a recognizable individual voice (cf. I.2.8.6), whereas obvious imitation and ordinariness count as drawbacks. However, these values presuppose definite social and institutional expectations about how and how far an author should innovate vs. imitate. Literary criticism reflects these expectations in its value judgements.

1.8 The devotion of stylistics to literature and poetry as sketched out above has generally eclipsed the stylistic study of non-literary texts. Traditional composition courses were largely devoted to reading, critiquing, and imitating literary styles. McLuhan (1975: 202) cites an 18th-century entry in the Oxford English Dictionary defining the "textbook" as a "Classick Author written very wide by the Students, to give room for an Interpretation dictated by the Master, &c., to be inserted in the Interlines." In some quarters, this attitude still lives on, leading to the impasse of "programs where teachers of English literature are required, under the exigencies created by open admissions policies, to teach the rudiments of writing but end up teaching literature just the same" (Shaughnessy, 1977: 222; cf. Maimon, 1981). Non-traditional students confronted with such complex refinement of literary styles as few of them could realistically hope to emulate during the course may be more intimidated than inspired.

1.9 Literacy education has to begin from a gradual acquisition of styles for everyday purposes. As usual, the composition teacher is caught in a dilemma (cf. I.2.18). Large segments of the average course or textbook are devoted enforcing *conformity* with the conventions of usage, grammar,

punctuation, and so on. Yet style depends crucially upon the *individuality* that lends writers their own voice. In practice, conflicts between upholding vs. transcending a norm are all too often resolved at the expense of creativity. The *imitation* of sample texts is an interesting compromise (cf. Weathers & Winchester, 1969, 1978; Weathers, 1980): gaining freedom by temporarily abdicating it. The "alternativity" of literature and poetry lends itself well to such training. The goal is to learn flexibility and control by assuming various stylistic tendencies in turn and thus getting a feel for the possibilities, including entirely new ones. Ideally, the students learn the *principles* of style, rather than a jumble of *marked expressions* to sprinkle over a text like Christmas-tree tinsel. But this goal presupposes an ambience in which students are not constantly anxious about choosing the "wrong" options (I.2.11, 17). Unless the demand for conformity is consistently balanced against the encouragement of creativity, style is likely to be treated as just another game with strict but mysterious rules (cf. VI.1.16).

1.10 Students particularly need to appreciate how the stylistic tendencies of casual speech differ from those of expository writing (cf. V.3.2). Though neither speech nor writing has one uniform style, the proportions of language options are typically different for the two modalities. Despite certain discrepancies, research generally indicates that writing is distinguished from speech by having longer words, more diverse vocabulary, fewer recurrent words, fewer references to the text producer and receiver(s), longer independent clauses, and more dependent clauses (cf. Borchers, 1936; Green, 1958; Horowitz & Newman, 1964; DeVito, 1965, 1966; Gibson, Gruner, Kibler, & Kelley, 1966; O'Donnell, 1974; Einhorn, 1978; Danielewicz & Chafe, 1981; Chafe, 1982). Some of the discrepancies in the findings came from difficulties deciding what would constitute a "spoken sentence," or the spoken equivalent of a sentence (cf. II.3.13; IV.2.17; V.2.18; V.3.7ff). Others were due to differences in the choice of samples. For instance, Blankenship (1962: 422) found few clear differences and concluded "that syntactical structure is determined by an individual's style," and "that dimensions other than 'written/oral'" would be more useful to study. But her samples, taped speeches vs. published essays by nationally known figures like Margaret Mead and Adlai Stevenson, are hardly representative of everyday communication: public speakers are prone to align their spoken style with their written one (V.3.27), especially since they often compose written versions to be presented orally.

1.11 Even unanimous statistics about the linguistic proportions of writing vs. speech would not stipulate concrete methods for teaching style. Tabulations are not procedures for developing a writing style, just as structural analysis of language samples by professional linguists is not an account of human language acquisition. Linguistic proportions are symptoms, not explanations (II.3.23); and may not be consciously monitored as proportions. Writing typically has longer, more diversified words and fewer recurrences

because the preserved surface text allows and encourages better control of familiarity and informationality (recurrence, innovation, paraphrase, parallelism, ellipsis, etc.) (cf. IV.2.37-44; V.3.32-37). The tendency toward more lengthy and subordinated clause formats corresponds to the more hierarchical organization of writing, as compared to the more additive organization of speech (cf. I.3.18; II.3.41, 43; IV.2.46; IV.3.15, 24; V.3.10, 13; VI.2.22). References to the text producer and receiver(s) are less probable in a situation where the two sides don't meet each other face to face. Hence, these linguistic proportions reflect communicative conditions that are by no means uniform in all contexts. To flatly recommend that a learner follow these proportions—or to reward them where they appear (cf. II.3.32f)—is to reverse the natural causalities of communication. For example, sentence-combining increases the length of independent clauses, and the number of dependent clauses; but so far, no one has a documented empirical and theoretical account of how such manipulations fit into the total picture of a person's style (cf. II.3.36-44).

1.12 To appreciate the statistics summarized in VI.1.10, we should bear in mind that schooling massively intervenes in the natural selection of language options. The clearest illustration is found in the "class menagerie" of "rules" turned up by my student surveys (cf. I.2.14ff). During at least one course, and sometimes over several years, a student may be forbidden to use legitimate, strategic language options: first and second person, passives, contractions, etc. The dummy constructions 'there is' and 'it is' are deemed needless words by teachers unaware of the role of place-holders in creating focus, e.g. the "cleft" construction (IV.2.63). At the start of a sentence, 'because' is banned as an perilous instigator of sentence fragments; 'and' falls victim to the overuse it inherits from speech habits (V.3.13). The conversational frequency of 'anyway', 'a lot', 'a little', 'very', and 'really' doom them to exile. In all these "rules," the expressions themselves are made the scapegoats merely because they are used carelessly in some contexts (I.2.15).

1.13 This unduly negative, coercive stance of some English teachers is a drastic response to the many bizarre dilemmas wherein they find themselves (cf. I.2.18; I.3.13; III.3.30; IV.3.44; V.1.40; V.2.3, 31; VI.1.9; VI.3.2). The educational system is heavily oriented toward a fixed dichotomy between "right vs. wrong responses" without regard for social and psychological contexts (I.2.13). Thus, a language item which is misused on occasion is easily thrown on the heap of items that are plain "wrong." Without clear definitions or theories of style, there is often no rational, orderly recourse for determining which options should or should not be used. By default, personal attitudes can be converted to rules and enforced by social and institutional leverage (grading, career chances, etc.).

1.14 The damage done by this understandable but unfortunate attitude is hard to calculate (cf. I.2.17). The learners' language insecurities grow,

especially among disadvantaged groups whose literacy skills ought to be our greatest concern. Rising anxiety makes writing far more taxing and error-prone than it has to be. The ever-changing lists of multifarious "rules" blur into chaos. Several students reported they had been forbidden to use "conjunctions"; we finally found out that the rule had really blacklisted "contractions." Two students remembered the rule: "never underline the title of a book"—a conflation of "never underline the title of a paper" and "always underline the title of a book." A student who loses track of all the rules tends to write in a pessimistic prescience that some of them are being unwittingly violated at any moment.

1.15 Similar effects can result from forcing writers to follow numerical patterns (I.2.14). Several students from the same high school turned in papers as primitive and uniform as mass-produced Model T's. Every paper had five paragraphs: the first and last stated the thesis in two sentences apiece, though in different wording; the middle three paragraphs opened, respectively, with 'first/first of all', 'next/secondly', and 'finally/last of all', and had exactly five sentences, the fifth one (which had to begin with 'thus/therefore/consequently/of course') paraphrasing the first. The impression is oddly forced, ungainly, and repetitive, like a bad French villanelle:

> (465) First of all, deciding on the game is a very essential start. One must think carefully and decide on what game he would like to write. But he can't pick a game that he would be unable to write. Also, he has to realize that the computer he is using may be limited in memory compared to what his needs are for the program. Of course, one can see that deciding on which program is a vital need to begin.

At first I wondered if these students were all paying the same cut-rate hack to ghostwrite their papers. It turned out that the students believed expository writing always follows this same drastic "pyramid" format (III.2.16) they had had to use on *every* paper in their high-school careers—they had never learned to write any other way. Their English department had decided as a body to allow no deviations, evidently to make grading easier (cf. I.2.15; I.3.14). The uniform pattern actually impeded the development of the effective, self-reliant writing skills that fit patterns to contexts, as in:

> (465a) The first step is to decide on a game that one is willing and able to write. The programmer has to stay within his abilities and also within the size of the computer's memory.

(465a) says the same thing neatly in two sentences (34 words), instead of awkwardly in the obligatory five (80 words) of (465). I sent a courteous but emphatic letter to the high school principal, pointing out the unrealistic and unproductive nature of the approach; no answer came back.

1.16 Few of students we surveyed had ever questioned the validity of the "rules" they were made to obey. They didn't know, for example, that

many rules were simply the heritage of centuries of advice from obtuse grammarians. For example, "split infinitives" are still frowned upon, yet the original reason for their proscription was that they don't work in Latin, the language taken in the old days as a model for English grammar (Postman & Weingartner, 1966: 47). The fact that this construction is often useful, even inescapable, because the interposed adverb can't very well go anyplace else, e.g.:

(466) Just as the committee was about *to rapidly consider and approve* requested funds falsified figures were discovered.

didn't disturb the hallowed tradition. In the students' view, teachers are supposed to know what is right or wrong; and if not, there is no recourse comparable to re-doing a math problem or looking up a historical fact in the encyclopedia. A student with divergent opinions on usage has no authority to defend them in class. As one said, "What could I do when she was handing out the grades?" Eventually, students were drilled to accept, even believe in, whatever prescriptions and proscriptions got handed down. Odd prose like (465) readily emerges from this compulsion: writing as if playing a game of hopscotch—step on the legal squares, and jump over the others, no matter how clumsy your progress becomes.

1.17 Rather than following "rules," writers should make stylistic decisions that fit the purpose of the discourse, as Aristotle showed long ago. The main concern of modern composition programs is EXPOSITORY WRITING, writing that tells what something is or how it works (III.1.29). As Irmscher (1979a: 1f) points out, exposition is not cleanly distinct from narration, description, or argumentation, but often an amalgam of all these things. Thus, "expository style" is not a set of distinctive features exposition must have in opposition to all other types; it is the range of resources that are helpful for explaining things to an audience (cf. Cooper & Gray, 1981). Standards of correctness enter in only to the extent that their violation genuinely impedes that task. Otherwise, student writers must have the right to develop their own style, and the freedom to form the text according to its uses.

1.18 Scientific and technical discourse are among the major professional uses of exposition (Faigley et al., 1981). Competence in a field normally includes the ability to write reports about it. Even here, however, writing styles are open to language intervention. Journals and publishing houses typically employ copy editors whose authority to control usage is out of all proportion to their knowledge of either the language or of technical topics involved. For example, the contributors to a recent volume on writing research were surprised by rash of arbitrary tinkering with our manuscripts. 'While' was changed to 'although', 'upon' to 'on', 'like' to 'such as', and (of course) 'which' to 'that'. The useful abbreviations 'e.g.' and 'i.e.' got axed in favor of the the longer 'for example' and ' that is'—despite

monotony and wasted space. Commas bloomed into semicolons, and vice-versa. Dashes, hyphens, and quotation marks vanished like sand in a desert wind: their presumed inelegance was grounds to make authors suppress the distinction between their own terms and terms quoted from special sources; and adopt oddities like 'looselyknit'. My angry letters brought to light that our copy editor was trying (sporadically) to uphold the "good" usage prescribed in the handbook *Modern American Usage* by Wilson Follett, of all people. In effect, the prose of noted researchers on writing, such as James Britton, Carl Bereiter, and Arthur Applebee, was being tailored to the whimsical biases of an unreasonable pedant (cf. I.2.11). Small wonder that the letter replying to my objections stiffly hoped I wasn't "insisting that there were no standards to be adhered to" (i.e., that I wasn't another "saboteur").

1.19 Quaint notions about science as an institution filter down into stylistic biases about expository writing. Scientific objectivity is widely thought to require that the participants in communication, plus their goals and belief systems, should remain invisible, like the tricks and gadgets that make us think we're seeing miracles in a Hollywood Bible epic. The teachers who sternly forbid *opinions* in student essays (cf. I.2.14) are sacrificing their incense (and sense) on the same altar. The shibboleth denouncing the *first and second person,* another proverb from the same gospel, is still revered in "style sheets" (including, I am pained to say, the one issued by my own department). In scientific and technical discourse, the text topic and the issues it entails naturally dominate over the roles of text producer and audience, who are after all not usually face to face (VI.1 11; VI.2.9). But a clumsy avoidance of personal references is not in the interests of genuine science. The more an author agonizes over locutions and circumlocutions that obscure his or her own role and motivation in the discussion, the more we might suspect the statements being made—just as a jury disbelieves an evasive witness. Yet "many writers of scholarly prose, and almost all teachers, believe—mistakenly—that editors will not accept" the first person; "scientific writing in particular, they believe, demands an aloof, third-person style to demonstrate the author's objectivity—or at least his or her modesty" (Williams, 1981b: 27f). Baldwin's (1981: 223) survey found the second person "in all but the most scholarly journals," including "addressing the reader" and "uses of 'you' as an indefinite pronoun."[1]

1.20 The rule presumably lives on because it also presents the scientist's own intuitions, inclinations, and commitments as an abstract institution. You can garner authority by casting yourself as 'this researcher' (or 'the present writer'):

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[1] Strangely enough, Baldwin (1981: 224) clings to the old misconception that "technical and scientific writing never uses the first or second person, employing as it does the third person and passive voice to emphasize the objectivity of the research." Let's hope this "objectivity" doesn't rest on grammar alone.

(467) This researcher simply felt that [. . .] grammar is an indispensible tool for the researcher (O'Hare, 1973: 2)

If you can't figure out what your findings mean, you can say:

(468) An interpretation of this interaction does not readily present itself. (Blass & Siegman, 1975: 31)

I can't see the benefits of these coy, ungraceful flourishes, least of all in studies of the writing process itself. I know I am 'I'; an audience should decide for itself whether I am also a 'researcher'. If 'I' am the one making a presentation, surely (469a) rather than (469) is no act of hybris:

(469) This whole question will of course be returned to. (O'Hare, 1973: 37)
(469a) I will of course return to this whole question.

1.21 If an audience is expected to read a paper, they deserve to find out what this particular writer has to offer. The latter's stance and thesis affect the entire dynamics of communication and thus the motivation for reading the text at all. A writer's views should be openly identified as such whenever their departure from the prevailing consensus might not be clear. Stylistic taboos against the first-person may lead to genuine confusion. One paper of mine was scolded by a journal referee whose own style exhibited no great polish:

(470) The informality of the paper has been localized in the use of the first person.

The anonymous pedagogue serenely deleted all first-persons, even if the statement was thereby falsified:

(471) According to the most recent version *I could obtain,* the reading process would run as follows. [my text]
(471a) According to the most recent *obtainable* version the reading process would run as follows. [revision]

I didn't even know what the "most recent obtainable version" was; I only could cite what I personally had coaxed, over the telephone, out of a harried scientist battling madly against grant deadlines. For all I knew, he grabbed the report from the top of some stack and mailed it off.

1.22 The abuse of the *passive* to conceal the individual and his or her views inside a protective institution has long been censured by writing experts (e.g. Gibson 1966: 94; Shaughnessy, 1977: 86; Williams, 1981b: 25ff). However, such abuses mislead some people to see the tool itself as the villain and throw out the passive along with its many positive uses (Walpole, 1979; cf. I.2.14; VI.1.2). The experimental research reviewed in in IV.2.61 shows that the passive is the natural and justified choice for ranking the object of an action over the agent in numerous contexts. In scientific and technical writing, for example, the agent is often a lab technician, an experimenter, or a natural force, none of which need be relevant to a statement. Compare:

(472) Excised curarized frog sartorius muscles were massively stimulated. (Gopnik, 1972: 126)
(472a) Two overworked graduate students in biology massively stimulated excised curarized frog sartorius muscles.

Curiously, passives are often condemned in the same "style sheets" as the first person. A student who strains to avoid the latter, e.g.:

(473) It was wondered if this doll was the last.

falls from grace for using the former. In practice, style-conscious expository writers avoid the first person much more consistently than the passive. Language authorities may employ the passive at the very moment they berate it (Williams, 1981a: 158):

(474) I list [. . .] the tricks by means of which the work of prose construction is habitually dodged [. . .] the passive voice is wherever possible used in preference to the active. (Orwell)
(475) Emphasis is often achieved by the use of verbs [. . .] in the active rather than in the passive voice. (Reisman)

Evidently, the conflict between two mutually exclusive "rules" is resolved in favor of the one that lends more institutional authority to the writer's role (cf. VI.1.20).

1.23 Scientific and technical style are also characterized by specialized vocabulary whose acceptance is a necessary ritual for membership in a scientific or technical community (cf. Kuhn, 1970). The original impetus was to promote communication by agreeing on a set of defined, standardized terms. But communication only suffers when the terms are used as barriers against the general audience, and displayed like medals in a military parade to cow the ordinary citizen. Many terms continue to appear in published prose long after the theories that engendered them have been discredited—'stimulus/response' (II.2.5), 'competence' (II.3.9), 'left-branching' (II.1.13), 'T-unit' (II.3.18), etc. Unless the terms are re-defined via current theories, large research projects may be misleadingly conceptualized and described. On the other hand, changing entrenched terminology is a hard and thankless labor. Some of my terms in this book, though carefully explained and indexed, are ungainly and novel enough to be attacked as "jargon." 'Text producer' covers both 'speaker' and 'writer'; 'processing' includes both mental and physical agency; 'informativity' and 'intertextuality' designate standards that make a text a text. Elegance and euphony must be sacrificed to precision now and then, but finicky demurrals can be expected.

1.24 Professional organizations may set express guidelines for style. For example, the "publication manual" of the American Psychological Association has been embraced by many journals and has contributed greatly to standardization. But some of its specifications are arbitrary and incon-

siderate.[2] In a bibliography, researchers have only initials, not first names, and page numbers are given for journals, but not for edited volumes. Interdisciplinary readers may spend hours in the library trying to find the mailing address of 'J.R. Anderson' or 'E.E. Smith'; or sorting out 'G. Miller' into 'George' vs. 'Gerald', and 'N. Johnson' into 'Nancy' vs. 'Neal'; or leafing through thick tomes to track down a citation. References in the text go in alphabetical order, though chronological order is more sensible in fields where research is historical and cumulative. I myself follow such directives only when they do not inconvenience readers. Uniformity is no excuse for hampering communication.

1.25 As this illustration suggests, standardization ought to be done on rational grounds. Style is not likely to improve in the whole society until we all agree to resolve the trade-off between the writer's convenience and mannerisms vs. the audience's needs for clarity and readability (cf. I.2.11; III.3.16; IV.2.67; IV.3.35; VI.2.37). Traditional priorities have largely been the opposite, and for at least two cogent reasons. First, verbose, complicated, and disorganized prose is much easier to churn out than concise, streamlined, and transparent prose. When I thought, after at least twenty revisions of most passages, that I had this book done, I read it again (silently and out loud) and saw it was still too long and awkwardly composed. To take my own advice, I had to face the orgy of fear and loathing involved in starting over. Even spending between 7 and 16 hours a day at a word processor (far better than a typewriter for this sort of thing), I needed over two months to bludgeon the monster into what I began to consider readable English. (Chapter I, for instance, shrank by almost 20%—and it had already been edited the most, since revising complete chapters is less horrible than drafting new ones.) Nearly every word and sentence was eyed with vengeful distrust; paragraphs and sections migrated from chapter to chapter to unify the stages of the discussion. To insist on clarity and organization in exposition sometimes demands a twinge of fanaticism.

1.26 The second reason is that verbose, complex prose can bring rich rewards. Businesses and agencies win out over customers by giving them unreadable contracts to sign, as I have learned from testifying in court on the meaning of cryptic insurance policies,[3] e.g.:

> (476) "Residence employee" means an employee of an insured person while performing duties arising out of and in the course of employment in connection with

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[2] See the *Publication Manual of the American Psychological Assocatio,* second edition (Baltimore: Garamond/Pridemark, 1974), pp. 59ff. Saving space can't be the motive, since the same sheet demands 'pp.' for page numbers, e.g. (1970, pp. 31f) where (1970: 31f) would be perfectly clear. More likely, the convenience of the author (not having to look up names and numbers) is being rated over that of the reader (cf. III.3.16).

[3] Things are easier since Florida passed a regulation that the customer wins the case as soon as the court is convinced that the disputed passage is indeed ambiguous or incomprehensible. However, not all customers know about this advantage.

> the maintenance or use of the residence premises, including similar duties elsewhere, not in connection with the business of an insured person.

Public laws and statutes are often too arcanely expressed for the general public to discuss or contest, sometimes even baffling professional lawyers (cf. Bond, Hayes, & Flower, 1981; Charrow, 1981). Beyond these tangible effects, cumbersome prose apparently flatters the ego of its perpetrator. Forcing readers to slave for comprehension, and to reply in the same arduous language, is an exercise of power and privilege, as every bureaucrat knows (cf. II.3.26; III.3.16; V.3.37; VI.1.23). The allurements of writing obscurely are almost irresistable. On one side, tradition, philosophy, government, law, commerce, science, and technology seem to clamor for ornate, complex, and abstruse discourse; on the other side, the obliging, unseen reader modestly asks for clear, concrete, and readable discourse.

1.27 A reorientation of style toward the reader can begin nowhere else but in the teaching of English composition. Instructors should both align their responses to style with socially general responses and work to disseminate stylistic tolerance and enlightenment in society itself (Gere & Smith, 1979). Purpose and audience should be better defined (III.2.12f, 19), so that stylistic choices could be made in terms of their relevance (VI.1.17). If we concur that writing in school should prepare students for writing in real life, stylistic compulsions such as blacklisted words or phrases and straitjacket essay formats (VI.1.12-15) are irrelevant. Writing with the sole purpose of following "rules" to get a good grade doesn't equal writing to convey a message. A clear, direct style is hard enough without fretting over whether it is "incorrect" to open a sentence with a conjunction or a relative clause with 'which' instead of 'that'. Too much stress on minor points blocks the major ones from view (cf. I.2.17).

1.28 Paradoxically, students worry about style to the point of adopting tactics that only make the matter worse. Rule violations, they hope, will get lost in a tangle of complex prose. This strained, pretentious complexity is naturally disaster-prone, as we see in a memo mailed out by rural Florida high-school graduates to explain how they selected a site for a class reunion. No doubt pseudo-officialese was thought to be the tone a proper organizing committee should adopt, but the result was:

> (477) Our conclusions were based on many features, of which includes mutual agrement as of the time and nature of the reunion. Although we strongly considered pursuing indivudal imput from all former class memebers on this matter, we all felt that it would be best to tentatively commit ourselves to the plans outline below [. . .] Please include with remittance pictures of you children, names & ages on back please they will be returned at reunion.

Student writers with greater skill may still fall victim to their own mazes, e.g., overlooking the reactivation in (cf. V.3.33):

> (478) The actionist is the one with whom the practitioner deals with to accomplish tasks and to achieve goals of change effort.

Somewhere in their schooling, such students must have had teachers who graded highly for pompous style, even if it wasn't officially recommended (cf. II.3.26f). Otherwise, why would freshman writers proudly hand in prose replete with nominalizations and recurrences, e.g.:

> (479) a new engineer may be assigned to a design department where he assists in the performance of calculations needed to the development of a new vehicle design; or to a structural analysis group where he checks strengths of the vehicle's structures; to a performance group in which calculations on speed and other performance items are made [etc.]

"The student who defined 'good writing' as 'writing you can't understand,' or the student who complained that she deserved a higher grade on her essay because she had read it to her friends and they hadn't understood it, or the class that ranked a piece of gobbledygook above a passage by Mark Twain—such students have merely accepted the models that society offers them" (Shaughnessy, 1977: 196f).

1.29 To bring about changes in people's writing style, we can start from the same approach I proposed for moving from speech to writing in V.3. We can diagnose and build upon the current skills and attitudes people exhibit toward style, for instance, when asked to vary the style of a stretch of text. We can test how stylistic variations affect the people's abilities to understand and remember text content (cf. Jones, 1977; Thorndyke, 1977; Beaugrande, 1979c, 1980a, 1982e). This second line of inquiry accidently shed some light on the first. Working with Walter Kintsch, I designed variants of a prose sample he (and several researchers before him, especially Ernie Rothkopf at Bell Laboratories) had already used in experiments. It wasn't very well-written to begin with (an old "reading test lesson" from McCall and Crabbs) as I have since been told over and over, but I had to use what was available. The original went like this:[4]

> (480) A great black and yellow V-2 rocket 46 feet long stood in a desert in New Mexico. Empty, it weighed five tons. For fuel it carried eight tons of alcohol and liquid oxygen. Everything was ready. Scientists and generals withdrew to some distance and crouched behind earth mounds. Two red flares rose as a signal to fire the rocket.
>
> With a great roar and a burst of flame the rocket rose slowly and then faster and faster. Behind it trailed sixty feet of yellow flame. Soon the flame came to look like a yellow star. In a few seconds it was too high to be seen, but radar tracked it as it sped upward to 3,000 mph. A few minutes after it was fired, the pilot of a watching plane saw it return at a speed of 2,400 mph and plunge into earth forty miles from the starting point.

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[4] The other versions are listed in Beaugrande (1979c: 51f); the same report deals with how readers tended to imitate in their protocols the style of the version they read; and with how the six versions were graded by composition experts. On the retest with a harder topic, see Beaugrande (1982b).

Our tests with Colorado psychology students had a striking result: whether the style was plain, terse, ornate, blundering, or downright misleading, readers understood and recalled the content almost uniformly well. Yet surely style matters in everyday life, unless students have become experts at dealing with disorganized prose. To my relief, later tests showed that the uniformity was due to the well-structured, familiar topic that helped readers predict and integrate content (cf. IV.2.48). The same style variations had significant effects when the topic was more remote, e.g., 'the cause of sunspots'.

1.30 Meanwhile, I was re-running the original tests with composition students, partly as another memory probe and partly as a diagnostic of their writing experience (cf. VI.3.8ff). I would read it aloud and have them "tell it in their own words." The switch from psychology classes to English composition classes had a curious side-effect. Several students thought the point of the task was not to recall the content so much as to parade their style. Instead of a dumb test lesson for kids, prose came back that would qualify its instigators to write for Hollywood:

> (481) Thier they stood, three striving scientists looking at thier creation, thier live ambition. The Autumn night was cool, with a gentle breeze, and moonlight streaming down reflecting off thier metallic god looming above them.
> (482) Night turns to day, light to dark; lightening sparks, the heavens open up dragging the rocking and panicing craft to an unwilling destiny [. . .] Forces encircle and pull and draw to the brimstone hell in heaven [. . .] Through icicle stars and around Jacob's-coat colored bodies of matter, past hazy smoke forming rivers ending in misty whirlpools.

The psychology students had used a mere handful of mildly extravagant words, and only on the one version I had transformed into a correspondingly overdone style. Apparently, entering a composition class creates a special context that can impose a peculiar interpretation upon a neutral task (cf. III.3.24-30).

1.31 To pursue the matter, I gave another class copies of (480) and asked them to "put it into a fancy-sounding style." What *that* might mean they had to imagine on their own. The topic of space flight should allow some leeway to enact whatever the students believed to affect style. As it turned out, most of them manipulated the style with a limited set of consistent techniques:

1.31.1 *Synonyms* were substituted for text expressions. The 'rocket' was a 'missile', 'craft', 'spacecraft', 'projectile', 'ship', 'space vehical', 'vessel', or 'tower'. 'Stood' was traded for 'towered', 'abode', or 'stalked', 'empty' for 'vacant', 'carried' for 'transported', and 'fuel' for 'propellant'. Instead of 'withdrawing' and 'crouching', the personnel 'dispersed and shielded themselves', or 'receded and squashed down'. The 'radar' 'detected' or 'traced' the rocket rather than 'tracking' it. The synonyms were presumably intended to be rarer and fancier than the original vocabulary; some of the uses were certainly unconventional in these contexts.

1.31.2 Modifiers were inserted so generously that they must have been considered decisive markers of style. Some papers opened with a flourish:

(483) An uncomprehendable, pitch-black and sun-blazing yellow, high-speed, V-2, rocket jet
(484) An enormous jet stream glossy black and canary yellow V-2 rocket

The 'desert' was termed 'dry', 'arid', 'barren', 'lifeless', 'lonely', 'red-hot', 'scorching', 'blistering', and 'sun-bleached'. The 'alcohol' was 'potent', and the 'liquid oxygen' 'precious'. The 'scientists' and 'generals', who were extolled as 'brilliant', 'important', 'well-trained', and 'respected', hid behind mounds that wavered among being 'chocolate', 'clay colored', 'sand-infested', or 'muddy, sloshy'.[5] The 'star' was (inevitably) 'twinkling'. The epidemic of modifiers even seized expressions of quantity: 'a complete forty-six feet'; 'time-lacking seconds'; 'a seemingly endless few minutes'; 'a stinking forty miles'; and 'a whopping 3000 miles per single solitary hour'.

1.31.3 Sensory impressions were conveyed, mostly visual, some acoustic. Colors were intensified: 'coal black', 'brightly painted yellow', 'lemon yellow', 'blood red', 'ruby red', and 'scarlet'. Costumes were donated: 'scientists dressed in white lab coats and generals clad in military attire' 'with tons of medals hanging from their uniforms'. The 'roar and burst' touched off apocalyptic eloquence: 'radiant', 'sweltering', 'fearful', 'growling', 'tumultous', 'thunderous', 'deafening', 'earth-shaking', and 'earth-shattering'. The take-off left behind a 'collection of torrid flames' and a 'fluttering waning star' as the rocket 'dashed upward' and then 'spiraled to the earth', where it 'smashed into the hard terrain' and was left a 'smoldering hulk'. In the burgeoning euphoria, the modest 'flares' of the original (480a) were promoted to miniature rockets:

(480a) Two red flares rose
(485) A pair of crimson flares jetted into the sky
(486) Two lazerlike flares raged across the sky
(487) Two fiery, engine-red flares were forcefully shot up into the heavens.
(488) Two flickering red flares were ejected

Evidently, the students associated high style with vivid, colorful scenes and events.

1.31.4 Quantities were emphasized or increased. The 'V-2 rocket', actually quite humble compared to a Titan or an Atlas, was 'hulking', 'humongous', 'colosal', and 'gargantuan'; the 'tons' it weighed were 'massive', 'ponderous', and 'whopping'. The personnel, along with 'millions of onlookers', withdrew to an 'extreme distance' behind 'massive mountains of earth'. The rocket flew at 'blazing', 'fantastic', or 'unfathomable speeds'

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[5] Cape Kennedy must have been the launching scene that triggered such mental imagery. When slides of that location were shown during the reading, readers tended to disregard the 'desert' in their reports.

and returned 'minutes, seemingly hours later' to its 'wopping impact' at a 'considerable lengthy distance' from the starting point. Hyperbole of dimension thus assumed the stylistic role it sometimes had for such authors as Rabelais and Shakespeare.[6]

1.31.5 Human reactions to events were depicted. Sometimes, the reactions were assigned to the characters in the story. The 'scientists and generals' were 'cautious', 'eager', 'sceptical', 'unbelieving', 'tense', 'concerned', 'anxious', or 'excited'. The 'pilot' was 'worried' or 'incredulous'. Other times, the reactions belonged to no agent in particular. The 'overwhelmingly great' or 'incredibably bulky rocket' with its 'overwhelmingly awesome 46 feet' was 'unbelievably rumored to weigh a massive five tons, when empty!!!!' After the 'alarmingly red flares' rose, it went aloft with 'an impressive roar' and an 'agonizing slowness' that gave way to an 'incredible', 'amazing', or 'hair-raising speed'. After 'climactic', 'breathtaking moments', it went into a 'devastating', 'pitiful plunge'. The writers' intention was no doubt to suggest how the reader should react.

1.31.6 Metaphors were introduced into a text previously devoid of them (aside from the 'yellow star'). The rocket 'thrived on' fuel 'to satisfy its huge appetite'. A 'explosion screamed' as the craft took off like a 'ray of fury' amid 'a great bluster of engines' and a 'chorus of rumbling volcanoes'. It 'crashed through the atmosphere', 'released by man's claws into the uncaptive desolution of space', and 'worked toward its destiny', followed by its 'plume of yellow flame'. Though it 'escaped from the clutches of earth's gravity', the rocket couldn't elude 'the invisible, reaching fingers of radar', that 'modern miracle'. Finally, a 'pilot, sentinel to the atmosphere', saw it 'return like a loyal friend' and 'plunge like a meteor' down to 'mother Earth'.

1.31.7 Technological terms served as stylistic decorations. The 'fuel-injected rocket', a 'huge piece of man's technology', was powered by a 'highly combustible' and 'highly volital mixture' of fuel with 'oxygen in its unusual liquid form'. The launch came 'with all systems go', when 'all mechanisms had the go-ahead'. Tracking was done with a 'precise and complicated' or 'advanced radar system', or with 'highly technical radar equipment'. The 'pilot' was retrained to be an 'engineer'. Apparently, technological terms are taken as style markers because they are characteristic of scientific and technical text types, just as metaphors are associated with literary and poetic texts.

1.32 It was striking that a class of naive writers should spontaneously deploy such consistent techniques to influence style. The techniques listed in

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[6] His legs bestrid the ocean: his rear'd arm
Crested the world. His voice was propertied
As all the tuned spheres [. . .] Realms and islands
Were as plates dropped from his pocket.
(Antony and Cleopatra, V, ii, 82-92)

VI.1.31.1-7 accounted for nearly all operations performed on the original sample (480). Apparently due to the vivid, concrete topic, vague bureaucratic language was only rarely put into play, e.g., when the rocket returned to the 'point of commencement of this activity'; or when the personnel 'withdrew their physical position'. Also, I had been inoculating the students by having them simplify and revise ponderous, gratuitous verbiage (VI.1.34).

1.33 Admittedly, the freshmen didn't firmly control their forays into fancy style and slipped off into parody. Their intent to "substitute" the "words of academia" "for the plain words of daily life" (Shaughnessy, 1977: 188) was not always felicitous: 'magnanimous' for 'huge', 'vacuous' for 'empty', 'abode' for 'stood', etc. And their neologisms may have been mere confusions of real words: 'illustrous red blazes', an 'illuminous flame', a 'gleamy star', an 'inconvincible five tons', an 'uncaptive desolution', or a 'decceration of the rocket'. Still, whatever we want to teach about style must begin from the learner's beliefs and tactics regarding style. Like their grammar, the students' style is a body of procedures derived from experience and deserves to be tapped and applied—not just derided and patronized because the writers do not wield the academic authority of scholars and poets. Freedom to experiment is the first step toward improving stylistic sensitivity and competence (cf. Weathers, 1980; VI.1.9).

1.34 Though still at an early stage, my findings on style and its acquisition support these contentions. If, as Marcel Proust remarked, "style is a quality of vision, a revelation of the universe particular to each of us, not seen by others," a teacher should encourage variety more than conformity. Students can profit most by manipulating styles without being afraid of intolerant reactions. At least in basic work, students should be encouraged to expand the uses of their current vocabularies before they risk the appropriation of exotic new words. Even unskilled writers have a larger and more complicated stock of words than their casual conversation reveals. As we saw in VI.1.28, the teacher sometimes needs to calm them down when they want to display dangerously elaborate language. For the naive writer, a thesaurus is treacherous if it lists items without contexts. Many words in such lists cannot be substituted for each other except to pursue a specific intention (sarcasm, hyperbole, etc.). Exercises should include simplifying style as well as making it fancier. It requires some exertion to retrain a writer who thinks that English papers should be as pompous as possible. The student who wrote (489) regularly has to go through a cumbersome version before she reaches a more readable one like (489a):

(489) Various forms of emotional frustration and behavioral disturbances result from the child's inability to meet the demands of the world with adequate equipment for communicating. Autistic children have difficulty making use of auditory information.

(489a) Disturbances result because the child cannot meet the demands of the

world without the ability to communicate. The autistic child has a pronounced hearing problem.

In principle, there is no reason why toning down elevated style can't be done with explicit revision techniques just as well as reworking casual, speech-based style (cf. V.3.39ff). Whatever resources the student already has should be harnessed.

1.35 In a society where language style is so closely tied to roles, status, and attitudes, the teacher's task cannot be easy. But for the same reason, it is extremely crucial that stylistic flexibility and control be acquired during one's education. As Mellon (1969: 82) observes, "the teaching of styles" is "what we really mean when we speak of teaching writing." Individual interviews help to tailor our advice on style to the aspirations of each student. Much more research needs to address the evolution of stylistic awareness in skilled writers, and the methods for influencing that evolution through instruction. Some intuitions and strategies are already present, as we can see from the results in VI.1.31. Comprehensive, tolerant training can encourage the advancement of the student's own skills and, in the long run, of society's disposition toward straightforward communication and mutual respect among linguistic personalities.

2. THE STAGES OF DISCOURSE

2.1 Like style, the STAGES of a discourse, i.e., its progression from beginning to end, have not been well defined in terms of processes. The preoccupation with mechanical matters eclipsed the instruction of stages until the recent re-introduction of rhetoric into composition (cf. I.3.17f; II.3.34; III.2.23; IV.2.41; VI.2.22). Skilled speakers and writers intuitively know how to organize a progression such that a discourse has a workable beginning, middle, and end. The beginning and end are typically less fuzzily defined than the middle (whatever comes in between). Explicit signals such as 'to start with', 'in conclusion', and so on, are less decisive than the flow of content and purpose (VI.2.10, 36). A complex interaction among goals, ideas, and conceptual development decides what is talked about and when. Most writing states a THESIS: an outlook on a problematic issue (cf. III.2.16). The strategic position of the thesis is often, but not always, at the beginning and end. Presenting your thesis at the beginning appears to be effective if the audience is not yet strongly committed on the issue, or is unfamiliar with it; and if the opposing thesis won't be presented, or else only after the audience has committed itself (cf. Hovland, 1974). Following up your thesis right away with supporting evidence is persuasive (cf. Weiss, Rawson, & Pasamanick, 1974). Restating your thesis at the end is helpful if the opposing thesis was presented quite a bit earlier; and if the audience can

act on your thesis soon after the discourse (cf. N. Miller & Campbell, 1974; Wilson & H. Miller, 1974).[7]

2.2 Since the deepest phase of processing is *goal-planning* (III.2.6), participants need a *reason* for the discourse: why speaking or writing should take place at all. The reason is usually clarified during the beginning, either through monitoring the immediate situation, or through introducing a topic that is *relevant,* i.e., bearing on the participants' goals and intentions (cf. II.2.10; III.2.9, 15; VI.2.6f, 11, 32). In the next-deepest phase, that of *ideas,* the content of the discourse is organized and inter-connected in an explicit *topic flow*. This flow is often controlled by *degrees of generality* (cf. VI.2.7, 22ff, 28, 34, 36): thesis vs. evidence, whole vs. part, and so on. Each topic in succession is expected to be both *interesting* (novel, unexpected, etc., VI.2.32) as well as relevant within the context of previous topics or of the situation. Since problems are typically both interesting and relevant (VI.2.8-11), a thesis makes a good topic. Eventually, the discourse ends when the the topic flow appears satisfactorily resolved, e.g., when headway has been made toward the participants' goals. The middle of the discourse therefore usually pursues goals and elaborates topics, and is accordingly lower in generality than the beginning and ending (VI.2.10f, 23; 34ff). But all these tendencies can change in context. For instance, a general thesis is more common in personal essays than in scientific and technical texts (VI.2.7ff).

2.3 In spoken conversation between two people, both participants can contribute to beginning and ending the discourse, plus negotiating the topics in the middle (cf. Schegloff, 1968; Jefferson, 1973; Schegloff & Sacks, 1973; Sacks, Schegloff, & Jefferson, 1974). When the speakers meet face-to-face, greetings are exchanged with the options of entering into a discourse or continuing on one's way. If conversation begins, the first topic is likely to be construed and remembered as the reason for the discourse; hence, the more relevant (urgent, important, salient) a possible topic seems, the more likely a speaker is to start a discourse rather than walk away. Once the discourse gets going, the conversation itself offers further contexts in which other topics become relevant (Schegloff & Sacks, 1973: 301f). Thus, topics may concern the situation at hand, the immediately preceding utterances, and the prior knowledge shared among participants. Consider this sample (Schegloff & Sacks, 1973: 314):[8]

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[7] Attitude change is affected by other factors besides order of presentation, e.g., by the impact of the discourse on emotions, anxieties, prior commitments, participant roles (self-esteem, social influence, ego defense), and so on. An important collection of papers is offered in Himmelfarb & Eagly (Eds.), (1974). Although cognitive states are assiduously circumscribed in iron-clad behaviorist jargon (e.g. "attitudinal verbal reinforcement"), the work merits consideration—provided a theoretical framework can be found (cf. Steinman, 1982: 320f).

[8] Following Schegloff and co-workers, I use 'h' and 'hh' for less vs. more intense aspirations; and '[&]' for the point where an utterance starts to overlap with that of the next speaker. The upward arrow is for a rise in tone. The need for special ways to transcribe speech typically collides with the need to read the samples in a easy, natural way.

(490) A: Allo
B: Did I wake you
A: Who's it
B: Nancy
A: Oh hi
B: Hi did I wake you
A: No no no, not at all hh [&] h
B: [mumble] after a while it started ringing I kept thinkin maybe I should hang up but I you know hh
A: No no no, it's OK. [&] I was just uh rushing a little that's all hh
B: Oh good. hh Ummm don't bring any sausage because [etc.]

The opening is devoted to the reason why speaker A took so long to answer the phone. When the situation has been monitored to see if conversation is convenient, the topic of 'bringing sausage' supplies the reason for the discourse. B's goal is to prevent an expected action on A's part.

2.4 The middle of a conversation has a topic flow that can be influenced by how speaking turns are assigned (cf. Sacks, Schegloff, & Jefferson, 1974). Reichman (1978) argues that a small range of content relationships accounts for the coherence of conversation. A topic may be either a specification or a generalization of its predecessor, or may rehearse the same content in a clarified or reconsidered perspective. One example is a conversation where A is telling about her mother (Reichman, 1978: 303f normalized the transcription for print):

(491) A: She never liked her position in her job, which was a big part of her stupid problem, that she never changed it. Oh didn't I tell you, when I was home a couple of—about two months ago I was really angry 'cause I know how much she's suffered 'cause she hasn't had a career—or feelings of inferiority. And here I'm doing it and she's trying to stop me. And so, you know, I get so angry, and she was sitting and talking how important it is to have a career and to be able to do what you're doing. And I was just sitting in the living room dying, really getting angry. But I didn't say anything, which I thought was progress that I didn't say anything.
B: *Is* it?
A: Oh it *was* progress, 'cause I used to get into stupid arguments and fights with them.
B: But *isn't* it hard work, to keep all that in?

The general topic of how someone's mother feels about her job shifts down to a specific incident between her and the speaker in regard to 'having a career'. A confrontation with the mother and the speaker's reported reactions lead off toward a different general topic, whether it's better to keep silent when you're angry or to say something about it. Each topic illustrates, or is illustrated by, the one just before it. This sequence of close content associations contrasts with far-ranging topic shifts that pick up on something in the external situation, as in (Sacks, Schegloff, & Jefferson, 1974: 714):

(492) A: Oh I could drive if you want me to.
B: Well no I'll drive I don' min ↗
A: hhh I meant to offah [pause of 16 seconds] These shoes look nice when you keep putting stuff on 'em

The 'driving' topic was exhausted, and, after a pause, the 'shoes' were noticed and monitored as the new topic.

2.5 Once the reason for the conversation is apparent, the major option is to close; one participant offers a closing which the other one accepts or rejects (Schegloff & Sacks, 1973: 307):

(493) A: [. . .] and uh we're gonna see if we can't uh tie in our plans a little better
B: Okay [&] fine
A: *Alright?*
B: *Right*
A: Okay boy.
B: Okay
A: Bye [&] bye
B: G'night

As Schegloff and Sacks (1973: 306) note, a popular conversational closing is a general statement, such as "conventional wisdom which can be heard as the 'moral' or 'lesson' of the topic thereby being possibly closed." In (493), the general goal of 'tying in plans better' winds things up. In another example (ibid.), one speaker closes off the topic with a commonplace saying:

(494) A: Uh-you know, it's just like bringin the- blood up.
B: Yeah well, things uh always work out for the best

and the conversation ends almost at once. Such general statements make good endings because they won't be argued with and don't need further illustrations. Just as a controversial thesis leads into a discourse, a trivial one leads back out.

2.6 The coherence of expository writing is organized differently from that of conversation (cf. Tannen [Ed.], 1983; V.3.2). The communicative situation and shared past experience are mediated in time and space, so that commonsense knowledge may be the only reliable background. Harweg (1980) calls most written texts "non-obtrusive" (the audience comes to the text rather than vice-versa) and "pluri-local" (the audience does not share the visual field of the text producer).[9] These factors constrain the options typically used in the beginning, middle, or end of the written text. The discourse goal tends to be less explicit, sometimes unacknowledged, and its

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[9] Harweg stresses that this is not a speaking vs. writing distinction. For example, students pass written notes in class: the text comes to the audience, and visual fields are shared. Still, written texts are more often "non-obtrusive" than spoken ones.

relevance to the audience's personal situation more remote. Topics can be presented for their interest value, or their relevance to wide social concerns (cf. VI.2.2, 33, 36). For example, Hunter S. Thompson's study of the *Hell's Angels* portrays motorcycle gangs as losers fighting back on a society that both abhors and is fascinated by the lawless freedom of its own outcasts. Yet audiences may prefer to read the book for its novel and salient content and to disregard its social aspect.

2.7 The fact that the audience must seek out the written text influences the overall transaction between writer and reader (cf. Shanklin, 1982). By obtaining and concerning itself with the text, the audience has already shown its willingness to consider topics and goals whose relevance is mediated. If you start reading a biography, such as Lytton Strachey's *The End of General Gordon:*

> (495) During the year 1883 a solitary English gentleman was to be seen, wandering, with a thick book under his arm, in the neighborhood of Jerusalem.

you face a higher density of informative content than you would at the opening of a normal conversation (Harweg, 1980: 318f). The writer is expected to reward the audience's effort of obtaining the text and accepting dense, remote content. The *personal essay,* an expository sub-type favored in some composition courses, lends the writer a conspicuous role: to inform or entertain the audience with personal knowledge and experience. To fit this main goal, the text often begins with a high degree of generality, e.g., what is true of society at large, so that the topic appears widely revelant and motivates further reading:[10]

> (496) We live in an age of change and mobility. (Martin Krovetz)
> (497) Everybody at some time has probably felt blood pressure rise and pulse when loaded words have been used to diminish him. (Russell Baker)

Conversely, a specific beginning should make the audience interested in finding out what general issue is at stake, e.g:

> (498) A handsome brownstone house is being razed across the street from us, thrusting us into conflict between two seemingly irreconcilable groups. (Caskie Stinnett)
> (499) One hot night in the summer of 1949, I climbed to my usual perch in the cramped press box above the wooden stand of the baseball park in Lumberton, North Carolina. (Tom Wicker)

These detailed beginnings later lead to the general topic of old ways of life disappearing.

2.8 The personal essay seeks relevance especially by taking sides on a problematic human issue (cf. VI.2.1). This problem is an uncertain (and

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[10] Samples (496-499) are from Levin (Ed.), (1977: 2, 169, 7, 57).

hence dynamic) situation affecting the beliefs and goals of many people. Audiences enjoy controversy, especially if the writer seems to support their own belief system (cf. III.3.15). Topic shifts are free to move toward any content the writer feels will support the thesis, e.g., historical trends illustrated by urban clearance (498) or by baseball leagues (499). The continuation of (496) is a collection of incidents in the author's life that can represent 'change and mobility'. The "truth" of the general thesis about the human condition is strengthened by the truth of one's real-life experiences. The essay ends when the thesis seems sufficiently well-supported.

2.9 The stages of *scientific* exposition reflect a different approach to stating and supporting a thesis. The content of the thesis is usually far more specific than that treated in the personal essay, so that supporting materials are in turn extremely detailed, and the writer's experiences play a much smaller part.[11] The customary beginning is to announce the problem. One's own thesis can be presented by itself (500), saved for later (501), or contrasted with its predecessors and rivals (502):

> (500) A basic theme of this report is that early school experience is probably the most important stage in a child's educational career. (Cicourel, 1974: 1)
> (501) In this Chapter I am concerned with the placement of students in particular classes. (Leiter, 1974: 17)
> (502) In recent years cognitive psychology has shaken off the artificial limitations of its subject matter and methodology that had impaired its progress. [. . .] It is not enough to describe behavior in certain well-controlled laboratory situations; such descriptions must be powerful and general enough to deal with a much broader range of observations about cognition and language derived from other disciplines. (Kintsch, 1974: 1)

The audience can decide at once if the problem is interesting or relevant enough to warrant reading more. For the scientist, relevance is also specialized, as befits the topic.

2.10 The middle of a scientific text brings in evidence to support the writer's thesis according to much stricter conventions than in the personal essay. At the end, the writer sums up the evidence brought forth and the reasons why it justifies a conclusion about the problem and its solution:

> (500a) Objectivity is claimed in standardized testing conditions by holding constant or eliminating cultural background conditions and socially relevant features. These so-called objective measures do not recognize that each child's performance is a product of each child's conception of his own language abilities and social understanding as they interlace with the natural intrusions and contributions of the learning or testing setting as socially defined by adults. (Cicourel, 1974: 16)
> (501a) The practices described in this chapter are everyday activities which form

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[11] Hence, joint authorship—division of labor, loss of the personal—is far more common in science texts than in essays.

"seen but unnoticed" sense-making methods for locating and describing students. [These] practices are essential to the process of more "standardized" tests as well. (Leiter, 1974: 73)

(502a) I have tried to show that the formal representation of meaning can [be] a useful basis for experimental investigations [. . .] it appears capable of providing the broad conceptual framework for the psychological study of memory and knowledge which the problem demands. The experiments reported here demonstrate that a broadly based approach is possible today, and even fruitful. (Kintsch, 1974: 261)

Such endings affirm the merits of the original thesis and may predict that future evidence will also bear them out, as in (502a) (which it did). The generality and relevance of an ending identify it better than worn-out cohesive signals like 'in conclusion' (cf. VI.2.1, 36).

2.11 *Technical* exposition is devoted to a different kind of problem than is scientific. The facts are taken as given, rather than in dispute. The problem is to report and explain them to people for whom they have practical relevance. (503) addresses those who want to learn a certain computer language; (504) leads into an account of an electrical project:

(503) This manual is designed for people who want to learn to program in Apple's Applesoft BASIC. With this manual, and an Apple computer, and a bit of your time and attention, you will find there is nothing difficult about learning how to program a computer. *The Applesoft Tutorial,* p. v).

(504) Although Consumers Power presently has distribution underbuild on 46kV lines, it does not have distribution underbuild on 138kV lines. The Planning Commission has recently proposed adding distribution circuit underbuilds to existing single and double circuit lines in the Northwest area. Therefore a study was conducted by the Systems Analysis section to determine the feasibility of the proposal. (Mathes & Stevenson, 1976: 265)

Ordinary language is well suited to the much wider audience of (503) and reassures them that 'nothing difficult' is in store. The narrower audience of (504) knows the technical terms and concepts ('distribution circuit underbuild') and wants advice on a particular project. After their middle sections, where the details are provided, the texts end with a return to the contexts raised in the beginnings:

(503a) This book has presented the core of Applesoft BASIC. If you now go through this book again, writing your own programs with the statements that have been presented here, you will solidify your knowledge considerably. *(The Applesoft Tutorial,* p. 111)

(504a) The problems with the proposed construction of 138kV single and double circuit underbuild can be solved by the use of the methods outlined in this report [. . .] we will be able to provide continuous, low cost electricity to our customers in these rural areas for many years to come. (Mathes & Stevenson, 1976: 270)

By asserting that the problem is solvable in the way proposed in the middle, the ending leaves the audience satisfied. The "technical" problem is settled in conjunction with the writer's own "rhetorical" problem of tailoring the topic and goal to the audience (Mathes & Stevenson, 1976)—the public, the management, the technician, the researcher, and so forth (cf. also Pearsall, 1969).

2.12 As we see, the stages of written discourse are yet another dimension that students must learn to distinguish from spoken discourse. The writer's audience is broader, so that the relevance of goals and topics is more mediated. Hence, the writer must be more careful to keep the topic flow explicit or easily inferrable (cf. VI.2.4, 19). Graphic patterns to signal the stages of the text are imposed by PARAGRAPHING. The motives of writers for marking off paragraphs are still in dispute. Early scholars since Alexander Bain drew an analogy between the paragraph made up of sentences and the sentence made up of words (cf. Rodgers, 1965). However, the analogy remained controversial (cf. Becker, 1965; Christensen, 1965; Christensen, Becker, Rodgers, Miles, & Karrfalt, 1966; Rodgers, 1966), and can't help us without a more complete theory of how writers mark off sentences. The formal structure of a sentence is easier to define and has at best a metaphoric resemblance to a paragraph; for instance, a "sentence fragment" is a more reasonable notion than a "paragraph fragment" (cf. VI.2.16). On the other hand, both the sentence and the paragraph (a) indicate conceptual chunking; (b) are shorter for heavier materials and longer for less heavy ones; (c) can be sequenced to begin with the point of orientation and move from there to new or unexpected materials; and (d) are fuzzy notions for speaking, but well established for writing (II.3.13, 41f; III.2.28; IV.2.60, 63f; IV.3.12f, 17; V.2.18, 33, 37). Some languages have spoken paragraph markers (III.2.28); but English has at most some sporadic signals like 'okay', 'well', 'anyway', etc. (V.3.14).

2.13 Like punctuation, paragraphing is partly a reaction to the organization of a text, and partly an intentional shaping of it (cf. IV.3.1). The content of a paragraph is intended to be processed as a chunk; and, because the content forms a chunk, the writer is impelled to mark off a paragraph. Text processing typically distributes the most resources to the first and last sentences of a paragraph, according to studies of memory (Sachs, 1967) and eye movement (Just & Carpenter, 1980). Yet there is no single *correct* way to make paragraphs, but only a range of *motivated* ways. Here also, paragraphing resembles punctuation, and, since paragraphs are linear units, they might be accounted for in terms of the seven principles of linear processing presented in Chapter IV. These principles could interact and adapt to a range of contexts and communicative intentions.

2.14 Following the *core-and-adjunct* principle, the *topic sentence* is an explicit statement of an *idea* formatted as a single phrase unit. The *look-ahead* principle suggests that the preferential position for the topic sentence

is at the start of the paragraph (cf. Kieras, 1978). The topic is then made clear before it is developed, as in:[12]

> (505) Leading farmer organizations have been of little help. Wary of all government regulation, they favor conservation programs but oppose any effort to make them mandatory. Environmental groups are only beginning to wake up to soil erosion as a pressing national problem.

But the *look-back* principle may require that the opening sentence relate back to the preceding paragraph, so that the topic sentence gets moved at least into second position, e.g.:

> (506) [. . . .]for Hegel, the most eloquent demonstration of the ethical life, a sister's disinterested love for her brother, is the fidelity of "the heavenly Antigone, the noblest of figures that ever appeared on earth."
>
> My point is not that Hegel's argument is particularly compelling as either philosophy or literary criticism. Rather, I wish to suggest that Hegel's addiction to the play, partially for so idiosyncratic a reason, may be seen as the nineteenth-century appreciation exactly polar to Arnold's summary dismissal. For if Arnold focuses on the *Antigone* as the classical work irrelevant to modern existence, Hegel keeps returning to it as the single most expressive play in Western literature. [etc.]

The opening sentence goes back to repudiate an inference drawn from the previous paragraph; the second sentence of the new paragraph brings forward the real 'point', the new topic. The topic sentence should not go first if an abrupt or confusing shift would result.

2.15 According to the *heaviness* principle, a paragraph's length should be arranged so that the content forms a manageable chunk. Minimal paragraphs of only one sentence naturally attract strong focus. Newspapers and advertisments, which may get read in distracting settings (e.g., while riding a bus or train, waiting at a stoplight, etc.), have abnormally short paragraphs, partly to grab attention or to compensate for casual, sporadic reading, and partly to provide blocks that the eye can take in and follow without losing one's place. In most other published texts, such as essays and reports, one-sentence paragraphing is reserved for special effects (cf. IV.2.60; IV.3.17; VI.2.21). In (507), unusual focus falls on a question (what 'friend' means to Americans) that could easily have gone at the end of the previous paragraph or at the start of the following one:

> (507) Coming into an American home, the European visitor finds no visible landmarks. The atmosphere is relaxed. Most people, young and old, are called by first names.
>
> Who then is a friend?
>
> Even simple translation from one language to another is difficult. "You see," a

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[12] Examples (505, 508-510, and 514) are from *TIME* Magazine (Feb. 15, 1982).

> Frenchman explains, "if I were to say to you in France, 'This is my good friend,' that person would not be as close to me as someone about whom I said only, 'This is my friend.' Anyone about whom I have to say *more* is really less." (Margaret Mead and Rhoda Metraux)

The heaviness principle may also affect order, as we saw for sentences (IV.2.56-64). Interest can be aroused by postponing the topic sentence until second position:

> (508) It is among the most durable of American dreams. The young man with a bright idea for a new product or service decides to form his own company. He invests his family's savings in the new venture. He is soon working 18-hour days [etc.]

or even until the next paragraph:

> (509) The blond host sits on a windowsill, smiling into a filtered lens. An apple is in one hand, a hair dryer in the other. Dress is informal; in fact, it is nonexistent. The host is: a) Diane Sawyer, co-host of CBS's *Morning* show, making an all-out bid to win the war of the a.m. news programs; b) ABC'S David Hartmann, doing the same; or c) Lassie, doing what comes naturally.
>
> The answer is none of the above. The correct response: Shannon Tweed, the November 1981 *Playboy* centerfold, inviting viewers to join her in Hugh Hefner's new electronic rabbit warren [. . .] a series of one hour video magazines.

If the material is interesting, readers stay tuned in until the topic is revealed.

2.16 The *listing* principle applies when paragraphs are built around enumerations. In (508), the topic sentence brings 'American dreams' to the fore, and the following sentences list in turn the actions belong to the 'dream'. However, a whole paragraph may list illustrations of a topic announced elsewhere. A paragraph further on in the same text as (508) enumerates people who lived out the 'American dream':

> (510) Some of these successful new capitalists are tinkering innovators in blue jeans, while others are button-down bankers with M.B.A's. Some are immigrants or the sons of blue-collar workers, while others are from old established families. Most are still little known outside their own fields. Frederick W. Smith, 37, is just another guy named, well, Smith. Yet his company, Federal Express Corp., has become a 600 million firm by delivering packages that "absolutely, positively have to be there overnight," as its ads claim. Nolan K. Bushnell, 39, invented Pong, the first video game, in 1972. He then sold his company Atari, to Warner Communications in 1976 for 28 million. Steven Jobs, 26, the co-founder of five-year-old Apple Computer, practically singlehandedly created the personal computer industry. This college dropout is now worth 149 million.

All sentences in this paragraph are at the same lower degree of generality than the topic established before. I have not found many examples of this pattern, but it doesn't make a "paragraph fragment" (cf. VI.2.12).

2.17 If paragraphing indeed adapts to the conditions of linear process-

ing, then a "rule" demanding a topic sentence in the first position of every paragraph is unrealistic. Teachers may have imposed the rule because some students followed conversational habits by making abrupt, unannounced topic shifts (cf. VI.2.4, 12, 19). But the rule has been criticized from the standpoints of rhetoric (McConkey, 1964; Rockas, 1964; Rodgers, 1966) and textual evidence (Braddock, 1974). My own graduate students John Pieters, Steven Robitaille, and Manolo Pineiro surveyed the location of topic sentences in 120 paragraphs from expository writing in essays and journal articles. All but 5 had a topic sentence: 95 had it at the start, 6 at the end, and 14 in the middle; the proportions were almost the same in Spanish paragraphs as in English ones. The large number of journals in the sampling probably contributed to the high ratio. In any case, the initial topic sentence is common and efficient for look-ahead, though contexts may call for other patterns (506, 508-510). Its absence should count as an "error" only if the topic flow is thereby obscured.

2.18 Context also requires some flexible and adaptable strategies for selecting the point to indent for a new paragraph. The conceptual chunks of a text need not always coincide with paragraphs (cf. Rodgers, 1966; Pitkin, 1969; Nold & Davis, 1980). Undoubtedly, the most essential strategy in expository writing is:

Start a new paragraph at a topic shift.

Many transitions that would seem abrupt in the middle of a paragraph do not at the start of a new one. A new conceptual chunk is expected, though not obligatory, following each indentation. The essay on 'friendship' already cited in (507) has a global list of paragraphs, each one specifying the topic for one nationality. These contrastive subtopics are named right after each new indentation, thus conforming to the heaviness principle which, as was shown for punctuation, marks off contrastive content into separate units (cf. IV.3.4, 6, 8, 27, 40; VI.2.21, 30):

> (511) For the French, friendship is a one-to-one relationship that demands a keen awareness of the other person's intellect, temperament, and particular interests. [etc.]
>
> In Germany, in contrast with France, friendship is much more articulately a matter of feeling. [etc.]
>
> English friendships follow a still different pattern. Their basis is shared activity. [etc.]

In this sample from Aristotle's *Rhetoric* (Cooper, 1932), contrast again calls for a paragraph boundary:

> (512) If you have taken an oath before, and it contradicts the present oath, you must argue that either the first oath or the present one was brought about by force or trickery, so you cannot be held responsible.
>
> On the other hand, if it is your opponent who has sworn conflicting oaths,

you must argue that a man who does not abide by his oath undermines the whole established order.

Like many contrasts, this one is set against a background of similarities (cf. IV.2.40, 51): the same actions expressed with recurrence and parallelism to highlight different agents and lines of 'argument'.

2.19 Whereas topic shifts in conversation can draw their coherence from the participants' shared experience in a current or past situation (VI.2.4f), topic shifts in writing are best controlled by following up typical conceptual relations. These relations would be assumed as defaults if the writer offers no signals to the contrary. One strategy is:

Start a new paragraph when moving from cause to effect.

An illustration would be:

(513) [. . .] He sent Constans's letter and his own to the *Journal des débats* in Paris, where they were published fourteen days later. Thus the news traveled with astonishing speed to Paris and from there to other cities.

Local scholars pricked up their ears immediately. And naturally, the whole body of ancient mythology about wild men and savages reappeared in the press. (Shattuck, 1980: 20)

Though less common (presumably because text order tends to follow causal order), the reverse strategy:

Start a new paragraph when moving from effect to cause.

does apply sometimes:

(514) [. . .] The government announced last week that new street clashes near the Lenin shipyard had ended in 14 injuries and the detention of 205 demonstrators.

The six-hour uprising began after shipyard workers placed flowers at the base of a 140-ft. steel monument honoring their comrades who were killed by government troops in Gdansk during the riots of 1970.

2.20 Another common strategy follows temporal, rather than causal, relations among topic concepts:

Start a new paragraph when moving from earlier to later.

A series of indentations can signal movement through a time progression from event to event:

(515) The first time I witnessed people eating pet food was among neighbors and acquaintances during my youth in the South. [etc.]

The second time occurred in Cleveland in the summer of 1953. [etc.]

The next time I ate dog food was in 1956 while struggling through a summer session in college without income for food. [etc.]

Later, while working as a hospital corpsman, I had the opportunity to ask new recruits about their home life and nutrition practices. [etc.] (Edward Peeples)

The time expressions ('the first/second/next time', 'later') at the start of each paragraph make the transitions explicit. These expressions could be omitted, however, since the mention of dates and places keeps the events distinct, and readers normally assume that text order matches temporal order (III.3.19).

2.21 The next strategy is easy to subsume under the listing principle:

Start a new paragraph when moving from the whole to a part, or from one part to another.

One good occasion would be the exposition of objects distributed in space, as in Robert Ramirez' protrayal of a Chicano 'barrio'. He first depicts the 'entire area', and then devotes one paragraph each to a single part:

> (516) Members of the barrio describe the entire area as their home, but it is more than this. The barrio is a refuge from the harshness and coldness of the Anglo world. [etc.]
>
> The *tortilleria* fires up its machinery three times a day, producing steaming, round, flat slices of barrio bread. In the winter, the warmth of the factory is a wool sarape in the chilly morning hours, but in the summer, it unbearably toasts every noontime customer.
>
> The *panaderia* sends its sweet messenger aroma down the dimly lit street, announcing the arrival of fresh, hot sugary *pan dulce*.
>
> The small corner grocery store serves the meal-to-meal needs of customers, and the owner, a part of the neighborhood, willingly gives credit to people unable to pay cash for foodstuffs.
>
> The barbershop is a living room with hydraulic chairs, radio, and television, where old friends meet and speak of life as their salted hair falls aimlessly about them.

At every shift of place, the new location is mentioned right away: 'tortilleria', 'panaderia', 'corner grocery store', and 'barbershop'—again, contrast as a motive for division (VI.2.18). Notice that this organization calls for some one-sentence paragraphs justified by their unity as conceptual chunks, and by the heaviness of the contrast (cf. VI.2.15).

2.22 As was remarked in VI.2.2, the stages of discourse are most pervasively influenced by degrees of generality and importance. Writing allows for more complex and elaborate hierarchies than speech does (cf. IV.3.15; V.3.10; VI.1.11). Any two related elements in a discourse are *co-ordinated* (on equal planes in the hierarchy), or else one of them is *subordinated* (on a lower plane) to the other.[13] Syntactic subordination inside sentences is well-known in traditional grammar (II.3.19; IV.2.52; V.2.25); but recent explora-

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[13] The general-to-specific progression is sometimes called "deduction," and the specific-to-general "induction," especially when the general is the thesis, and the specific is the supporting evidence (cf. Christensen, 1963; 156; Christensen et al., 1966; 65f; Rodgers, 1966; 2f, 6; Grady, 1971; 354; D'Angelo, 1974; 3900. However, these patterns are fairly deep and potentially fuzzy, so that Christensen's "rhetoric" does not suffice as an active procedure for "invention" of the surface text (cf. S. Johnson, 1969; C. Bond, 1972).

tions, especially among rhetoricians, have been devoted to content subordination within whole paragraphs and texts (cf. Christensen, 1965; Christensen et al., 1966; Pitkin, 1969; Winterowd, 1970a; Grady, 1971; D'Angelo, 1974; Jones, 1977; Van Nostrand et al., 1978; Nold & Davis, 1980; I.3.18). In linear processing, the superordinate element is the core, and the subordinate element the adjunct (IV.2.7). Co-ordinate elements have the same status: they are both cores for elements below them in the hierarchy, or both adjuncts for elements above them. Several motives favor stating more general content at the beginning and end of a written text rather than in the middle (cf. VI.2.2). A general topic (a) leaves the writer substantial leeway for conceptual development; (b) is easily comprehensible without specialized knowledge; (c) can be supported with large amounts of evidence; (d) is readily viewed as important; (e) is relevant to many possible goals; and (f) should thus motivate a wide audience to read the text. The tendency of the important elements in expository hierarchies to gravitate toward the beginning and end of a paper is an interesting parallel to the movement of important items to the start or conclusion of a sentence (cf. IV.2.64; VI.2.12). As psychologists and rhetoricians know, the first and last speaking turn in persuasive interaction can be a strong advantage (VI.1.1).

2.23 Besides initial and final positioning, many other means are available to indicate the components of a hierarchy and their relative status. In this book, for example, central terms appear in block capitals the first time (or after a long interval), and in italics when emphasis is needed later on; paragraphs with two-place decimal numbers, e.g. (1.1.1), are subordinated to those with one-place decimals, e.g. (1.1). Indentation is a more conventional, though less determinate, means to suggest hierarchies. The strategy would be:

> *Begin a new paragraph when you move to a lower or higher plane in the hierarchy.*

This strategy commonly calls for an indentation that marks the transition from the opening paragraph(s) to those in the middle and thereby delimits the main components of the text. In this typical student paper, the opening goes from general topic plus thesis to the specifics of the equipment:

> (517) Video taping is one of many styles of photography. The images from the camera are recorded on a tape, rather than on a film. I started working with video tape equipment in high school and found it the most satisfying way to photograph.
>
> There are two main types of units, portable and stationary. [etc.]

Conversely, the transition from the middle to the end of the paper takes us back from specific to general, and leads into the concluding paragraph:

> (518) [. . .] My final copy had the still frame with the credits rolling over the picture, and the music "We Are The Champions" by Queen, playing in the background.

> I think video taping is an excellent way of expressing oneself. It can be used to tape special events in one's life, to help athletes in their games, and to teach students in schools.

The writer turns from describing one of his films to restating his thesis that 'video taping' is rewarding and useful. This conclusion both reviews the details from the middle of the paper (e.g. 'special events', 'games') and asserts the importance of his topic, so that the effort of having read the paper seems worthwhile.

2.24 Another pervasive influence upon stages of discourse, as we have seen, is *problem-solving* (I.4.16; III.1.19; III.2.24; IV.2.4; VI.2.1f). Organizing the text itself, e.g., finding ways to put together cohesive and coherent configurations, is one aspect of this activity, but there are many others. A "thesis" always implies that the topic is problematic, and that opposed viewpoints are possible (VI.2.1f). The writer relates the thesis to the problem by producing evidence that the problem is serious and relevant for many people; and that the writer's thesis or solution is justified and effective. Frequently, problem vs. solution is made the topic or used as the explicit framework for topic flow (VI.2.30, 33-37). A supporting strategy in paragraphing would be:

Begin a new paragraph when you move from problem to solution.

In (519), the problem is how to catch crowds of TV viewers without offering them 'ideas'; the solution is 'violence':

> (519) Television could, and occasionally does, present conflicts of ideas, but you can't run a crowd-catching business at this level. Instant crowds require simple phenomena, quickly grasped. Furthermore, ideas are controversial, dangerous; people have convictions, they take sides, are easily offended. Crowd-catchers want only happy customers.
>
> The type of conflict that will deliver instant crowds most efficiently is physical violence.

Paragraphing can also be used to mark off chunks of evidence that define the problem, for example:

> *Begin a new paragraph when you move from the thesis to the supporting evidence, or vice-versa.*

Rhetorically, the thesis is more general than the evidence, as well as more important. In (520), the classes of 'agents' and 'deeds' are followed by instances listed in a new paragraph:

> (520) [. . .]at present, instead of being champions and persons, the agents of great deeds are becoming personnel of the collective.
>
> This has occurred rapidly in the past century. Pasteur was an epic figure; Fleming and Salk have been much less so. Laying the railroad and the cable and digging the Panama Canal were more epic than building the big dams or orbiting

> Telstar. Going to the Poles was more epic than going to the Moon. (Paul Goodman)

If the thesis or problem statement might be surprising or unwelcome, the writer could back it up first, i.e., move from the evidence to the thesis (Rogers, 1952). Otherwise, the audience could become hostile and uncooperative right away, and not consider the evidence fairly. In (521), the report prepares its readers before presenting the unpleasant 'conclusion':

> (521) The procedure for certification presently used in Centerville Hospital does not always provide the proper certification information. Certification cards are often missing from patients' charts or are only partially completed. The result is that cards are sometimes illegally completed by unauthorized personnel in the Medical Records Office or Credit Offices.
>
> The obvious conclusion is that the present system is defective. (Mathes & Stevenson, 1976: 35)

Again, an indentation helps to mark the border between thesis vs. evidence.

2.25 The focused position of the text ending obliges the writer to find some satisfactory way to close off the discourse. The thesis may reappear (502a, 518), or a statement closely related to the thesis (500a), e.g., a solution to the problem (504a) (cf. VI.2.36f). The audience's contribution to solving the problem may be made explicit, e.g., using personalized 'testing practices' (501a) or 'solidifying their knowledge' (503a). Or, the contribution may be left implicit, e.g., to make testing 'socially relevant' (500a) or to get involved with 'video taping' (517). Looking back to the thesis allows a return to the degree of generality and importance that carries conviction—analogous to the general statements for closing a conversation (VI.2.5). The final statement of the thesis, being able to look back over the evidence, is normally stronger than the initial one. Whether or not the audience can be expected to accept it, the thesis should appear to address dynamic, worthwhile issues (IV.2.23). The essay on 'What is friendship?' (507, 511) closes with the 'common elements' shared by cultures, and moves from a major concern of humanity to a practical benefit for the intended reader:

> (522) [. . .]friendship, in contrast to kinship, offers freedom of choice. A friend is someone who chooses and is chosen. Related to this is the sense each friend gives the other of being a special individual, on whatever grounds this recognition is based. And between friends there is inevitably a kind of equality of give-and-take. These similarities make the bridge between societies possible, and the American's characteristic openness to different styles of relationship makes it possible for him to find new friends abroad with whom he feels at home.

The elements common to friendship everywhere make the most general and important material for the ending. The final touch, though, is to hold forth hopes to Americans that they will 'find new friends abroad'. A similarly reassuring note is sounded in other closings: that 'things work out for the best' (495); that 'a broadly based approach' to 'the study of memory and

knowledge' is 'fruitful' (502a); that 'customers' will have 'continuous low cost electricity' (504a); and so on. Audiences appreciate a hopeful resolution, even if they believe something very different (e.g., that 'things work out' disgustingly—especially plans for 'low-cost' energy).

2.26 As was argued for grammar and style (V.2.7ff, 20ff; VI.1.29ff, 33f), the stages of discourse should be instructed on the basis of what the learners already know. Recent textbooks have tried to harness commonsense associative reasoning as a vehicle for conceptual "invention" (e.g. Young, Becker, & Pike, 1970; Miller, 1976; Corder, 1979; D'Angelo, 1979a; Tibbetts & Tibbetts, 1979; Flower, 1981). Burke's (1947) dramatistic "pentad" was dusted off and used as a framework for building content around "act," "scene," "agent," "agency," and "purpose" (a scholarly version of the "what/where/who/how/why" jingle with "when" thrown out for some reason). The difficulty with associative reasoning is that once it gets going, a flood of content may pour out into stilted, trivial writing (cf. III.2.14, 19f). Don Adriano de Armado is as zealous a disciple of the "pentad" as any freshman could aspire to be—and as tedious:[14]

> (523) As I am gentleman [I] betook myself to walk. The time When? About the sixth hour, when beasts most graze, birds best peck, and men sit down to that nourishment which is called supper. So much for the time When. Now for the ground Which? which, I mean, I walked upon. It is ycliped thy park. Then for the place Where?, where, I mean, I did encounter that obscene and most prepost'rous event that draweth from my snow-white pen the ebon-colored ink which here thou viewest, beholdest, surveyest, or seest. But to the place Where? It standeth north-north-east and by east from the west corner of thy curious-knotted garden. *(Love's Labour's Lost,* I, i, 233ff)

Obviously, schemes for associative reasoning are only the first step. Content must then be organized, and screened for interest and relevance within its context (III.2.15; VI.2.32).

2.27 To get started, students need a topic which interests them, and about which, either through experience or research, they are knowledgeable (cf. III.3.20ff). Such a topic will bring sufficient content to mind, but in a miscellaneous order closer to the additive organization of casual speech (cf. VI.2.22). This disarray characteristically appears in a rough draft, and carries over into the final version of unskilled writers, e.g. (524). This student couldn't make sense of his notes from various source books. Straining for complex sentences probably drew off vital resources from ideation and conceptual development:

> (524) First, new technologies advanced and diffused in recent years have exhibited vast power to alter society and affect the environment on a scale previously unknown. Electric power generating technologies such as burning coal, has emit-

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[14] The hapless Don Armado takes "ground" not as "purpose," but as a piece of land.

> ted daily thousand to tons of fly ash, and sulfur oxides to the air. Supersonic aircraft, pesticides, nuclear wastes with half lives of thousand of years the decline of industries relocating populations. Motor vehicles cause most of the air and noise pollution in the environment. For example, certain insecticides pollute the soil and water endangering plant and animal life.

More experienced writers can still profit from simple strategies for determining what should be mentioned, and in what patterns. At least four steps are helpful. Materials need to be *sorted, arranged, consolidated,* and *developed*. Though these steps are doubtless not cleanly separate in natural writing, they can be done in sequence by writers who need to make more manageable sub-tasks out of the larger task of organizing a text into stages (cf. I.2.21; I.3.24; VI.3.13). The disarray of content in rough drafts then looks less fearsome and hopeless.

2.28 I have found simple, small-scale demonstrations useful for expounding the four steps. Here is a first draft by a twelve-year-old in a rural Florida school, writing from his own experience:

> (525) Trees are very tall. Trees are green. Trees wave in the wind. Pine trees contain tar. Tar sticks to you when you sit on a stump. Trees have seeds. Trees sometimes whistle. Trees are helpful and fun.

The text seems a faithful record of ideas coming to mind, like a snapshot taken early in a complex event. The childlike impression is partly due to the lack of plan in the sequence. However, the child's revision—a shapshot of a later moment—already sounds more mature:

> (526) Trees are tall and green. They wave in the wind and whistle. The wind blows out seeds which float to the ground to begin new trees. Trees contain tar which sticks to you. Trees are very helpful and fun but can be dangerous.

The child has *sorted* his materials by discarding some items ('very', 'pine', 'when you sit on a stump', and 'sometimes'), and by grouping the rest according to similarities: the appearance of trees; the effects of the wind; tar; and concluding thesis (the closest statement to a topic sentence). The sorting made it easy to *arrange* related things near each other, and to *consolidate* them by deleting redundant words. The 'wind' offered an explicit bridge among three events it causes, 'waving', 'whistling', and 'blowing out seeds'; the first two were compact enough that two sentences got combined into one; the third was given its own sentence. The appearance of trees offered an implicit bridge between 'tall' and 'green', and again, the respective sentences were combined. The writer discarded some qualifiers because distinctions were either levelled, e.g. 'very' in 'very tall' (the height of trees varies), or else not relevant, e.g. 'sometimes' in 'sometimes whistle' (all his statements apply only 'sometimes'). The loss of 'sit on a stump' may have come from a desire to keep a unified perspective focused on the 'trees' alone. Finally, the child *developed* some aspects of the topic. The randomly mentioned 'seeds' of (525) are now explicitly related in (526) to 'wind' and lead

to the further idea of how 'new trees' come about. The final thesis is also developed to add the reservation that 'trees can be dangerous'. The 'tar' may have triggered this association; or perhaps some memory of falling (or falling out of) trees was activated, but not expressed. The switch from 'pine trees' to just 'trees' may have also come from trying to maintain a single plane of generality, or to give evidence for the thesis that 'trees' in general 'can be dangerous'.

2.29 Despite its simplicity, (526) illustrates revising processes that adults carry out on more extensive and complicated materials. To encourage revising, I have students take rough drafts, outlines[15], or mere notes (lists of key words and phrases) and carry out the four steps sketched above. SORTING materials by putting similar things together and discarding irrelevant or uninteresting ones can work from a set of notes like this:

(527) lots of things I hate to do—getting up early—paying bills—registering for school—hassling with the bank—having classes in the morning—worrying about money—filling out applications

or from a disordered, awkward sample text like this:

(528) Florida is a very attractive state. Many lakes are found. The range of wildlife is large and varied. Disney World and Circus World provide entertainment. The beaches are among the world's finest. Jacksonville and Miami are centers of commerce. Florida has many things of great natural beauty. Real estate is booming. The sun shines most of the year. The countryside is flat. Lagoons provide for fishing and scuba diving. Mother Nature has been good to Florida.

After some demonstration exercises with similar examples, most students had no trouble making a smooth prose passage out of (528). The preferred order was: general opening thesis; supporting evidence (natural beauty—waters, sunshine, wildlife; entertainment; commerce); and general closing thesis. One student's revision was:

(529) Florida is a very attractive state. It has many things of great natural beauty, such as lakes, sunshine, and a large and varied range of wildlife. Its beaches are the world's finest and there are lagoons for fishing and scuba diving. The countryside is flat. Disney World and Circus World provide entertainment, while Jacksonville and Miami provide commerce with booming real estate. Mother Nature has been good to Florida.

Some papers classified waters with entertainment, or sunshine and landscape with real estate and commerce.[16] I had expected the waters to be all

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[15] I do not insist on formal outlining. Steinberg (1980: 163) remarks that this instrument is self-defeating if students make the outline only after the paper is done. Rose (1981: 68) complains that textbooks "treat the outline as a static genre rather than as an ordering strategy." Students may reject good material during writing just because it doesn't fit into their formal outline.

[16] This combination caused the only minor contamination (III.3.38), one made by the writer of (525): 'Real estate is flat and booming'.

grouped in a series, but students more often mixed them with the other items of 'natural beauty'.

2.30 ARRANGING is easy after the materials that go together have been sorted out (VI.2.28). Basic students start by formatting notes into just two or three statements whose relations can also connect larger chunks (cf. VI.2.19-24), such as cause-effect (530), problem-solution (531), or thesis-evidence (532):

(530) winds of hurricane force—dramatic evacuations near Miami
(531) energy shortage—more efficient transportation—public mass transit—car pools—smaller, more economical engines
(532) erosion of public confidence in the new government—large protest rallies in Washington

Later, complete (though short) expositions with several paragraphs are fashioned from more elaborate notes like (533). We use a problem-solution framework because of its prominent role in exposition (VI.2.2, 8-11, 24).

(533) recent rise in crimes on or near campus—grave situation—students, administrators alarmed—thefts—assaults—vandalism—huge increase over the last ten years—new security for dorms—outside doors locked—room doors locked—night watchmen—hall patrols—new escort service across campus after dark—student volunteers—escorts with walkie-talkies—requested by phone—new lighting—sidewalks—parking lots—dorm vicinity—new hot lines—phone services 24 hours—call for immediate help—new courses—self-defense training—karate—judo—boxing—better student awareness—avoid needless risks—be alert

Paragraphing is first practised by applying the strategies in VI.2.18-24 in order to find plausible points for indentation in samples that move from cause to effect, earlier to later, thesis to evidence, etc., such as:

(534) The status of the middle class has improved in many ways over the last fifty years. Personal cars, private homes on their own tracts of land, and technological equipment have become commonplace. But this picture has now been darkened by inflation and unemployment. Money no longer buys the same goods, and increasing numbers of once secure jobs are melting away.
(535) The disease spread rapidly in the hot, moist summer air. Sanitation was poor in that part of the world. Hospitals were filled even before the epidemic broke out. Finally, the authorities recognized that a state of emergency had arrived. They sent a call to the government asking for special forces to meet the disaster.

Contrasts are helpful (VI.2.18, 21), though I didn't put any dead giveaways like 'On the other hand' in the samples. Content, not syntax, was supposed to be the central motive for paragraphing.[17] Most students in my class read-

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[17] Becker (1965) undertook to show that paragraphs are "grammatical structures" by having people restore deleted indentations. The surprising finding was that people agreed on paragraph boundaries almost as much if all content words were replaced with nonsense syllables (Christensen et al., 1966: 69f; cf. Koen, Becker, & Young, 1969). Becker tells me he hasn't followed up this research since then.

ily marked 'But' in (534) (contrast, earlier-later) and 'Finally' in (535) (earlier-later, cause-effect) as good places to ident. Patsy Lynn also explained the strategies to 32 students and gave a test, and only 4 students failed to mark these points.

2.31 CONSOLIDATION resembles the training to reduce redundancies (cf. V.3.40), but with more focus on topic relationships. Students practice ways to make one statement out of a whole passage by removing fillers, recurrences, and self-paraphrases, and then recombining the essential words left over. One of our samples was:

(536) People in the caste system in India have almost no way of changing it. This means that changes in the system to improve it don't happen very often. They happen hardly ever.

Students circle the essential words ('caste system', 'India', etc.) and bracket the inessential and repetitive ones ('This means that', 'very often/hardly ever', etc.) to make a version such as:

(537) People in the caste system in India hardly ever find a way to change or improve it.

This drastic "sentence-combining" is more necessary for many students than the contrived, quasi-formal manipulations of projects like O'Hare's (1973), where insufficient emphasis was placed on combating verbosity and obscurity (II.3.45ff).

2.32 DEVELOPMENT is divided into two training sessions. First, students focus on RELEVANT details that an audience would need to know for some purpose, particularly to solve problems. Students use notes to develop expositions of how to do things; if necessary, experts or reference works are consulted. For example, directions are to be given for handling the common woes of the would-be gardener in stormy, pest-bitten Florida, based on a set of notes like this:

(538) planting a garden—time of year—amount of sunlight—water sources and drainage—kinds of plants—flowers—vegetables—pests—weeds

In the second session, students focus on INTERESTING details that an audience would find unusual, novel, unexpected, specific, variable, and the like (cf. III.2.24; VI.2.2). Exercises start with detecting the interesting details in a sample like (539): 'cancer' is problematic, unusual, and extreme; the 'wonder drug' is relevant, novel, and mysterious; 'one out of every four people' is a specific and scary statistic;[18] and so on.

(539) Of all known diseases, cancer is the most dreaded. One out of every four people contract some form of cancer in their lifetime, and a thousand people die

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[18] The dividing lines where numbers become tedious and irrelevant is frequently obscured by the bias toward quantification in science (I.1.2). The numbers seem well-structured, even if the facts they represent aren't very noteworthy.

> of it every day. Every year new wonder drugs are developed to fight cancer, such as interferon. Scientists are still baffled by how interferon works. Somehow it disrupts the capacity of cancer cells to reproduce.

After picking out items and saying why they're interesting, the students develop prose with their own interesting details, working from more sets of notes, e.g.:

> (540) satellite television—number of channels—programs—special interest groups—music—arts—sports—movies

Trivial, commonplace details are to be avoided; experts are to be consulted as needed on specialized issues (problems from an electronic, commercial, legal, etc. standpoint). This training helps reduce the dangers I sketched for associative reasoning techniques such as Burke's "pentad" (VI.2.26). For instance, the "scene" where interferon was discovered and tested is hardly relevant; the obvious "agent" (gardener) with a "purpose" (grow plants) requires far less elaboration in a set of directions than "act" and "agency"; and so on. Screening for relevance and interest constrains the "invention" of details to fit the rhetorical context.

2.33 To provide students a supporting framework for an entire composition, the problem-solving approach has been helpful for organizing topics (cf. I.4.16; VI.2.1f, 8ff, 24). Here is a complete short exposition by a student working from his own set of notes:

> (541.1) Although rarely spoken about by society, child abuse is one of the nation's most pressing problems today. As population continues to grow, so does the number of unwanted and unplanned children. It is estimated that six or seven out of a hundred children will be maltreated or neglected.
> (541.2) Child abuse can come in three forms: (1) passive cruelty in the neglect of children by an unloving or uneducated parent; (2) occasional cruelty in the momentary violent reaction of a frustrated or overburdened parent; and (3) consistent, deliberate cruelty in uncontrollable actions by a mentally sick parent. Simple neglect is easiest to correct. Actual abuse on the spur of the moment is more serious, but still much less than continual abuse due to mental illness.
> (541.3) Most cities and counties maintain social workers to investigate reports of child abuse. These workers are sent to the reported offenders and can make recommendations about the future of the child. If counseling fails or is rejected by a stubborn parent, the child may eventually be placed in a foster home. This solution would be called for in cases of mentally ill parents.
> (541.4) Some high schools and colleges are introducing programs on family planning and child care. Future parents learn what their situation may be like and how to deal with it. Abuse due to ignorance or lack of attention can be reduced in this way. Also, learning how to deal with stress reduces the likelihood of sudden violent outbursts.
> (541.5) Day-care centers for children help to unload overworked parents. The parents need not feel responsible for every moment of the child's day, and are thus less likely to feel inadequate and frustrated. The day-care center also benefits the child with companionship at the same age.

(541.6) If day-care centers are not available, improved public recreation areas would be a partial solution. The child would be out of the home, relieving any tensions that might build up. Companionship with other children would again be offered. Of course, some responsible adult ought to be in the area in case of an accident.
(541.7) In the future, society must get a firmer grip on child abuse, and stop ignoring it. Social workers for offenders, school programs for future parents, and day-care centers or public recreation areas for children are all helpful. But we must do much more. We must be ready to devote all necessary resources to solving this grave social problem.

The 'problem' is identified in the very first sentence with the thesis that it is 'one of nation's most pressing'—the strategy of saying why the topic is important and relevant for a wide audience (VI.2.22ff). The next sentence reveals a movement from effect to cause (cf. VI.2.19): 'unwanted and unplanned children'. Then, the thesis is backed up with specific (statistical) evidence, i.e., how many children 'out of a hundred' suffer abuse.

2.34 A new paragraph (541.2) marks a shift from the general topic to the specific 'forms' of 'child abuse', and a related shift from the whole to its parts (VI.2.1,21). In keeping with the principles of listing and heaviness, the three 'forms' are arranged from less extreme and frequent to more so (IV.2.73): 'neglect', 'occasional cruelty', 'consistent, deliberate cruelty'. The two remaining sentences in the paragraph adhere to the same order of mention when estimating the relative difficulty of 'correcting' the abuses. The second paragraph belongs with the first as a statement of the problem and thesis, but is a step lower in the hierarchy of generality. Hence, it hovers at the transition between the beginning and the middle of the text (cf. VI.2.1, 36).

2.35 The list of solutions plainly belongs to the middle. By definition, any feasible solution is relevant material for developing a problem topic (cf. VI.2.32). Here, the main topic of the problem is broken down into four subtopics, each of them treated in one paragraph: 'social workers' (541.3), 'school programs' (541.4), 'day-care centers' (541.5), and 'public recreation areas' (541.6). Each paragraph opens with a topic sentence containing the key expression for each solution, so that the sequence is immediately coherent without emphatic—and possibly tedious—cohesive devices at every transition (e.g., 'the first solution to the problem is', and so on) (cf. VI.2.1, 36f). More subtle cohesion is provided by recurrences and paraphrases looking back to the second paragraph that lists the three 'forms' of abuse: 'mentally ill parents' (541.3) vs. 'mentally sick parent' (541.2); 'sudden violent outbursts' (541.4) vs. 'momentary violent reaction' (541.2); and 'frustrated' (541.2, 541.5). These devices promote unity without the disadvantage of bulky restatements (compare 447, 456, 458, and 462 in V.3.34, 37, and 40).

2.36 After surveying four solutions in the middle, the writer signals the ending by returning to a high degree of generality (cf. VI.2.1, 10). The

indentation at (541.7), followed by mention of the global time ('future') and agent ('society'), marks the concluding paragraph—again, worn-out cohesive cues ('in conclusion', etc.) are spared. The four solutions are passed in a quick review: 'social workers for offenders', 'school programs for future parents', 'day-care centers', and 'public recreation areas'. The three 'forms' of abuse are not recalled here—a possible indication that the writer grouped the second paragraph with the middle, not with the beginning (cf. VI.2.34). The opening thesis that the problem is important is reasserted with more force, but also with the reassurance that solutions are possible (VI.2.25). The supporting evidence presented in the middle is thereby drawn together to satisfy and convince the reader, while at the same time, the unity of the text is strengthened. The ending is dynamic because the 'much more' to be done 'in the future' looks ahead outside the text itself to large-scale societal goals (cf. IV.2.9, 47; VI.2.10).

2.37 Though not immortal prose, (541) is a well-organized exposition of the kind students will find useful for professional careers. My analysis of a whole student paper (not just of the brief excerpts usually discussed) should indicate that global organization has principles similar to those of local organization. We saw some positive effects of training students along the lines sketched in VI.2.26-32 to organize and unify their writing without chaining them up in heavy-handed, tiresome surface formats (VI.1.15). When the stages of discourse are developed and controlled by coherent conceptual relations like cause-effect, earlier-later, problem-solution, thesis-evidence, and the like, clumsy signposts ('this paper is about', 'in this paragraph I will deal with', 'the next thing to consider is', 'let me conclude by saying', and many more) are no longer needed as a crutch or a substitute for clear topic organization (cf. VI.2.1, 10). Well-aimed exercises in sorting, arranging, consolidating, and developing can clear up the mystery of "invention" as propagated by vitalistic and romantic folk-wisdom (cf. I.2.23.7; III.2.23). Ultimately, society will be more considerate toward readers if writers have effectual methods to break their own task into more manageable sub-tasks (cf. I.2.21; VI.2.27; VI.3.13f). The writer vs. reader trade-off (III.3.16; VI.1.25) becomes less acute and antagonistic as the writing of a whole paper is widely recognized to be the outcome of powerful strategies average people can readily acquire and apply.

3. THEORY AND PRACTICE: A COMMON CAUSE

3.1 The most crucial step for progress in resolving the "literacy crisis" is that theory and practice finally co-operate on a large scale and without the customary delays. The value of theories or models of language and discourse ultimately rests on whether they can account for human language acquisition and development, including the success or failure of classroom

techniques. Progress also requires that theory and practice maintain a constant, constructive skepticism toward accepted priorities, attitudes, curricula, diagnostics, evaluations, and so on (cf. VI.3.25). A dynamic respect for scientific progress should have precedence over a static respect for established scientific institutions. Valid, thoughtful, and constructive criticism must not be misunderstood as an attack upon individual persons. From the standpoint of future theories, all those we now have are wrong (I.1.9); there is no disgrace in acknowledging the inevitable and getting on with the quest for something new. Theoretical research is steadily clarifying the rational foundations and guidelines for resolving disputes over language.

3.2 In absence of such foundations, public and educational language policies have traditionally been diffuse, fragmented, or uninformed. Administrators, teachers, and students are all caught in a dilemma between unrealistic, biased language attitudes vs. the social and psychological contexts of productive research and education. Teachers have a hard choice: either to embody and enact public attitudes, risking credibility and fostering inhibitions; or to accept current usage among prominent writers, evoking the illusion of an enlightened public audience. In the schools, sporadic, disunified, and coercive approaches to literacy impede cumulative learning and fail to harness the actual preconditions and resources of the learner (I.2.12, 17). In society, intransigent "language authorities" dismiss reform efforts as bridges to anarchy and try to force upon the world the alternatives of accepting their "rules" or else sinking into mindless chaos (I.2.11). Meanwhile, the practical issues, such as the size of writing classes and the course hours they are allotted, are arbitrarily decided—the numbers hardly matter as long as *none* of them are theoretically justified. The lack of expertise on research thereby distorts and blocks everyday methods.

3.3 The old division between theory and practice threatens to make both sides irrelevant. Structuralist, behaviorist, and mentalist theories all hit a point of diminishing returns because they assumed that a properly "scientific" method must drastically abridge the realities of everyday communication (cf. Chapter II). Overworked teachers had to choose between ignoring the official theories and experimental findings vs. extrapolating tentative, makeshift approaches out of them—either way, the needs of society and education were likely to be misunderstood. The lines of communication between theory and practice were impaired to the point that neither side could make much progress on its own concerns, let alone on each other's. Surely this factor, more than any other, has been responsible for the slow headway toward resolving the literacy crisis.

3.4 I have tried to set forth some ways in which the two sides can meaningfully interact for their mutual advantage. Each special concern can best be clarified in the framework of the general conditions under which cognition and communication take place in human activities. Processing is a

complex system of operations which reorganizes itself as skills develop and improve, but whose demands and limitations define each successive state and constrain the impact of knowledge and training upon future performance. Hence, unless these conditions are expounded in theory and consulted in practice, there is no way to tell which issues should be pursued for what motives. Whether human beings can enact what they know always depends on the context of the action. If each experiment or instructional module is designed in isolation, its measurable effects on the total capacities we are trying to test, observe, and describe, may be pure artifacts or accidents. An improvement or degradation of performance might then be a side-product of factors not even contemplated when the method was designed. For example, sentence-combining has been found to improve writing quality in some cases, and to make no great difference in others; so far, we have no theory to explain what syntactic manipulations can best assist a person's overall stylistic and rhetorical skills, or how and why this comes about (cf. II.3.35-44, 47).

3.5 Teaching is a special case of communication (cf. Sinclair & Coulthard, 1975). Teacher and learner must negotiate the effort each of them has to contribute, just as a trade-off is worked out between the text producer and the audience (III.3.16; V.2.27). However, the average school overloads the teacher so heavily that the learner's end of the bargain is unavoidably disproportionate. For example, countless incidental "facts" are dispensed, but the learner is left to develop his or her own strategies for organizing them into a sufficiently coherent chunk to be remembered just for the next quiz, let alone for any real-life application (I.3.6). There is no evidence that the average child is competent to select and work out optimal strategies at this degree of power—which is why the "average" grade of "C" usually implies some kind of failure (I.3.9). The evidence suggests instead that many children improvise haphazard strategies and patch them up pretty aimlessly and ineffectively. So many processing resources are concentrated on performing isolated tasks under high pressure from day to day that little remains for designing and optimizing the powerful strategies that form the true "basics" of learning. Consequently, failure is not caused by "low intelligence," "laziness," "poor attitude," and all the other catch-phrase alibis that shift the blame onto the child. Those deficiencies are *effects, not causes,* of the fragmented context in which the child is placed to sink or swim in a sea of obscurely related activities (Combs, 1979).

3.6 The same overload and pressure prevents the average teacher from designing new instructional modules that could promote the strategic evolution of high-powered learning strategies. This task falls by rights to the research community with the time and resources denied to the teacher, but demanded for understanding the actions and events of instruction. If "science" insulates itself from the everyday processes—mistakenly believing them to lack a properly "scientific" structure (I.1.3)—the task is left in a

no-man's land where theory and practice either ignore or talk past each other. And the victims are the teachers, the learners, and society at large.

3.7 Consider the inescapable necessity of diagnosing language skills in order to place students in workable groups. A narrow diagnostic such as a multiple-choice or a fill-in-the-blanks quiz is easily graded and produces a strict numerical scale, but bears little resemblance to spontaneous communication and is a poor measure of ability (cf. Nairn, 1980). A free-style diagnostic, such as an in-class essay, is more realistic, but harder to grade, and produces a rough, disunified scale. The more personal a writer's voice, the less chance we have for a meaningful comparison based only on the traits shared by everybody (I.3.7). Therefore, we cannot sensibly place students unless we can tell the difference between indicators of those skill levels we want to advance vs. indicators of individual freedom of choice. An increase in skill ought to expand and strengthen that freedom; hence, methods that restrict freedom with a barrage of "rules" can scarcely be expected to improve writing skills (cf. Youdelman, 1978; Ohmann, 1979; Rose, 1981).

3.8 One diagnostic to filter out the factors relevant to teaching fundamental expository writing can be derived from the assumption that most college students already speak more fluently and successfully than they write (cf. II.2.28; II.3.36; V.3.3). At the start of the course, my students hear two short recorded samples and are asked to "write in their own words" what they just heard. One sample is taped from the casual speech, e.g., a student recounting her high school graduation trip to Disney World (542); and the other from reading aloud a well-organized written exposition, e.g., John Brainerd giving instructions on how to move stones (543) (Levin [Ed.], 1977: 179f):

> (542) about ten o'clock in the morning / before grad night / bout nine friends and I got together / at one of my friends' house // with // a lot of booze / and a lot of mixers // aaand we started drinking // and // we kept and kept drinking and kept drinking for a couple hours I'd say // then we put the leftovers / the leftovers alcohol and everything in our coolers and hid it in our / luggage and stuff // then we went down to the beach which is / right down the road from the school and partied some more // then it was time to go get on the bus / and we get to school and we find out we had to / have our / luggage checked and every- and our coolers checked and everything / by this time everyone was very paranoid because everyone was pretty wasted // aannd // luckily / we all made it through without getting checked // got on the bus and started partying some more [etc.]
>
> (543) When lifting a rock, bend your knees, not your back, to let your legs do the work. Keep your toes out from under; you can never predict when a rock may slip and drop accidentally. Do not let your fingers be pinched between your rock and another; one slip can in a second crush a finger or hand if a rock is heavy.
>
> When a stone is too heavy or awkward to lift by yourself, get a helper. Roll or slide the stone onto a burlap bag or canvas which can form a sling between you, to distribute the weight and keep it farther from your feet in case it falls. Stones

> can be hoisted a bit at a time by using a pry bar at one corner. Slide small stones or sticks under the lifted edge to hold it up while you repeat the process at another corner. [etc.]

Memory experiments had shown that students would not write down a verbatim rendition of what they'd heard. Instead, they would impose a given style—depending on their awareness of stylistic types—on whatever gist of the content they could recall (cf. VI.1.29ff). I predicted that unskilled writers should follow the tendencies of casual speech in rendering both samples; skilled writers should do so on neither; and intermediate ones should imitate the style of each original sample. Specific indicators of literacy development should be easier to recognize and compare if style was varied while content was made equally available and stable for everybody (cf. V.3.6).

3.9 These predictions were largely confirmed: the spread of results proved a fairly reliable clue to the problems the individual students manifested later during the course. The unskilled writers duly retold the 'grad night' story with the inconsistencies and redundancies of casual speech (cf. V.3.10-37), e.g.:

> (544) About 10 O'clock in the morning a young lady and her friends started drinking and they kept on drinking and then they went to the beach and drank some more. By this time it was time for their luggage to be checked that where they had put the liquor, but all of them manage to make through the check in point.

This effect did not depend on reproducing the same expressions and constructions as the original. One student followed the speech pattern in which the first part of each sentence or main clause rehearses material from the previous one (cf. (447) in V.3.34):

> (545) This girl tells about how she gets drunk *before going to school. Before she gets to school,* she hides some liquor in her luggage, but a teacher says that *the luggage will be checked.* Somehow she and her friends manage to *get on the bus without getting their luggage checked,* so when they *got on the bus* they started drinking again.

In contrast, more skilled writers duly edited the story into reasonable prose. In (546), the immediate cross-outs (in pointed brackets) reveal a conscious avoidance of vague pronouns and repeated words:

> (546) Before arriving at the highschool to board the buses they consumed a fairly large quantity of alcohol and packed an auxiliary supply in their luggage for their stay in Orlando. Because of their inebreated condition they were worried when they heard that luggage would be checked, but luckily <they> these students didn't get <checked> searched.

In between came the largest group of students who attenuated the traits of casual speech here and there, but not consistently or reliably.

3.10 The unskilled writers retold the 'stone' exposition with the same inconsistencies and redundancies as their 'grad night' stories, e.g.:

> (547) In this the speaker how to move a rock and moving a rock can be dangerous. When moving a rock or a stone keep your fingers and feet out of its way, if a large rock rolls over your feet or your fingers the rock can crush these parts of your body.

The skilled writers preserved the style of written prose:

> (548) When moving stones let your legs do the work. Be careful not to pinch your fingers between your stone and another.

Intermediate writers tended to imitate the style of each original, casual for 'grad night', and concise for 'moving a stone', e.g. the student who wrote:

> (549) They just kept drinking and drinking. Then they went to the school, after putting all the remaining booze in the cooler, they realized that the luggage and coolers were being checked, luckily they got on without being checked.
> (550) When a person moves a large stone, he should use his legs for power. If a stone is too large for a single person, you should get help. Take a burlap bag and roll the stone on it.

The recurrences and fuzzy sentence boundaries in (549) have no counterpart in (550), though the same student wrote both only a few minutes apart.

3.11 This two-sample diagnostic should illustrate the kind of interaction I am advocating between theory and practice. By investigating how the respective conditions of casual speech and of competent writing are reflected in text features, we are better able to design the means for classroom techniques and to evaluate the results. We can in turn identify the essential tasks for a particular student or for a whole class during the course. A syllabus can be tailored to the occasion, rather than carried over blindly from class to class (cf. VI.3.15, 26); and individual profiles can be set up for the interviews. The less skilled writers take on modest projects and focus on explicit revising. The more skilled ones attack fairly ambitious projects, such as research papers, and focus much less on revising. Any gradation in between can be worked out for the intermediates.

3.12 A theoretical account would also help define how writing becomes easier through *support activities* that composition experts have propounded (e.g. Rohman, 1965; Moffett, 1968; Macrorie, 1970; Elbow, 1973; Miller, 1976; Nystrand & Widerspiel, 1977; Shaughnessy, 1977; Irmscher, 1979a; Booher, 1981; Bruffee, 1981; Staton, Shuy, & Kreeft, 1982). Some hypotheses could be derived from the framework advanced in this book. *Prewriting* probably aids ideation and conceptual development by relaxing the strict demands for cohesion during phrasing: students gather materials, make notes, and explore ideas without actually producing extended, continuous text. *Outlining* offers a similar trade-off, but its more rigid patterning may make the savings on resources smaller (cf. VI[15]). In *free writing,* coher-

ence is relaxed in order to promote fluency: students loosen up and write at top speed whatever occurs to them. *Journal keeping* lowers the requirements for relevance and interest so that situationality, familiarity, and perceptual immediacy can come to the writer's aid. *Peer tutoring* raises feedback and audience awareness and lowers anxiety by using students to help each other write. Detailed research could pursue hypotheses like these to find out which support activities are effective and reliable enough to be widely included in future textbooks and curricula for particular groups and ages of learners.

3.13 The same outlook can be extended to decisions and policies regarding all aspects of literacy. The more detailed and precise our theoretical understanding of the writing process, the better our chances to fit instructional design to human contexts, and to transcend the dreary regimenting of assignments, topics, tasks, and number of papers per course, plus the menacing arsenal of points and demerits—all the juggernaut machinery of standardization so unsuited to such a creative, individual activity as writing (cf. I.3.6ff, 12). Realistic, dynamic standards should reward, not ignore, the development of personal voice, the transition to a higher plane of skills, and the actual strain of mastering technical matters teachers mistakenly consider simple (cf. I.2.16.6; I.3.8, 22). Grades should gauge how a student progressed in the framework of what could be realistically required or accomplished at his or her state of development. When teachers and students agree on explicit procedures for recognizing and resolving the problems of prose organization, the forbidding task of writing becomes an orderly set of manageable sub-tasks (cf. I.2.21; I.3.24ff; VI.2.27, 37). Failure would be likely only if the student refused to carry out the procedures, or suffered from uncommon difficulties not yet explored or treated in the method. In my experience, these two factors apply to about 10% of average college students. If standards are ill-defined, errors are stigmatized, and self-help procedures are vague, alienation and acceptance of failure are high (in some schools, close to 50%); and plagiarism is more frequent because students who are too fearful or intimidated to believe they can reach the goal honestly are prone to hand in an already approved paper.[19] Teachers may sincerely believe that an "A paper" or "F paper" can exist for all times, places, and persons (cf. I.3.13); but the objectivity of such a judgement is a moot point until its basis is explained to students in terms they can understand and apply.

3.14 The same interaction between theory and practice is the only plausible way to convince society and its educational institutions that a reform

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[19] Dishonesty might cloud the method I am advocating if students willfully underperform at the start of the course so that progress can appear greater at the end. However, most student writers need our courses precisely because they are not skilled enough to manipulate quality, either downwards or upwards. Whoever knowingly inserts features of bad writing can also edit them out.

of literacy programs can be based on rational criteria, not just on faddish innovations or momentary political pressures. The best theories are those with the most substantial implications for improving literacy throughout society. But attitudes, biases, and customs are entrenched at deep levels, and will not yield to mere assertion. Only a scientifically credible quest for the means to replace this hoary legacy can hope to carry conviction among administrators and executors. For example, the interview approach is advocated by the need for individual profiles and priorities. The emergent strengths and weaknesses of writers from diverse language backgrounds set the real conditions for progress. Personal counsel is more convincing, specific, and tactful than advice or censure dispensed in a classroom. The unskilled writer has already discovered that the usual class techniques don't work for everybody, and desperately needs to experience success in order to have faith in the whole enterprise. Working though a series of sub-tasks may be a slow road to improvement, but it holds forth hopes that large, badly defined tasks deny.

3.15 This line of argument, for which I have presented detailed empirical and theoretical support in the preceding chapters, has obvious, immediate consequences for institutional decisions. One-way lectures should be replaced by two-way discussions. The size and frequency of classes must be trimmed to strict limits to make way for the interviews. The clear impact of these numbers on the teacher's actual work load must receive recognition in faculty assignments and pay scales.[20] Syllabuses should be flexible enough to meet the group demands defined by efficient diagnostics (cf. I.2.23.11; VI.3.11, 26). Grades should be non-punitive wherever it appears strategic. All these implications provide decisive leverage in administrative decision-making.

3.16 The interaction between theory and practice would also have the most favorable effect on student attitudes. The advice dispensed by teachers should carry a conviction and authority beyond personal opinions and institutional pressure. Students who do or don't do things because the teacher says so cannot learn the reliance and self-discipline good writers possess—when the pressure is removed, a vacuum is left to be filled with the half-hearted guesses and quirky jigsaws of rules that make real-life writing tedious, inhibited, and hard to read. But if we can show on the basis of careful research what the choices are, and what effects follow from them, students come to appreciate and apply their own powers of judgement. For example, they can stop fretting over "how long should my paper be?" when they learn that length is not a fixed value, but one which is discovered as the text evolves. Detailed procedures for organizing the stages of discourse—

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[20] I usually schedule the interviews for 10 minutes, so that 6 students equals 1 teaching hour; but my teaching load is comparatively light. I have also found 6-minute interviews quite workable (hence 10 students per hour). Whatver ratio is selected, the point is the same: the proportion between the teacher's burden and class size is immediately clear.

sorting, arranging, consolidating, developing (cf. VI.2.27-32)—provide a way to let the topic control the length. A paper is then too long or too short not because it doesn't have the 500 words dictated by somebody's lesson plan, but because the degree of generality or specificity doesn't reflect the range of details the audience would consider relevant (important, problematic) and interesting (novel, unexpected). Qualified professional writing respects these motives more than arbitrary numbers of words and pages. Texts produced to fill a quota are hardly likely to be worth anybody's while.

3.17 The same outlook can relieve the confrontation and resentment in traditional paper-correcting. Little is accomplished as long as the corrections are meaningful only to the teachers who make them (Butler, 1980). The students who elicit the most red marks cannot reliably infer the nature, causes, and remedies of their problems. Workable, helpful remediation requires new research on how errors arise from systematic factors intervening between intention and action, between knowledge and performance (cf. I.2.8.2; I.3.3, 11; II.2.10; III.1.19; III.3.2.2; IV.1.12; IV.2.48; V.1.14f, 36, 40; V.2.16; Bartholomae, 1980). An "error" is an unmotivated, disturbing departure from a genuine consensus among one's audiences (cf. I.2.19f). Students must first understand the options and their effects before they can sensibly appreciate, detect, and repair their own errors. After concentrated editing practice, the teacher can indicate at the top of a paper which error types are present, and the student has to find them. The teacher is thereby spared a huge waste of time and effort on work that the student should rightfully be practising anyway (Applebee, 1981: 73).[21] The student can actively rewrite, instead of just re-submitting the same paper, in neater handwriting, with only those items reworked that somebody else pointed out.

3.18 For all these motives, I believe that a "science of composition" is not only possible, but indispensable to any real improvement in public literacy. No commitment of intellectual and institutional resources is too great for the enterprise at hand. This book has been an exploration in search of a framework for using prior theories and experiments alongside an expanding range of newer ones. I shall conclude with ten general guidelines I consider productive at this time.

3.19 First, the theoretical and practical issues of discourse and literacy should be treated from *multiple perspectives* (cf. Bereiter & Scardamalia, 1982b). *Exploration* and *classification* can refine and specify our corpus of knowledge. Being a dynamic event, the text should also be considered in its *evolution,* and the skills of text processing in their *development.* Our conclusions come partly from *observation* of manifest actions and texts, and partly from *reconstruction* via the process models we design (cf. III.1.7-32). The models should therefore try to restate *logical* notions (derived from static analysis after the fact) as *operational* ones (derived from dynamic

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[21] I hope to relieve teacher load still further with computer programs that train editing techniques.

synthesis of the fact). By including the motives and effects of communicative actions in our inquiry, we can approach the *evaluation* of texts as the correlation between intention and action, or between knowledge and performance. These multiple perspectives can help us to situate detailed issues in the broader context they merit.

3.20 Second, we should take a *really close look* at what people in general and students in particular actually know, say, and write (e.g. Emig, 1971; Britton et al., 1975; Perl, 1977; Shaughnessy, 1977; Matsuhashi, 1979; Flower & Hayes, 1980; Gould, 1980; Lunsford, 1980; Goswami, 1981; Harste, 1981; Hidi & Klaiman, 1981; Mosenthal & Na, 1981; Rentel, 1981; Scardamalia, Bereiter & Goelman, 1982; Staton, Shuy, & Kreeft, 1982). Traditional discussions tended to favor philosophical arguments more than the direct analysis of ordinary discourse. (e.g. Ong, 1975; Hirsch, 1977; Olson, 1977a). For instance, Hirsch's "philosophy of composition" includes (and doesn't analyze) exactly one sample of student writing, and none at all of student speech. Instead, he directs his remarks to passages from the writings of William Painter, Ben Jonson, John Milton, John Bormuth, Marcel Cohen, Ernst Nagel, Thomas Macaulay, Abraham Lincoln, Alan Moorehead, Edward Sapir, and *The Times Literary Supplement;* and to the made-up sentences so dear to linguists and psycholinguists.[22] Most of the revision of samples is done by Hirsch himself. The real conditions, stages, and problems of everyday writers can hardly be uncovered in such remote sources. Olson's (1977a) paper doesn't examine a single real-life example for his very restricted notion of a "text".[23]

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[22] See Hirsch (1977: 60f, 69ff, 81, 84ff, 87f, 103f, 118, 130f, 135, 156). Hirsch's book is suspended between the conflicting tendencies of philosophical speculation and empirical research. On the one hand, he backs up his arguments with citations of psychological and sociological research. On the other hand, he regales us—"in ignorance of the actual history of many European grapholects" (p. 58)—with speculations that can easily be proven empirically wrong: that the "verb-at-the-end" rule "holds in none of the oral dialects of German" (p. 119) (not true except in some eastern-territory dialects like Silesian); or that "the number of frequently used syntactic patterns has become much reduced in all the grapholects of Europe—the scope for choice of word order has diminished since Shakepeare's day" (p. 57) (not true for the Slavic languages, cf. Sgall et al., 1973). Moreover, his "theoretical case" regarding "practical implications" is that "the tried and true maxims of composition turn out to correlate very well with the psychological principles of readability" (p. 145)—in his eyes, a vindication for using Strunk and White (p. 168). Actually, this "correlation" does not hold very well (cf. I.2.11; IV.3.31; V.3.32f, 39; VI.1.15, 19, 22). And the "psychological principles" are in part outdated, e.g., "correct more faults than one comments on," and "repetition" is "an effective teaching device" (p. 160f) (cf. discussion and references in I.2.17, 20, 22; III.1.18, 28; VI.3.17). Thus, though I agree with Hirsch on many issues and value his book as a major contribution, it doesn't follow up its own intentions as fully or consistently as it should.

[23] Whereas Olson's "text" is "best represented by formal, written, expository prose statements" (1977a: 262), his examples are a handful of banal 'John-and-Mary' sentences, contrived philosophers' samples, and children's utterances (1977a: 261, 272, 275; 1977b: 17, 20, 22f). As I argued in V[26], Olson's "text" is a pious fiction: *all* texts, including written ones, are processed by enriching, expanding, or modifying the explicit "logical meaning"; at most, writing restricts actions based on immediate situational contact. Thus, in contrast to Hirsch's book (Note 22), Olson's recent work appears misguided in its fundamental intentions, though more refined in its empirical and experimental procedures (cf. work cited in II.2.19; III.3.19; IV.2.61).

3.21 Third, we should include the *contexts and settings of discourse* in our inquiry. These factors strongly affect the style, organization, and evaluation of any one text. The "modes" of discourse are conventional frameworks for suiting the text to the occasion (cf. surveys in D'Angelo, 1976; Kinneavy, 1980). The broad text types, such as description, narration, argumentation, and exposition, have characteristic dominances (III.1.29); more immediate goals decide how these types are selected and combined. For example, the personal essay regulates the writer-reader relationship and the topic flow in ways distinct from scientific and technical reports (cf. VI.2.7-11).

3.22 Fourth, we should not be so preoccupied with *statistical norms* that we lose sight of the *individual action or human being,* or stress *quantitative* research to the exclusion of *qualitative.* The interchange between special cases and general ones is vital to the theoretical interpretation of evidence, and to the "ecological validity" of research (cf. I.1.3, 12, 15; III.1.31.1, 8). Though measuring large proportions in "experimental groups" vs. "control groups" is vital to scientific generality, all acquisition, development, and application take place via a particular person in a a particular context. Individual case studies (e.g., Emig, 1971; Nystrand & Widerspiel, 1977; Matsuhashi, 1979; Bartholomew, 1981) should therefore supplement group studies, and may shed new light even on general theories. For example, theories or methods that work for a majority should not lead us to neglect special literacy problems; the treatment of the latter can make the biggest difference in the lives of the people affected, and our responsibility is correspondingly urgent. Nor should we use a student's speech and behavior to invoke a stereotype that colors our later evaluation of writing (cf. Gwin, 1981: 125), or our estimate of true potential (cf. I.2.7).

3.23 Fifth, an *interdisciplinary approach* is the only way to encompass the issues raised in VI.3.18-22. In theoretical research, communication and cognition require the consideration of psychology, linguistics, sociology, ethnography, education, neuroscience, and computer science (cf. Beaugrande, 1980a). In practice, literacy programs can profit from collaboration with other departments and with funded projects in order to improve writing all across the curriculum (cf. Shaughnessy, 1977: 88; Deaux, 1981; Graham, 1981; Maimon, 1981; Maimon, Belcher, Hearn, Nodine, & O'Connor, 1981). The awareness of writing strategies and standards can thereby reach a larger sector of social and professional writing (cf. Bond, Hayes, & Flower, 1980; Swarts, Flower, & Hayes, 1980; Charrow, 1981; Goswami, 1981; Holland & Redish, 1981).

3.24 Sixth, an expanded outlook can promote closer collaboration between *theory and practice.* Theories can both profit and contribute by their applications in real-life settings. Practical methods carry the greatest conviction in the framework of a theory that accounts for their effects, especially when we need to advise institutions on the format of writing

programs. Current theories of cognition and communication can help adjudicate the concerns of the English curriculum: the benefits of teaching sentence-combining, grammar, or linguistics (II.3.19-47; V.2.1ff); the contribution of support activities like imitating literary styles, pre-writing, outlining, free writing, and peer tutoring (VI.1.9; VI.3.12); the dangers inherent in spelling, sentence formatting, and speech habits (V.1.40-49; V.2.30-45; V.3.13-40); the tactics for advising, evaluating, and grading (I.3.21-26; VI.3.13); and the size and frequency of classes (VI.3.14).

3.25 Seventh, the alignment of theory and practice offers a forum for *re-examining our basic assumptions* on language and literacy. Teachers should not be content to re-enact the same methods they underwent as students (cf. Milic, 1965: 66; Macrorie, 1970: 176; Irmscher, 1979a: 8). If these assumptions remain invisible and unchallenged, we risk pursuing irrelevant issues and overlooking the relevant ones outside our customary framework of thinking, for example, taking the role of the "sentence" in discourse for granted and thus not adequately investigating its empirical and instructional status (II.3.13ff; V.2.5, 19ff). Explicit discussion of underlying beliefs clarifies them and suggests how they can be impartially examined and tested. We should not strive to rescue or patch up old theories and methods when there is good reason to search for new ones, given that all theories are only approximations along the way toward better ones (cf. I.1.9ff; VI.3.1). Scientists and educators who are not complacent, assertive, and self-serving regarding their own public image welcome a refutation not as a personal failure, but as an increase in our cumulative knowledge about the enterprise. The point is not to insist on already being right, but to accept new discoveries and raise one's chances of eventually being right. And if we concur that *teaching is research* (I.4.17; II.2.33; III.2.40), nothing prevents the teacher from dropping an ineffectual technique, just as a scientist drops a refuted hypothesis. For example, many claims about "incorrect" usage can be overturned by showing that the contested item appears in high-quality prose (cf. IV.3.31; V.2.32f, 39; VI.1.22).

3.26 Eighth, we should strive to see that new insights are reflected in *textbooks* and *learning materials* (syllabuses, style sheets, etc.) (cf. D. Stewart, 1978). Traditionally, the publishers of composition textbooks have a neat division of labor: the promotion department loudly proclaims the next book is new and innovative, while the production department quietly makes sure it is just the opposite. The teachers lament the lack of modern, helpful textbooks at the same time the publishers lament the reluctance of schools to buy any. This vicious circle can be broken only by a concerted effort of writing experts to provide truly innovative materials to publishers, and to convince the rank-and-file teachers that reforms lead out of chaos, not into it (cf. I.2.11, 15). A reviewer for a pilot version of my workbook remarked, "if you don't get to the teacher-purchaser, you will never reach the student user since he has no choice as to which grammar or handbook he will buy";

once the book gets ordered, it may, by a "happy accident," also be "appropriate for or appealing to the student-user." Teachers who stubbornly cling to familiar textbook formats unwittingly defeat their own calling, particularly at the expense of disadvantaged students (cf. I.2.23.10; V.2.6).

3.27 Ninth, writing experts must also work to spread *enlightened, tolerant language attitudes* (cf. I.2.13-22; VI.1.9-28). Arbitrary, rule-bound teaching only confuses and intimidates the learners who need the most aid. The anxious, helpless, or prejudiced attitudes in a whole society can only be changed through educational programs. Writers who are denied freedom of choice by elaborate compulsions and prohibitions never learn how good writing evolves from decision-making; instead, they learn that writing of any kind is a stressful, hopeless task they should either avoid or else perform behind a smoke screen of verbosity and obscurity. Hence, improvements in literacy depend on the willingness of institutionalized authorities to view language realistically and impartially. Students who know what consequences language options have can work out their own style, voice, and role.

3.28 Finally, composition should receive the *respect* it deserves. Literacy can be an enduringly great achievement of culture and a decisive vehicle of personal, social, and technological advancement. The complexity of language processing makes the enterprise of exploring and improving written communication enormously challenging. The efforts of teachers and learners are no less formidable than those of academic researchers. The way out of the literacy crisis is not "back to the basics" of a simpler age long vanished, but "*forward* to the basics"—the essential skills of cognition and communication as we are beginning to discover them. Ultimately, communication (and the theory and practice of mastering it) is utopian in the sense that texts and text processes are never as perfect, definitive, or complete as they might be. Still, a utopia is not a hopeless trap; it is an endless domain for new progress. The partial, provisional theories and methods of the past offer bridges to the more extensive and precise ones of the future. Our "science" reposes in following the best insights we can gather and apply. Though we have often been compelled to do less, we surely cannot be asked to do more.

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Abbreviations

AERA: American Educational Research Association Meeting
AmerEdResJ: American Educational Research Journal
AmerJPsy: American Journal of Psychology
AmerPsychologist: American Psychologist
BBN: Bolt Beranek & Newman Inc., 50 Moulton St., Cambridge, MA, 01238
BullPsychonomSoc: Bulletin of the Psychonomic Society
BritJDisordComm: British Journal of Disorders in Communication
BritJEdPsy: British Journal of Educational Psychology
BritJPsy: British Journal of Psychology
BritJSocClinPsy: British Journal of Social and Clinical Psychology
CanJBehavSci: Canadian Journal of Behavioral Science
CanJPsy: Canadian Journal of Psychology
CCC: College Composition and Communication
CE: College English
CHIP: Center for the Study of Human Information Processing
CogPsy: Cognitive Psychology
CogSci: Cognitive Science
ContempEdPsy: Contemporary Educational Psychology
CS-TR: Computer Sciences Technical Report
CUP: Cambridge University Press
DisProc: Discourse Processes
diss: dissertation
EdRev: Educational Review
ElemEng: Elementary English
EngEd: English Education

EngJ: English Journal
ERIC: Educational Resources Information Center
HarvEdRev: Harvard Educational Review
IJCAI: International Joint Conference on Artificial Intelligence Proceedings
IRA: International Reading Association
IRAL: International Review of Applied Linguistics
JAbnormSocPsy: Journal of Abnormal and Social Psychology
JAcoustSocAmer: Journal of the Acoustic Society of America
JApplPsy: Journal of Applied Psychology
JChildPsy: Journal of Child Psychology
JClinPsy: Journal of Clinical Psychology
JCommun: Journal of Communication
JConsultClinPsy: Journal of Consulting and Clinical Psychology
JConsultPsy: Journal of Consulting Psychology
JEdPsy: Journal of Educational Psychology
JExperChildPsy: Journal of Experimental Child Psychology
JExperEd: Journal of Experimental Education
JExperPsy: Journal of Experimental Psychology
JExperResPers: Journal of Experimental Research on Personality
JGenticPsy: Journal of Genetic Psychology
JLing: Journal of Linguistics
JMathPsy: Journal of Mathematical Psychology
JPersSocPsy: Journal of Personality and Social Psychology
JPrag: Journal of Pragmatics
JPsycholingRes: Journal of Psycholinguistic Research
JReadBehavior: Journal of Reading Behavior
JReading: Journal of Reading
JSpeechHearRes: Journal of Speech and Hearing Research
JTechWritCom: Journal of Technical Writing and Commmunication
JVLVB: Journal of Verbal Learning and Verbal Behavior
LangSpeech: Language and Speech
LingAnal: Linguistic Analysis
MemCog: Memory and Cognition
NCTE: National Council of Teachers of English
NY: New York (city)
OISE: Ontario Institute for Studies of Education
PercepMotSkills: Perceptual and Motor Skills
PMLA: Publications of the Modern Language Association
PsyBull: Psychological Bulletin
PsychonomSci: Psychonomic Science
PsyReports: Psychological Reports
PsyRev: Psychological Review
QJExperPsy: Quarterly Journal of Experimental Psychology

QJSpeech: Quarterly Journal of Speech
RevEdRes: Review of Educational Research
RR: Research Report
RRQ: Reading Research Quarterly
RTE: Research in the Teaching of English
SIL: Summer Institute of Linguistics
SUNY: State University of New York
SWRL: Southwest Research Laboratories, Los Alamitos
TESOL: Teachers of English to Speakers of Other Languages
TINLAP: Theoretical Issues in Natural Language Processing
TR: Technical Report
UCLA: University of California, Los Angeles
VisLang: Visible Language

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