

Journal
of
Near-Death Studies

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Book Review:

Dying to Live: Science and Near-Death Experience, by Susan Blackmore •
Reviewed by Kenneth Ring, Ph.D.

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Volume 14, Number 2, Winter 1995



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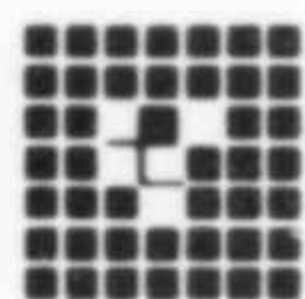
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JOURNAL OF NEAR-DEATH STUDIES (formerly ANABIOSIS) is sponsored by the International Association for Near-Death Studies (IANDS). The Journal publishes articles on near-death experiences and on the empirical effects and theoretical implications of such events, and on such related phenomena as out-of-body experiences, deathbed visions, the experiences of dying persons, comparable experiences occurring under other circumstances, and the implications of such phenomena for our understanding of human consciousness and its relation to the life and death processes. The Journal is committed to an unbiased exploration of these issues, and specifically welcomes a variety of theoretical perspectives and interpretations that are grounded in empirical observation or research.

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Editor's Foreword

This issue of the Journal focuses on physical models for understanding the near-death experience (NDE). In our lead article, physical chemist and counseling psychologist Kenneth Arnette elaborates on his theory of "essence," introduced in the Fall 1992 issue of the Journal. In this follow-up article, Arnette uses the physics of electromagnetism and quantum mechanics to describe phenomena reported by NDErs in a model consistent with Descartes's dualistic concept of human nature.

In another speculative theoretical article, biophysicist and qi scholar Deno Kazanis argues that "dark matter," an invisible essence with mass but no charge that is thought to comprise at least 90 percent of the physical universe, is the matter of mysticism, constituting the subtle body. Using contemporary concepts of the properties of dark matter, Kazanis proposes that near-death phenomena can be understood in terms of interpenetration of the uncharged dark matter with our visible charge-carrying bodies.

In this issue's book review, social psychologist and near-death research pioneer Kenneth Ring reviews British physiological psychologist Susan Blackmore's *Dying to Live*, a provocative book that has stirred up controversy, among NDErs because of her reductionistic physiological view of near-death phenomena and among skeptics because of her Buddhist conclusions about the nature of reality.

Indian scholar V. Krishnan speculates in a Letter to the Editor about possible physical mechanisms for apparent out-of-body vision in darkness. Finally, we end this issue with the Announcement of the relocation of the Journal's editorial office and IANDS' Research Division to the University of Virginia.

Bruce Greyson, M.D.



The Theory of Essence. II. An Electromagnetic-Quantum Mechanical Model of Interactionism

J. Kenneth Arnette, Ph.D.
Colorado State University

ABSTRACT: The theory of essence, based on the physics of electromagnetism and quantum mechanics, solves the problem of interaction resulting from Descartes's dualistic conception of human nature. The theory is empirically based in phenomena consistently reported by near-death experiencers. These phenomena are divided into four categories of interaction experienced by the dissociated mind (or *essence*), each of which is analogous to properties of electric dipoles. I compare the theory of essence with Descartes's interactionist propositions and propose an experimental test of the theory.

Contemplation of the relationship between mind and body is a time-honored human activity. Such musings occurred in antiquity, as evidenced by Homer's *Odyssey* (Popper and Eccles, 1977), and debate continues today (Dennett, 1991). In the history of this debate, René Descartes is a pivotal figure. Karl Popper (Popper and Eccles, 1977) asserted that before Descartes, all significant philosophers (of whom we know enough to comment) were either explicitly or implicitly dualistic interactionists, except perhaps for the Greek thinkers Leucippus and Democritus, a view espoused a century ago by Friedrich Lange (1865/1925).

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Descartes's *Meditations on First Philosophy* (1641/1986) contained his conception of what became known as interactionism, the doctrine that mind and body were two different things that interacted with each other. *Meditations* spurred strong reactions from other philosophers of the time. Both Pierre Gassendi and Thomas Hobbes were driven to respond to Descartes with materialistic philosophies (Sarasohn, 1985) and the works of Baruch Spinoza, Gottfried Leibniz, and Nicholas de Malebranche were partly motivated by what was seen as a central weakness in Descartes's theory: the question of how mind and body, being very different in nature, could interact (Radner, 1985).

It is useful to summarize the interactionist propositions Descartes put forth in his *Meditations*. (1) A "substance" is defined as "a thing capable of existing independently" (Descartes, 1641/1986, p. 30). (2) Mind and body both are substances, but (3) mind is thinking and non-extended, whereas (4) body is non-thinking and extended:

On the one hand I have a clear and distinct idea of myself, in so far as I am simply a thinking, non-extended thing; and on the other hand I have a distinct idea of body, in so far as this is simply an extended, non-thinking thing. And accordingly, it is certain that I am really distinct from my body, and can exist without it. (Descartes, 1641/1986, p. 54)

(5) An extended substance is defined as three-dimensional, with shape and motion:

I distinctly imagine the extension of the quantity (or rather of the thing which is quantified) in length, breadth, and depth. I also enumerate various parts of the thing, and to these parts I assign various sizes, shapes, positions and local motions; and to these motions I assign various durations. (Descartes, 1641/1986, p. 44)

(6) The body, as an extended substance, also has the property of exclusionary occupation of space: "By body I understand whatever has a determinable shape and a definable location and can occupy space in such a way as to exclude any other body..." (Descartes, 1641/1986, p. 17). (7) Mind and body differ further in that the former is indivisible and the latter divisible: "The body is by its very nature always divisible, while the mind is utterly indivisible" (Descartes, 1641/1986, p. 59). (8) The human being is an interactive union of mind and body: "For these sensations of hunger, thirst, pain and so on are nothing but confused modes of thinking which arise from the union and, as it were, intermingling of the mind with the body," and "My body,

or rather my whole self, in so far as I am a combination of mind and body, can be affected by the various beneficial or harmful bodies which surround it" (Descartes, 1641/1986, p. 56).

Daisie Radner (1971) has investigated this last point. She reviewed the writings of Descartes, including his letters to Princess Elizabeth of Bohemia, in order to establish his views on the question of union. Radner found that Descartes de-emphasized his doctrine of the complete disparity between mind and body, saying that mind and body formed a "substantial union" that allowed causal interaction. Descartes proposed that there were four types of "primary notions": thought (or mind), extension (or body), those things common to both thought and extension (such as appetites, emotions, sensations, existence, unity, and duration), and the union of mind and body. Thus, he conceived it possible that mind and body could share some characteristics, although his stated common features do not give insight into the interaction mechanism. He further explained that while mind and body are substances in the Cartesian sense, the human being is a composite of the two and incomplete without both.

Thus, there are eight propositions of Descartes's interactionism, but no answer to the obvious question, Pierre Gassendi's objection: how does the interaction work? More specifically, what is the nature of the mind/body union, and how can this union be causal? Although some have claimed that no such problem exists (Loeb, 1981), and although Descartes himself denied the importance of such questions (Radner, 1971, 1985), it is quite clear that a problem of interaction does exist (Radner, 1985) and that dualistic interactionism as a theory is incomplete in the absence of a model for interaction. The aim of this paper is to propose such a model.

Ideally, a theory of interactionism should be grounded in empirical data. It is difficult, however, to identify reliable empirical evidence that unequivocally supports the dualistic viewpoint. There are phenomena, such as out-of-body experiences, past-lives regressions, near-death experiences, and psychic experiences, that can be interpreted from a dualistic perspective. While each of these phenomena is controversial and subject to multiple explanations, the near-death experience does offer a reproducible body of data that is difficult to explain from a completely materialistic (*materialist monist*) view of human nature.

In a recent paper reviewing results from research on the near-death experience (NDE) within the context of the mind/body problem (Arnette, 1992), I found that the NDE provides strong support for

dualism. Furthermore, I suggested that marked similarities exist between the observations of NDErs and predictions made by the general theory of relativity (Einstein, 1961). In particular, the *tunnel phenomenon* (Moody, 1975; Ring, 1980, 1984; Sabom, 1982) often reported by NDErs bears close resemblance to the relativistically predicted *wormhole* (Misner, Thorne, and Wheeler, 1973), which in principle can connect our universe with other universes. The tunnel and other features of the NDE are consistent with a conception of interdimensional travel provided by general relativity theory.

On the basis of the scientific foundation formed by the similarities between the NDE and general relativity, I proposed that the human being is composed of two parts: body and *essence* (Arnette, 1992). The essence is that part of the person that survives the death of the body. It is composed of something other than matter, and thus is not subject to many of the physical laws of this universe, such as gravity or other constraints on motion. The essence contains the essential elements of the human personality or consciousness. The theory of essence holds that upon bodily death, the essence is disengaged from both the body and this universe (or *spacetime*), and travels via a connecting wormhole to locales imperceptible to us while in physical form. The theory suggests that the observations made by the essence during NDEs constitute empirical data, and that these data could be used to construct a scientifically valid model of human nature based on well-established principles of physics and chemistry.

The present paper represents the first step in this model construction. From NDE data concerning various types of interactions that the essence experiences, a model of those interactions is built upon a foundation formed by the theories of electromagnetism and quantum mechanics. From the model, a structural definition of mind is proposed and then compared with Descartes's interactionist propositions.

Method

NDE data take the form of interviews, with transcriptional material being analyzed with a qualitative research methodology (Tesch, 1990). Interview and other textual data can be analyzed for their content, in order to identify regularities (or irregularities) in the data, categories represented, and relationships among such categories. A method for accomplishing these tasks is *content analysis*, which has been broadly defined as "any technique for making inferences by ob-

jectively and systematically identifying specified characteristics of messages" (Holsti, 1969, p.14). Content analysis can be performed for a variety of purposes. Those relevant to NDE data analysis include describing the characteristics of communications, auditing communication contents against standards, and identifying trends or categories in communication content (Holsti, 1969).

Symbolic interactionism (Blumer, 1969) is a school of thought with methods of analysis and theory construction that build upon content analysis. The methodology of this school aims at "the formulation of propositions about relationships among categories of data, which the researcher weaves into a 'theoretical scheme'" (Tesch, 1990, p. 83). This method generally consists of three steps (Becker and Geer, 1982): (1) the observations are used to construct hypotheses about the existence of a phenomenon and its possible relationships to other phenomena; (2) the generality of the phenomena and their possible relationships is determined; and (3) the individual findings are used to verify, reject, or modify the propositions.

These steps are not necessarily sequential or distinct, but rather occur interactively throughout the analysis. The researcher also looks for exceptions to the phenomena discovered; finding none establishes the generality of the phenomena. At the end of the process, the researcher has extracted meaningful, general categories from the data and is in a position to make logical connections between categories, that is, to build a theory based on the data.

The tools of qualitative research have been applied to NDE data in major studies by Raymond Moody (1975), Kenneth Ring (1980, 1984), and Michael Sabom (1982). Moody's study (1975) was the first systematic investigation of the near-death experience. The impetus for his work was the strong similarity of features among various NDE reports he had encountered. Moody's sample consisted of 150 NDE cases. His analysis drew from this sample the general categories that constitute the NDE.

Ring (1980) replicated and extended Moody's work by identifying and content analyzing a sample of 102 NDE cases, and verified the generality of the phenomena Moody had found. Ring then proposed a model of the NDE that included five stages representing increasing depth of the experience. Sabom (1982) collected a sample of 116 cases and performed content analysis on the resulting data. He confirmed the results and categories of Moody and Ring. Sabom classified NDEs as autoscopic (viewing one's own body), transcendental (entering a

different reality), and composite (having autoscopic and transcendental elements).

Sabom's study is especially noteworthy. Not only did he provide important verification of the work of the two previous researchers, but he also offered a unique perspective for near-death research from his position as a cardiologist. Sabom identified ten cases of autoscopic NDEs occurring in operating rooms, and accessed the medical records for these cases. He compared the NDE interview data with these records—which the patients had never seen—and found that in every case, the NDEr's report was consistent with the medical records. A great many of the observations thus verified could have only been obtained visually by the NDEr. Of course, the NDEr typically offered more detail than appeared in the records, but where the records were explicit, the interview data were consistent. In terms of content analysis, this comparison of records with interviews is an example of auditing communication content against standards (Holsti, 1969).

In one case, for example, the NDEr supplied minute visual details of the behavior of two meters on the defibrillator being used to revive his body. Sabom compared these details with his own knowledge of the defibrillator model used at the time of the incident, and found the NDEr's description to be extremely accurate. Cases such as this one are very difficult to explain from the materialist monist perspective, since the unconscious and dying NDEr must have been able to see the details reported. In the language of Thomas Kuhn (1970), these cases are the anomalies that can induce paradigm change. These anomalies have been the motivation for the theory discussed below.

In this paper, NDE data are approached from the symbolic interactionist perspective. The major studies outlined above yielded a set of phenomena that have been established as general and reproducible by three independent researchers. From these major studies, four classes of interaction are identified: interactions of the essence with the NDEr body, with the NDEr brain, with other bodies, and with other essences. All but the first of these classes represent general observations for which no exceptions were found. The essence/NDEr body interactions reported are themselves exceptions, since the NDEr typically does not remember reentering the body (Moody, 1975). Further comments on this point are made below.

After the identification of interaction classes, the next steps in the process are to look for logical connections between these classes and to construct an explanatory theory from the connections. The unify-

ing perspective that emerges from the four interactional classes of data is that of electromagnetic-quantum mechanical theory. This perspective organizes the data in a consistent and logical fashion, revealing relationships between seemingly unconnected phenomena. The theory thus constructed allows predictions to be made, one of which is presented below in the Discussion.

Empirical Observations

For each interactional class discussed below, three examples are cited, drawn from two sources. Within a given category, each account is from a different NDEr. Any emphasis indicated is that of the subject.

Interactions with the Body

NDEs occurring in hospital operating rooms provide an unusual opportunity to learn about the forces at work between the essence and the NDEr's physical body. Revival of the NDEr's body by electric shock provides a distinct off/on transition for the body; NDErs observing this transition during the autoscopic phase, which Ring (1980) called Stage 2, are in a unique position to make important observations about the essence/body reunion. The first three NDE excerpts were from surgical patients whose hearts had stopped and who had observed their own revivals by defibrillator.

Case 1:

I was up there at the ceiling, watching them work on me. When they put the shocks on my chest, and my body jumped up, I just fell right back down to my body, just like dead weight. The next thing I knew, I was in my body again. (Moody, 1975, p. 82)

Case 2:

The nurse was on this side of the bed with that machine. She picked up them shocker things and put one there and one right there [pointing to appropriate places on chest] and I seen my body flop like that. . . . It seemed like it just took me and slammed me together, you know. It seemed like I was apart and then like two forces coming together in a crash. It seemed like I was up here [pointing to ceiling] and it grabbed me and my body and forced it back, pushed it back. (Sabom, 1982. p. 35)

Case 3:

I was sitting up there somewhere and I could look down. . . . They thumped me a second time. . . . Then I reentered my body—a transition that was just like that [the snap of a finger]. (Sabom, 1982, p. 35)

Once their physical bodies were resuscitated, each of these NDErs reported an immediate return to the body. In the second account, this returning was likened to the expression of a powerful force, and in the first account, to the force of gravity.

It can be seen from these first three examples that NDErs vary somewhat in the way they describe an apparently common experience. This variation is consistent with the psychological principle of individual differences in attention, concentration, memory, and verbal skills. It is also important to realize that NDEs are difficult to describe in ordinary language. In most respects, the phenomena reported are beyond our common physical experience. Despite these potential sources of variation, the agreement among the reports is strong.

Interactions with Other Bodies

While there is clearly an interaction between the essence and the NDEr's living body, quite a different situation arises in cases where the essence interacts with other living bodies. These cases again occurred during the autoscopic phase of the NDE.

Case 4:

The doctors and nurses were pounding on my body to try to get IV's started and to get me back. . . . I tried to move their hands to keep them from beating on my body, but nothing would happen. I couldn't get anywhere. It was like—I don't really know what happened, but I couldn't move their hands. It looked like I was touching their hands and I tried to move them—yet when I would give it the stroke, their hands were still there. I don't know whether my hand was going through it, around it, or what. I didn't feel any pressure against their hands when I was trying to move them. (Moody, 1975, p. 44)

Case 5:

As they came by they wouldn't seem to notice me. They would just keep walking with their eyes straight ahead. As they came real close, I would try to turn around, to get out of their way, but they would just walk *through* me. (Moody, 1975, p. 45)

Case 6:

I'm trying to stop them [the doctors]. I really did try to grab ahold of them and stop them, because I really felt happy where I was. . . . I actually remember grabbing the doctor. . . . [What happened?] Nothing, absolutely nothing. It was almost like he wasn't there. I grabbed and he wasn't there or either I just went through him or whatever. (Sabom, 1982, p. 33)

Whether intentional or accidental, physical contact with people is impossible for the essence to achieve. It seems that the essence can occupy the same space as a body, without interacting with it.

Cognitive Effects of Dissociation

Once the essence has acclimated to its dissociation from the body, it begins to notice some of its attributes. One such attribute that is important for the present purpose is the nature of the essential thinking process. Knowledge of this process will give insight into essence/brain interaction, since one may then make a comparison of cognition in the dissociated and integrated states.

Case 7:

Things that are not possible now, are then. Your mind is so clear. It's so nice. My mind just took everything down and worked everything out for me the first time, without having to go through it more than once. (Moody, 1975, p. 51)

Case 8:

I just thought that I was dying at that particular time. It didn't even affect me as far as being scared. Of course, being up there and knowing your mind was alive, but my mind was very much alive. I could think very clearly, even though I was considered dead [laughs]. (Ring, 1980, p. 89)

Case 9:

[How would you describe how your mind was working while in this state?] Very cognitive. Really, very rational. Very determined. (Ring, 1980, p. 91)

The first account directly states, and the others imply, that cognitive functioning is noticeably improved by essence/body dissociation. Thinking is clearer, more rational, and more efficient when separated from the brain.

Interactions with Other Essences

Although the essence cannot interact physically with others, it can indeed interact mentally with others. This is evident when essences encounter each other, as in the transcendental phase (Sabom, 1982) or Stage 3 or 4 of the NDE (Ring, 1980). Also, in some cases when the essence is near people, as in the autoscopic phase or Stage 2, the NDEr reports sensing thoughts.

Case 10:

I could see people all around, and I could understand what they were saying. I didn't hear them, audibly, like I'm hearing you. It was more like knowing what they were thinking, exactly what they were thinking, but only in my mind, not in their actual vocabulary I would catch it the second before they opened their mouths to speak. (Moody, 1975, p. 52)

Case 11:

While I was dead, in this void, I talked to people—and yet, I really couldn't say that I talked to any *bodily* people. . . . Whenever I wondered what was going on, I would always get a thought back from one of them. . . . I always got an answer back for every question that I asked. They didn't leave my mind void. (Moody, 1975, p. 58)

Case 12:

[When you heard the voice, it was a male voice. Did you actually hear the voice, or—?] It was like it was *coming into my mind*. It was like I didn't have any hearing or sight or anything. It was like it was being *projected into my mind*. (Ring, 1980, p. 93)

The data indicate that the essence can interact with other essences by exchanging information at a distance in the form of thought. The essence can also receive the thoughts of those in physical form before the words are spoken.

Theoretical Interpretation

The task at hand is to construct a theory within which the above observations form a consistent whole. The aim is to show that a certain perspective, employing concepts from the physics of electromagnetism and quantum mechanics, unifies the data and demonstrates that each phenomenon is a logical result of the nature of the essence. In pursuing this aim, I will use analogical reasoning: the analogy

will formally employ the behavior of *electric dipoles*, but will also informally appeal to the behavior of *magnetic dipoles*, since magnetism is more common in experience.

Essence/Body Interaction

There is evidently a great attractive force at work between the essence and the NDEr's body. The action of this force can be seen in the first three quotations cited above. The onset of the force is apparently associated with the resumption of the biological functioning of the body, which in the examples coincides with electric shock administered in the operating room. What is the nature of this essence/body force?

While it is conceivable that the body generates some unknown force that can act upon the essence, it is more reasonable and fruitful to propose that a known force is at work. A strong candidate for this operative force is electromagnetism, since the central nervous system is an electrochemical generator of electromagnetic energy. Neural impulses are, in fact, electromagnetic field pulses of a fixed amplitude and duration (Carlson, 1986). The pulses are transmitted down the neuronal axon by the opening of sodium and then potassium channels in a given region of the axonal membrane, thus turning the signal on and then off. The next segment of axon responds in a like manner, and the process continues until the signal has been relayed to the synapse at the axon's end. Information is transmitted via the frequency and pattern of these pulses. The living body is therefore a producer of a temporally varying and spatially extended electric field.

In order to identify electromagnetism as the operative essence/body force, it must also be established that the essence generates or is associated with an electric field of its own. This is a much more difficult task than in the case of the body. There is, however, some empirical evidence for an electrical or energetic aspect of the essence: three NDErs in Moody's sample referred to the essence as (1) composed of "waves" and being "charged" (Moody, 1975, p. 48); (2) being an "energy pattern" (Moody, 1975, p. 49); or (3) "a little ball of energy" (Moody, 1975, p. 50). In addition, Moody reported that almost everyone in his sample described the essence as having extension in space and as being composed of some sort of substance (Moody, 1975). There is reason, then, to proceed with the notion that the essence

is associated with a spatially extended electric field, and to explore the ramifications of that notion.

First, let us review some of the properties of electric fields in order to simplify the discussion. The electric field generated by an arbitrarily shaped collection of electric charges (an *arbitrary charge distribution*) can be represented mathematically by a summation of an infinite number of algebraic terms (Lorrain and Corson, 1970). For a distribution with no net charge, the first term of this infinite series represents the field produced by an electric dipole, which consists of two charges of equal magnitude and opposite signs, separated by a fixed distance. The dipole is the simplest possible distribution of charge. The second term of the infinite series represents an electric quadrupole, and each following term grows progressively more complex. The first term, however, dominates the series, especially as distance from the distribution increases. One can therefore use the dipole as a conceptual tool in the reasoning that follows.

To a first approximation, the electric fields of the body and of the essence can be represented as dipoles. One can then ask the question, how do dipoles interact? Dipole/dipole interaction is attractive or repulsive, depending on the relative orientations of the two dipoles. The interaction is maximally attractive when the dipoles are in the *antiparallel* relationship (Jackson, 1975), to be discussed below. Thus a dipole/dipole attraction occurs when two dipoles are in the proper relative orientations. The force of attraction is inversely proportional to the fourth power of the distance between the dipoles.

An analogy with magnetism is illuminating here. Permanent bar magnets (magnetic dipoles) possess two ends or poles arbitrarily designated as north (N) and south (S). Similar poles held in close proximity repel each other, while opposite poles attract each other. If two magnetic dipoles are oriented so that two N-S pairs are formed (the antiparallel configuration), the magnets are found to attract each other strongly. When one varies the distance between antiparallel magnets, one can feel the rapid change in the attractive force.

In a thought experiment, one may imagine that one magnet can be switched on and off; this magnet then represents the body. The two magnets are separated by a short distance and the body magnet is switched on. The two magnets immediately and forcefully unite. Such an event could easily be described as falling like "dead weight" (Case 1) or as "two forces coming together in a crash" (Case 2).

If such a powerful electromagnetic force is at work between body and essence, then what is the significance of the essence's failure to

interact physically with bodies other than its own (Cases 4-6)? There are at least two reasonable hypotheses, not mutually exclusive, concerning this question. The first involves concepts already encountered. When two physical dipoles closely approach each other due to mutual attraction in the antiparallel configuration, they form a quadrupole, which generates a field strength considerably less than that of a dipole. Because both dipoles are physical, that is, composed of mass, their motion towards each other is halted by the exclusionary nature of matter.

But if one dipole were not material, then the two approaching dipoles would be free to occupy the same space. As a result of this superposition, the dipolar fields would cancel each other, and the composite entity would exert no attractive (or repulsive) electromagnetic force. On this basis, one would expect that an essence could not interact with a composite of body and essence.

A second hypothesis concerning noninteraction involves the idea of *tuning*: perhaps the essence is specifically tuned to the NDEr's body, much the same as a radio can be tuned to a given frequency. Such a proposal would require that each body generate a characteristic field, an electromagnetic fingerprint, to which the essence could adjust. An example of this type of field is provided by an oscillating dipole with a characteristic *frequency of oscillation* (Lorrain and Corson, 1970). The physics of tuning is, in fact, familiar in everyday experience. Radio and television waves (and other forms of radiation) commonly pass through the body without interacting with it; humans are totally oblivious to the presence of these waves. And yet the waves interact strongly with properly tuned detection systems, allowing the reception of information.

Essence/Brain Interaction

Having addressed the question of essence/body interaction on a macroscopic scale, the theory-building process next turns to the problem of interaction of a more intimate type. Cases 7-9 demonstrate that essence and brain do interact, apparently to the detriment of essential cognitive processes. Is this finding consistent with the electromagnetic model?

Once again, the concept of dipoles is pertinent to this question. In the context of essence/brain interaction, however, the dipole is no longer meant to represent the entire entity (body or essence) but

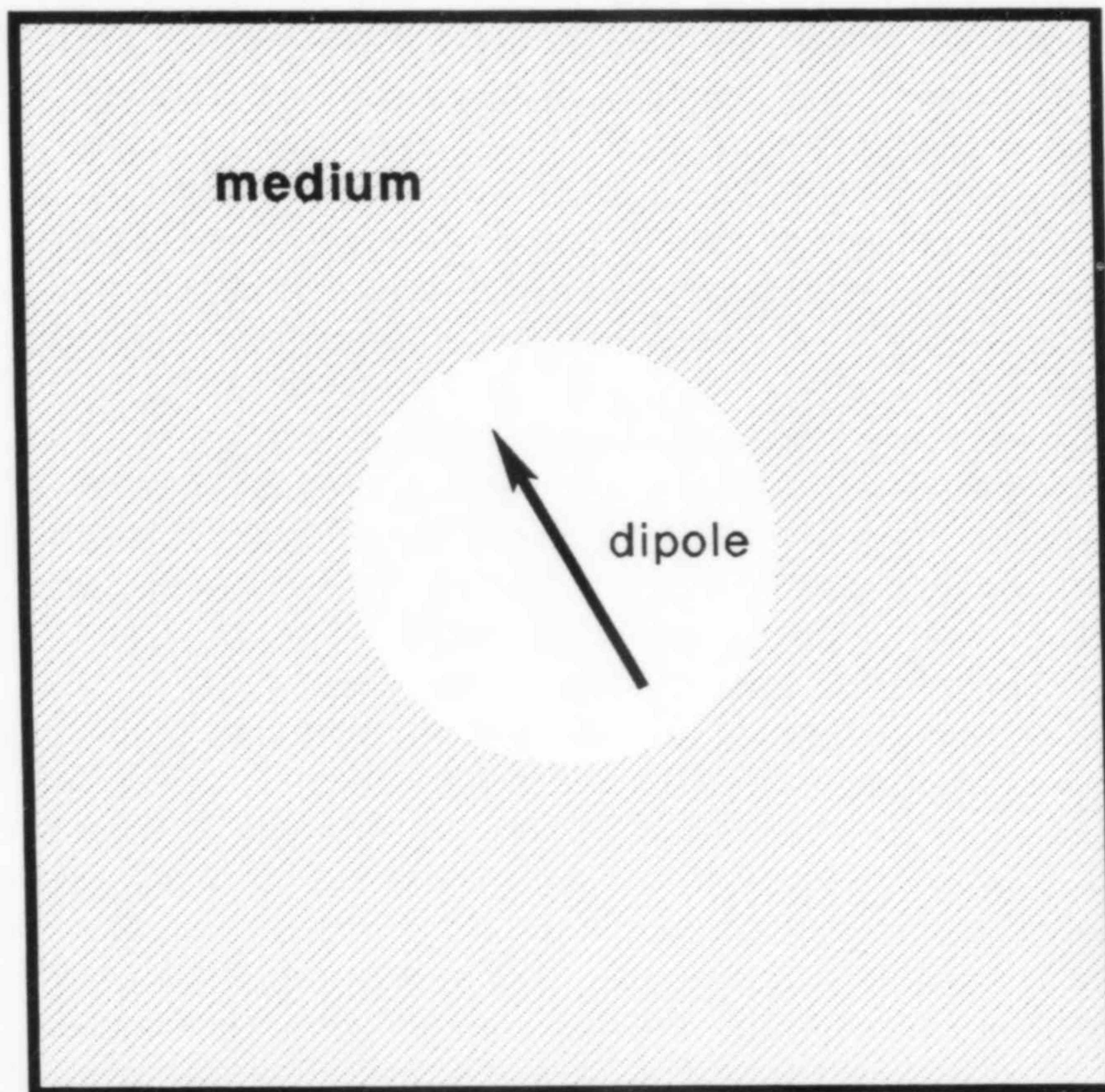


Figure 1. A cavity model for rotational relaxation. The spherical cavity is occupied by a single dipole at the cavity's center. The negatively charged end of the dipole is denoted by the arrowhead. The surrounding medium is considered to be continuous.

instead to model changes in the electric field on a microscopic scale. In this regard, concepts from an area of theoretical chemical physics called *dipolar rotational relaxation* (Arnette, 1981) are especially useful.

Consider a very simple model of interactions between molecules in a gas or liquid, illustrated in Figure 1. One imagines a single, rod-like, dipolar molecule, fixed in the center of an otherwise vacant spherical cavity carved out of the gaseous or liquid medium. The medium outside the cavity consists of dipolar molecules as well, but for simplicity the medium is assumed to be continuous. Both the dipole and the medium generate electric fields; the field of each is al-

lowed to exert effects upon the other. The dipole within the cavity is free to rotate about the center of the cavity in response to changes in the medium's field, and the medium is free to respond to the motion of the dipole. These are the only interactions allowed; that is, no collisions or other rearrangements occur.

It is a basic fact of electrodynamics that a dipole will align itself in the direction of an electric field imposed upon the dipole (Lorrain and Corson, 1970); this is analogous to the northward orientation of a compass needle in the Earth's magnetic field. In the present model, the medium imposes a field on the dipole, which tends to align itself with this field. But the dipole has a field of its own, which influences the orientations, and thus the electric fields, of the dipoles in the surrounding medium.

If one could freeze all molecular motion in the model system and investigate the fields both inside and outside the cavity, one would find that the dipole has *polarized* the medium; that is, the electric field of the medium is distorted from its configuration in the absence of the dipole (Jackson, 1975). The field resulting from this polarized medium is called the *reaction field* (Onsager, 1936), since the polarization is a reaction of the medium to the dipole.

In real systems, all the molecules are in constant motion due to thermal energy. A reaction field exists at any one instant, but at the next moment the dipole has reoriented. The medium must rearrange in response to the dipole's new orientation; at the same time, the motion of the dipole is slowed by interaction with the previously formed reaction field. This last effect is termed the *lag* of the reaction field. It occurs because the medium requires time to respond to the dipole's motion; the reaction field thus lags behind the dipole. Since the dipole tends to align with the imposed (reaction) field, the dipole experiences a drag or *dielectric friction* on its reorientation.

The model for rotational relaxation just described is illustrative of a purely electromagnetic interaction. The dipole and the medium interact through a mediating electric field, which is a manifestation of both the dipole and the medium. Dipole and medium are intimately intertwined; changes in the state of one cause immediate changes in the state of the other, via the mediating field. One could say that the field embodies the interaction between dipole and medium.

Essence/brain interactions can be understood within the context of the rotational relaxation model, but only after a proposition is made about the nature of essential cognitive processes. That proposition is that the dynamic thought process of the essence is associated with

a temporally varying and spatially extended electric field. That is, as the essence thinks, the field associated with the essence fluctuates. This is the case in the living human being, as demonstrated by electroencephalographic techniques (Carlson, 1986). Transferring this characteristic to the essence allows a description of essence/brain interactions in physical terms.

Suppose that the dipole in the rotational relaxation model represents the essence on a microscopic level, and is the driving force for cognition—that is, that the essence is the seat of thought. In light of the above proposition, the essential thought process then corresponds to the motion of the dipole. As has been seen above, dipolar motion affects the state of the medium, which in this analogy represents the brain. Thus, in the union between brain and essence, thought is integrally linked to the brain and is carried out in the presence of the brain's electric field. Two things are accomplished through this linkage: (1) sensory and other information from the body is available to the essence via the brain's electric field, and (2) the essence can influence the body by interacting with the brain's electric field.

The field representation of brain/essence union has another ramification: interaction of the brain field with the essence field interferes with or hinders the essential cognitive process. This is represented clearly in the rotational relaxation model as friction on the dipole due to the lag of the reaction field. This effect is demonstrated empirically in Cases 7-9.

Essence / Essence Interaction

The remaining question is that of the interaction of the essence with other essences. The data indicate that the essence can send and receive information at a distance. One NDEr characterized this process as a voice "being projected into my mind" (Case 12). Such an event is unknown in ordinary experience and in the classical physics of the macroscopic world. What is unknown in the classical world, however, can be quite common in the world of molecules.

Some molecules may, when exposed to light of the proper wavelength, absorb a photon of that light, and thus make the transition from the *ground state* to the *excited state*. The excited state has a brief lifetime, then the energy stored in the molecule finds an outlet. In ordinary fluorescence, part of the energy is re-emitted as a photon of light, and the molecule returns to the ground state (Lakowicz,

1983). In the phenomenon known as *fluorescence energy transfer* (Cantor and Schimmel, 1980; Fairclough and Cantor, 1978), the energy is transferred from the original molecule (the *donor*) to another nearby molecule (the *acceptor*). This transfer is accomplished without a photon being generated. If one were able to observe the donor/acceptor system without interfering with it, one would see the excited donor and ground state acceptor, and a brief moment later the ground state donor and excited acceptor, with no observable transfer of the energy.

Such behavior can be understood on the basis of quantum mechanics, the physics of molecules' interactions with each other and with energy. The excited donor and ground state acceptor are dipoles. As such, they can interact with each other at a distance, as was shown above. In *dipole/dipole coupling*, a potential energy of interaction exists between the two dipoles and depends on their relative orientations. Quantum mechanics allows the transfer of energy between two coupled dipoles. The acceptor acts as a sort of antenna, receiving a signal from the excited donor. The probability of the transfer occurring depends on the nature of the medium between donor and acceptor, the dipolar orientations, and on the distance between the molecules: the greater the distance, the lower the probability. This last aspect of energy transfer has made it a useful tool for the measurement of molecular distances (Arnette, Reedquist, Barisas, and Roess, 1990; Stryer, 1978).

If indeed electromagnetic energy is a manifestation of the essential thought process, as proposed above, then the experiences reported in Cases 10-12 can be seen as analogous to fluorescence energy transfer. Information (energy) is transferred between essences (molecules) at a distance with no apparent medium or mechanism of transfer. Information can in fact take the form of energy. The energy stored in the excited molecule is information in its simplest form, similar to a computer bit switched from off to on. In the case of essence interactions, the process is, of course, much more complex than in this simple analogy; but the important point is that information exchange has a precedent in the properties and behavior of dipoles.

Discussion

The electromagnetic-quantum mechanical perspective is very useful in organizing the NDE data. Interactions of the essence with bod-

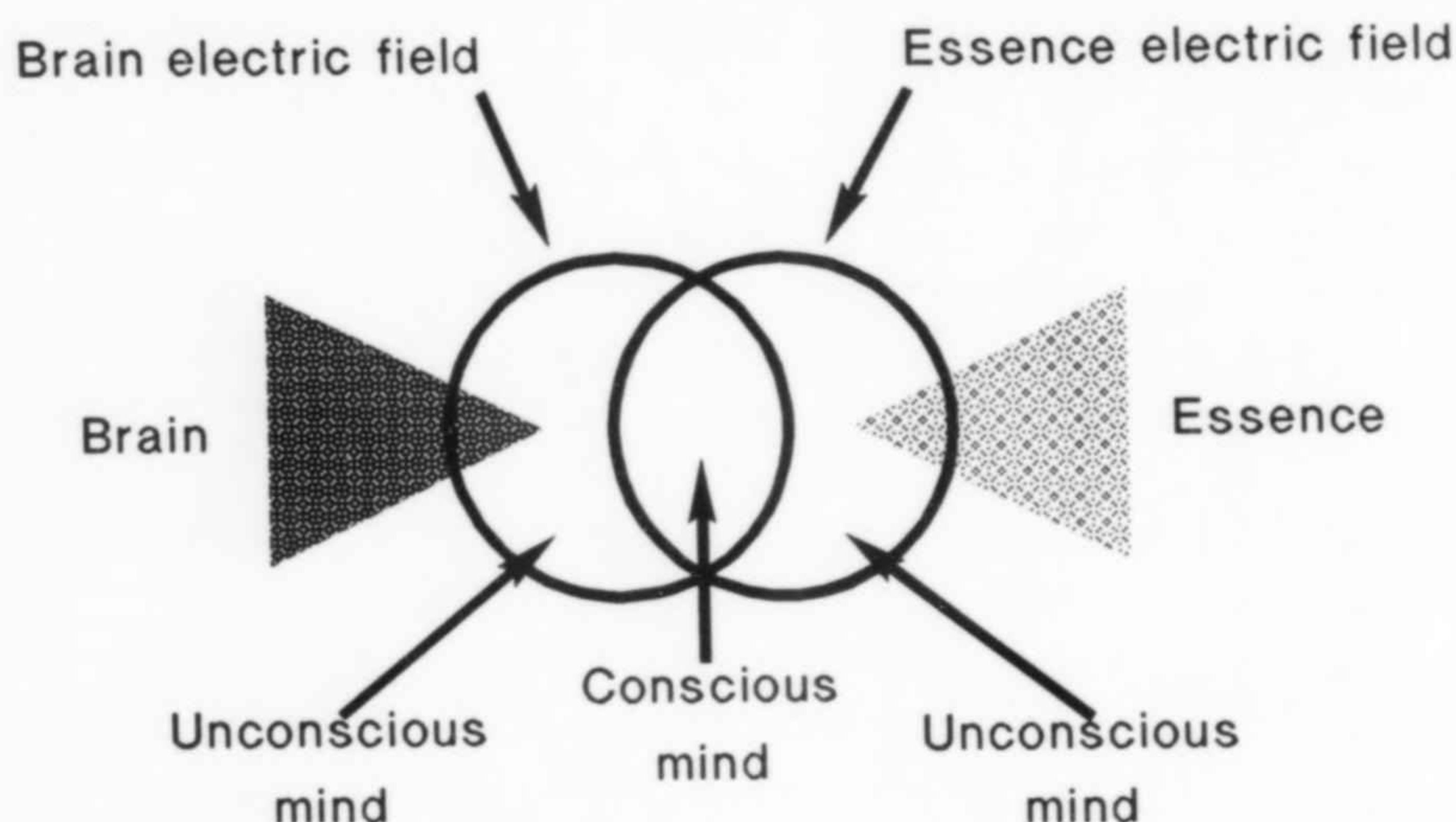


Figure 2. A structural model for a definition of mind. Conscious mind is defined as the overlap of the two fields, while unconscious mind is defined as the portions of the two fields that do not overlap.

ies, the brain, and other essences lend themselves to analogies with dipole/dipole attraction, dipolar rotational relaxation, and fluorescence energy transfer, respectively. The actual physics at work in essence interactions is undoubtedly more intricate than that of the dipole model described; the power of the dipole model lies in the fact that essence and dipole display similar types or classes of behavior. These classes are not independent of each other, but rather are linked by the physics behind the phenomena. Thus, the essence is not beyond understanding, but can be described by a set of scientific laws that have analogues in the physics of the natural world. The building of the theory of essence provides a scientific framework for the essence, and allows empirically testable predictions from that framework. One such prediction will be presented below.

A Definition of Mind

The conscious mind is that entity that is thinking, aware, and rational. It is capable of introspection, insight, and reflection. It is also in touch with sensory, physiological, and other kinds of information associated with the body. The mind can sense and process this in-

formation and is thus affected by it; the mind can also initiate physical action based on bodily data or on the results of introspection. The mind is in this position of control by virtue of its access to both the physical and essential worlds. Mind is the interface between these worlds.

Figure 2 is a diagrammatic representation of mind based upon the rotational relaxation model of essence/brain interaction. The two Cartesian substances, essence and body, are represented by triangles. Their associated electric fields take the form of circles. The conscious mind is symbolized as the overlap of the two fields, in keeping with the rotational relaxation concept. Thus, the conscious mind is a composite, possessing elements of both body and essence. It allows causal linkage between the two substances. The electromagnetic model for interactionism was foreseen by John Wisdom (1952), who suggested that this branch of physics could provide the basis of interaction for two otherwise disparate entities.

The representation in Figure 2 also allows for mind outside of consciousness. The unconscious mind is manifested by those portions of the two fields that do not directly overlap. The conscious mind may have access to information in those portions of the fields, but that information is by definition not directly in consciousness, and its origin may be a mystery to the conscious mind. In this model, the unconscious mind is a composite in a different sense from the dualistic conscious mind.

Comparison with Descartes's Propositions

Body and essence are different substances in the Cartesian sense. Essence does not fit the definition of matter, since it does not exclude matter—as seen above—and is unaffected by gravity (Arnette, 1992). Body *is* matter, and is extended in all of Descartes's senses of that word. Whether body without essence is *completely* nonthinking is uncertain; what is empirically clear from Cases 7-9 is that essence is indeed a thinking substance. Essence is extended in the sense that it is not dimensionless or pointlike and can interface with the three-dimensional brain. Essence is unextended in the sense that it does not exclude matter from its space. Essence is also indivisible, in the physical sense of that word.

Body and essence form a union, defined above as mind, that allows each substance to influence the other. The union is possible only be-

cause body and essence are posited to have a common characteristic: both are associated with temporally varying, spatially extended electric fields. The mind consists of the overlap of these fields, and thus is different from either field alone and incomplete without both contributions.

Descartes's definition of mind and the present concept of essence have many similarities, as pointed out above, but there are also important differences. The largest points of departure between the two conceptions are the notion of extension and the nature of the characteristics common to both mind (or essence) and body. The Cartesian mind is unextended, and since Descartes did not differentiate among the various aspects of that term, he implied that the mind was dimensionless. The theory of essence explicitly holds that the essence is indeed spatially extended, but, like Descartes's concept of mind, does not exclude matter. Descartes's proposed common traits did not provide a basis for interaction. The theory of essence specifies that the common trait of an associated electromagnetic field allows for interaction.

In the development of the theory of essence, it was necessary to propose that body and essence were not completely different. If one requires of dualism that body and essence must be completely different, a radical dualist view, then the present theory is not dualistic. Interactionist theories, by their very nature, however, must require some body/essence commonality and are therefore not radically dualistic. Essence must have some aspect that we would call physical in order for essence/body interaction to occur; the body must possess something essential as well. Essence and body are extremely different, and in this sense the term dualism is appropriate. But the two must in some way speak a common language in order to communicate.

A Possible Experimental Test of the Theory

Because the essence is posited to have some physical characteristics, an experimental test of the theory is conceivable. One may be able to exploit the proposed electromagnetic nature of the essence in order to detect its presence outside the body. During the autoscopic phase of the NDE, experiencers consistently report that their consciousness is located above the body near the ceiling of the room and at a diagonal angle to the body (Moody, 1975; Ring, 1980; Sabom,

1982). It is possible that the essence can be detected in such a situation, for example, by antennas connected with frequency analyzers.

Consider the following scenario. An operating room is specially equipped to detect and localize the presence of electromagnetic fields. The equipment is activated and monitored on a regular basis. Patients are not notified of the measurements, but are interviewed following surgery to identify cases of the NDE. Such occurrences are then correlated with the electromagnetic measurements.

If the theory of essence is correct, then the potential for success of this test rests upon the degree to which the electromagnetic properties of the essence can be detected physically. Two of the key practical problems involved are the selections of the frequency and intensity of the field to be detected. Perhaps some insight into these problems would be provided by investigations of the fields generated by living bodies. One must remember, however, that the essence may have unknown properties that would preclude physical measurements. Thus, negative results would not necessarily disprove the theory. Positive results, on the other hand, would provide powerful evidence.

Conclusion

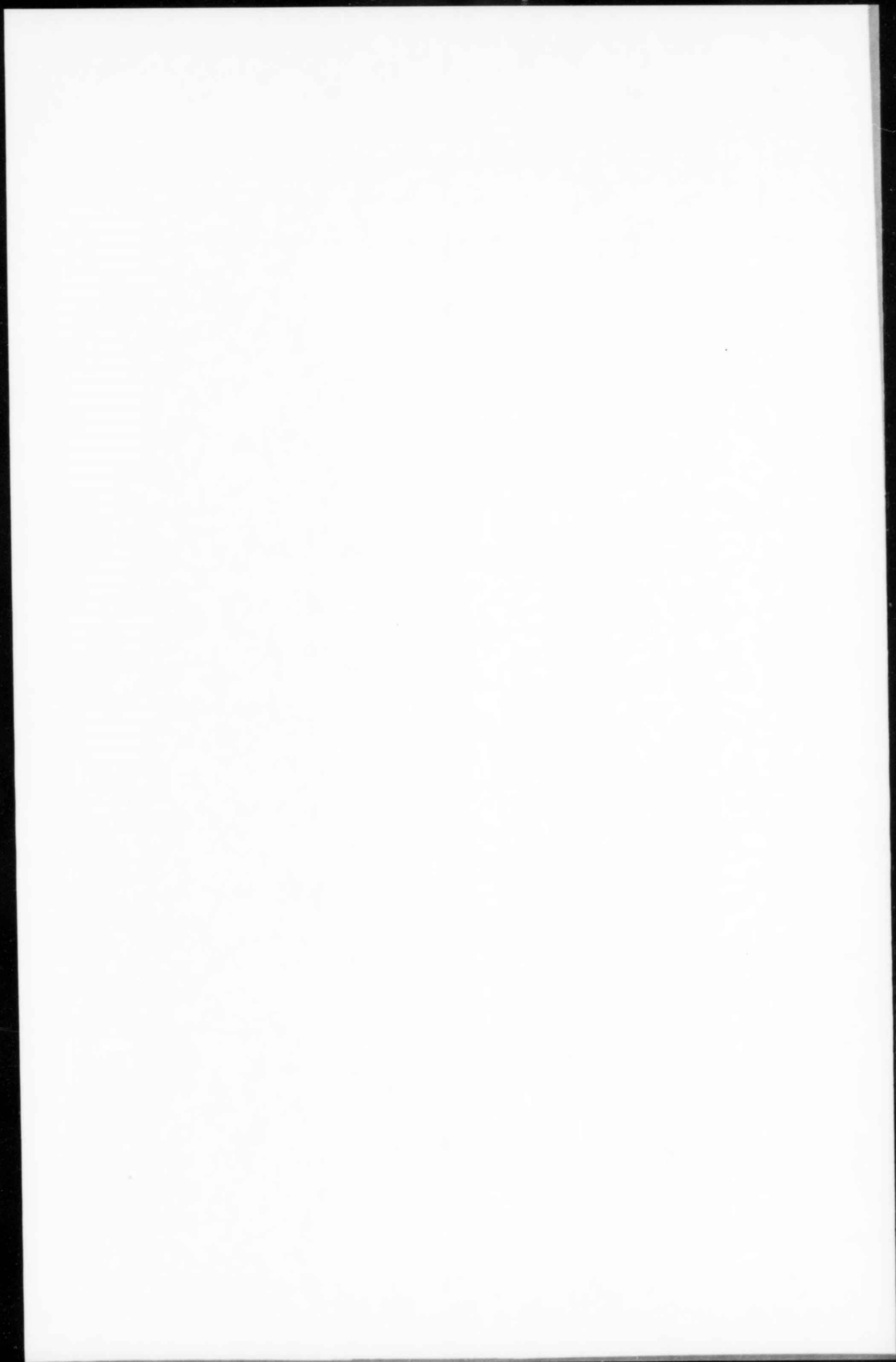
According to the theory of essence, the body acts as a *transformational system* for the essence. The body detects electromagnetic, auditory, thermal, chemical, and mechanical information and transforms it via the peripheral and central nervous systems into an electromagnetic energy pattern in the brain that the essence can sample. The essence is dependent on the accuracy and integrity of physical (biological) systems, both sensory and motor, for the sensory data and physical causality it needs in order to negotiate the world and life in it.

This theory generates a set of questions centering on the biological details and mechanisms of essence/brain interaction, which fall into two general categories: anatomical and physiological. We might ask, for example, about details of the essence/brain interface, where in the brain this interface might occur, what supporting evidence there is for any such localization, and the physiological mechanisms of interaction on the molecular level in the interface. These aspects of the theory are currently under development.

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The Physical Basis of Subtle Bodies and Near-Death Experiences

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ABSTRACT: The discovery of "dark matter" may provide the key to an age-old mystery concerning the nature of humanity. "Dark matter" cannot be seen or felt, but composes at least 90 percent of the physical universe. Since it is not composed of charged particles, it cannot produce electromagnetic waves and can interpenetrate with our visible charge-carrying matter. I suggest that "dark matter" is the matter of mysticism, which constitutes the subtle bodies and was present before (and responsible for) the Big Bang that created visible matter.

"The more important fundamental laws and facts of physical science have all been discovered, and these are now so firmly established that the possibility of their ever being supplanted in consequence of new discoveries is exceedingly remote. . . . Our future discoveries must be looked for in the sixth place of decimals."

Albert Abraham Michelson, 1894

Mystical teachings throughout the ages and throughout the world provide a comprehensive explanation for phenomena such as near-death experiences (NDEs). They describe persons as having a series of invisible interpenetrating bodies, often referred to as subtle bodies. Most, if not all, of the spiritual and philosophical writings and teachings that have emerged contain this concept. The ancient Egyptians, Chinese, and Greeks, as well as the Native Americans, the tribes of Africa, the Incas, early Christians, and Vedic seers of India all found the study of the visible and invisible bodies a key to the nature of humankind and the universe (Tansley, 1984). David Tansley wrote:

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According to various esoteric schools, the Creation is divided into seven major planes of consciousness or matter. Man reflects this pattern through his manifestation upon the cosmic physical plane, and draws matter from the various levels in order to create bodies through which he can learn to express the Divinity which lies at the heart of his being. So common is this concept of gradations of consciousness and substance that references to it can be found in Christianity, Theosophy, Buddhism, Yoga, Judaism, Rosicrucianism, Sufism, as well as in the teachings of ancient Greece and Egypt. It is also to be found in the Zoroastrian religion and the spiritual beliefs of the Polynesians. An understanding of these inter-related planes of consciousness is basic to any study of the subtle anatomy of man. (1980, p. 80)

It is noteworthy not only that this belief in nonvisible "bodies" composed of matter from other "planes" has been described in considerable detail, but that these details are very consistent from culture to culture, from ancient to modern times. One must wonder about the coincidence and the persistence of such a conviction. But science has been unable to find any physical basis for such a belief; look as we will, no physical scientific evidence for these subtle bodies has been discovered. Are we to view subtle bodies as purely subjective concepts, perhaps useful in meditation, perhaps purely imaginary and dismissable as meaningless fantasies?

Mystics and shamans tell us that they have directly experienced these subtle bodies. Many traditions have speculated on the basis for these experiences, such as "energy fields" surrounding the body, but they fail to explain what could produce these fields physically. Nevertheless the belief in this phenomenon is very strong. Gopi Krishna spoke for many when he wrote:

It is high time now that scientists accept the existence of bio-energy (prana), the intelligent force behind all chemical actions and reactions of a biological organism. Here we deal with a new dimension of matter and consciousness. . . . The experiments . . . are yet in a rudimentary stage, but . . . if the idea is based on a solid foundation, the experiments will be successful and the illusive medium will be located one day. (1975, p. 12)

Before I discuss a physical basis for this illusive medium and for NDEs, let me first briefly summarize a typical description of the subtle bodies as presented in Western mysticism.

The Subtle Bodies

A person's bodies are usually described as interpenetrating "envelopes" or "sheaths" of decreasing densities (Mookerjee, 1991). The most dense is the "physical" body, which has two components, the very dense visible body and the less dense etheric body, which has a shape similar to the visible body. The etheric body is directly related to the nervous system, which it feeds, controls, and galvanizes into action. It appears as a fine network of energy webs or energy streams. This subtle body is a receiver, assimilator, and transmitter of "qi" or "prana," an internal energy (Tansley, 1984), and also contains the acupuncture meridians (Mookerjee, 1991).

The next interpenetrating body is referred to as the astral body and is composed of less dense matter from the astral plane. Involved with an interplay of emotions, it connects the mind by way of the etheric body to the external world. It can sense the mood of another person or "atmosphere" in a room or location. Next is the mental body, composed of even finer matter of the mental plane. It is used for rational, discriminative, and intellectual thinking (Tansley, 1984).

The soul, the vehicle of manifestation for the spirit, is veiled by these three bodies of mental, emotional, and dense "physical" matter. These three bodies are not regarded as permanent, but as lasting only one incarnation. The causal body, which contains the soul, is relatively permanent. Humankind is also composed of even finer matter from other planes (Tansley, 1984).

Most often there are seven primary "chakras," or energy centers, associated with the subtle bodies, and each chakra is associated with an endocrine gland and governs certain areas of the body. These chakras are (1) the base chakra, located at the base of the spine; (2) the sacral chakra, located below the naval; (3) the solar plexus chakra; (4) the heart chakra; (5) the throat chakra; (6) the "third eye" or brow chakra, located between the eyebrows, whose activation gives inner vision, a simultaneous knowledge of things as they really are, as the "third eye," cosmic consciousness, opens at this center; and (7) the crown chakra, located on the top of the head.

Through the chakras, the major nerve plexuses, the lesser ganglia and the intricate network of fine nerves, man registers those energies and forces which flow to him from a multitude of sources throughout the universe. (Tansley, 1984, p. 82)

The subtle bodies are related to the gross or visible particles at several psychic points, which are interlinked by numerous subtle channels known as "nadis." The most important nadis are: (1) the central channel, which runs from just below the naval to the forehead; (2) a white channel, which runs on the left of the central channel; and (3) a red channel, which runs on the right of the central channel. The right and left channels run from the perineum at the base of the spine, spiraling in opposite directions around the central channel, and all three meet between the eyebrows (Mookerjee, 1991).

There is a special energy, or energies, associated with the subtle bodies, called "qi" in China, "prana" in India, and by other names in other cultures. In Chinese, qi

means air, power, motion, energy, life, etc. According to Chinese terminology the correct definition should be: "the intrinsic energy," or "the internal energy," or "the original energy, the eternal energy, the ultimate energy." (Liao, 1981, p. 26)

Qi can be cultivated through meditation or through specialized movements, such as tai chi chuan or qi gong. Cultivating qi brings health and general well being. An experiential phenomenon, qi or prana is an energy associated with the subtle bodies, which can also be utilized to arouse a potent inner energy referred to as "kundalini."

The existence of the subtle bodies would explain not only NDEs, but also out-of-body experiences (OBEs), clairvoyance and extrasensory perception, hands-on healing, the power of prayer, and comparable phenomena. But wherein lies the physical basis for these mystical bodies?

"Dark Matter"

Recent discoveries in physical cosmologists' explorations of the phenomenon of "dark matter" may well point the way to a physical basis for subtle bodies. Until recently scientists had no idea that this "dark matter" existed because it cannot be seen (thus its name) or touched, but can pass right through visible matter. These properties indicate that it is not composed of electrically charged particles. We know it exists only because of its gravitational effect observed in distant galaxies. Furthermore, "dark matter" is not rare; according to cosmologists, at least 90 percent of the universe is composed of it. The mystery of what this matter is and how to explore it still remains

(Trefil, 1993). While I would prefer using some name other than "dark matter" for this phenomenon, the term has unfortunately crept into scientific literature and using any other term tends to confuse people. For this reason, I will continue to use the term in quotes.

The first scientific evidence for the existence of "dark matter" came when Fritz Zwicky (1933) showed that there wasn't nearly enough mass associated with visible light for gravity to hold the galaxies together in a region of space called the Virgo Cluster. This discovery was overlooked until the 1980s, when scientists, probing the universe with dedicated ground observatories and new instruments in space, discovered evidence of "dark matter" wherever they looked in the universe (Turner, 1993).

Exploration of this phenomenon has proceeded as a multidisciplinary effort involving physical cosmologists, particle physicists, astrophysicists, plasma physicists, and others, pursuing the detection of particle "dark matter" with the expectation that their search will reveal which model of particle physics is the most accurate: the Standard Model or some of its extensions, such as the Peccei-Quinn Symmetry, Supersymmetry, Technicolor, or Superstrings model. Each of these models proposes a different candidate for the identity of the "dark matter" particle, such as a very light axion, a light neutrino, and a heavy neutralino (Turner, 1993); however, it appears likely we need to introduce totally new candidates.

In addition, cosmologists and particle physicists hope that the determination of the "dark matter" particle will fill in some missing information on the Big Bang. The Big Bang is regarded as a single energy event whose eruption created not only matter but simultaneously time and space. Although the occurrence of the Big Bang is well established, science has failed to explain how an uncaused effect could have occurred; that is, science may be able to describe what happened but cannot explain why it happened.

I would like to make two points concerning "dark matter." First, the microwave background radiation of the universe (the "echo" of the Big Bang) and primordial nucleosynthesis (Big Bang atomic nuclear production) are the two quantitative tests supporting the hot Big Bang Theory (Schramm, 1993). Yet these two phenomena speak only to the creation of *matter that produces electromagnetic radiation*—luminous or visible matter—and not to "dark matter." Furthermore, since "dark matter" makes up most of the matter in the universe, it is possible that some forms of "dark matter" predate luminous matter, and could in fact be the substance out of which lu-

minous matter was produced. That is to say, "dark matter" could be responsible for the Big Bang. The production of luminous matter in the Big Bang could have been generated from a very small percentage of the then-existing "dark matter." Thus, it would be possible to explore the nature of the universe prior to the Big Bang, and explore the properties and the role of "dark matter(s)" in the Big Bang.

Second, while we are exploring deep into the universe to comprehend "dark matter," there is also evidence here on earth for the presence of "dark matter." As mentioned, from ancient times to the present, humankind has experienced phenomena and developed concepts that suggest the presence of nonvisible "bodies" that are a part of us, often referred to as the subtle bodies (Tansley, 1984). These bodies could be composed of "dark matter," a substance capable of interpenetrating with our visible body, and are in every way a part of our being as much as our organs or our bones. There are considerable experimental data and experiential phenomena to support this view. These phenomena include the subtle bodies, qi or chi, out-of-body experiences, NDEs, hands-on healing or therapeutic touch, and the power of prayer. Literature on these subjects abounds and so does scientific evidence; yet without a physical basis it has been largely ignored, if not ridiculed, by the scientific community. Now, however, the discovery of "dark matter" might well explain these phenomena. In order to understand how "dark matter" presents us with a physical basis for the subtle bodies, let us first consider a brief history of matter from Isaac Newton's time on.

A Brief History of Matter

The concepts of mass and matter appear to have been originally conceptually the same. Even when Newton introduced "mass" in his *Laws of Physics* he probably viewed mass and matter as one; and he probably thought that we saw and felt objects because they had mass. But Newton's Second Law of Motion, the inertial property of mass, gave it its first property or first definition. The equation $F = ma$, where F = force, m = mass, and a = acceleration, is the mathematical statement of Newton's Second Law. In this equation, the only known quantity is acceleration, which is defined as a change in velocity. What Newton did was to define "force" as that which causes acceleration, or changes an object's velocity (speed or direction). But he also defined "mass" as that which resists a change in motion,

which gave rise to the inertial property of mass. It takes a greater force to produce an equivalent *change of velocity* of a more massive object.

Newton later gave mass another property when he "discovered" gravity. The universal attraction of the force of gravity is due to mass. This can be expressed in the equation $F = GMm/r^2$, where F = the gravitational force, M and m = the two masses exerting the gravitational force on each other, r = the distance between the two masses, and G = some number or constant, which depends on the units of measurement used. This property of mass is very different from its inertial property. With gravity we are talking about an attractive force between two objects that have mass. As far as we know, these two properties are inseparable from mass, even though they are in principle conceptually different. In visible or luminous matter, the protons and neutrons in the atomic nucleus are primarily responsible for the gravitational force, *because they have almost all of the mass of the atom.*

In this century Albert Einstein was able to equate mass with energy. The equation $E = mc^2$, where E = energy, m = mass, and c = the speed of light (3×10^8 meters/second). This expression not only showed that mass was a form of energy, but also stated that it takes a large amount of energy to produce a small piece of mass.

At the beginning, it was tacitly assumed that we saw mass and we touched mass. When we began exploring the quantity of electric "charge," and as electromagnetic theory was developed in the 19th century, our understanding of mass also changed significantly. Charge does not exert a force on mass, or vice versa. Charge exerts a force on charge, called an electromagnetic force; and mass exerts a force on mass, called a gravitational force. After the basic experimental equations for electromagnetic phenomena had been established, James Clerk Maxwell in 1873 discovered an inconsistency in these well-established equations unifying electric and magnetic phenomena; in correcting that inconsistency, the electromagnetic equations now known as Maxwell's Equations predicted that charge could generate electromagnetic waves that moved at the speed of light. Nothing like this had ever been suspected; Maxwell concluded that light was probably an electromagnetic wave.

As experimentation was performed to prove his theory, electromagnetic radiation was soon discovered everywhere, and was easily generated. Visible light was just a small part of the electromagnetic spectrum. Suddenly we discovered that light was a property of elec-

tric charge; that is, we saw objects not because of their mass, but because of their charge. By the end of the 19th century most scientists believed that the last great discoveries in physics had been made, and only details needed to be worked on. However, the 20th century exploded with amazing new discoveries calling for unexpected new perspectives.

As the atom was explored and quantum mechanics was introduced, the importance of electric charge became even more profound. In fact, it turned out that the structure of the atom was electric in nature: negatively charged electrons attracted by a positively charged nucleus. Chemical phenomena were a property of charge, and most everyday phenomena became attributed to charge. Even the fact that we could hold an object in our hand was found to be a property of charge. *Charge was responsible for vision and for the force that held electrons to the atom; it therefore gave the atoms their chemical properties, and so made them appear and feel solid.* Of course, charged particles such as electrons and protons also had mass, but mass had nothing to do with seeing or feeling physical objects. It was the property of charge that made that possible.

If there were a massive object not made up of electrically charged particles, we could not see it, and it would pass right through visible matter. We wouldn't know it existed unless it were massive enough to exert a gravitational force on us. Mass clearly was not what we thought it was. It had become something different, having only the properties Newton mentioned, its inertial property and its gravitational property; and it was a form of energy, as Einstein showed. But mass itself could not be seen or touched.

With the discovery of "dark matter," which is *not* composed of electrically charged particles, we now have matter that cannot be seen or touched with our visible bodies. "Dark matter" and "luminous matter" can exist at the same place at the same time; they can interpenetrate. "Dark matter" could be an intricate part of us and we—the visible part of us—wouldn't know it.

"Dark Matter" as the Matter of Mysticism

Mysticism is its own discipline and is not dependent upon science for its verification. Those who have experienced phenomena associated with mysticism generally have no need for scientific proof. Nevertheless, because mass is a form of energy, it is reasonable that the

subtle bodies would have a physical basis. The physical properties of "dark matter"—its invisible nature and its ability to interpenetrate with visible matter—are consistent with the physical properties of the subtle matter and the subtle bodies described by mystics, long before such a substance was even suspected by the scientific community. Let us take a look at phenomena such as NDEs and the power of prayer in light of "dark matter" subtle bodies.

Elisabeth Kübler-Ross (1975) and Raymond Moody (1975) independently found a convergence of experiential information from people who had NDEs. Such NDEers often claim that words are inadequate to explain their experience, but typically they report the same events. They say that they experienced leaving their "body" and observing themselves from a distance, witnessing in detail activities carried out; in some cases their observations could be confirmed. They say that their form may vary, from amorphous clouds to energy patterns or pure consciousness; others experience a distinct feeling of having a body, but one that is permeable, invisible, and inaudible to those in the phenomenal world. They report feelings ranging from fear and confusion to ecstatic feelings of timelessness, weightlessness, serenity, and tranquility. They say that they hear peculiar sounds, sometimes unpleasant, sometimes soothing. Many report passing through a dark enclosed space such as a tunnel, cave, funnel, or valley. They describe encounters with other beings such as dead relatives or friends, "guardian spirits" or "spirit guides"; visions of a light being who shows qualities of love, warmth, compassion, and a sense of humor are common. They often report communication through thought. They describe a life review, self-judgment, or divine judgment; and an understanding of the consequences of their past actions and thoughts (Grof and Grof, 1980; Moody, 1975).

NDEs parallel the afterdeath views of esoteric traditions, including such different sources as Rudolf Steiner (1968), Emanuel Swedenborg, and Tibetan Buddhism (Moody, 1975). NDEs and out-of-body experiences are easily explained by mystical subtle body models as the subtle body leaving the dense visible body for a period of time. The conditions that allow the separation to occur and the level at which this separation occurs—the etheric, astral, mental, or higher level—are not clear. In different cases the subtle body that separates may be different, and the experience may be accordingly unique and categorizable. The complete experience of the subtle bodies seems to be inaccessible to ordinary consciousness.

Scientific evidence for the healing power of prayer and its effectiveness in medicine has recently been presented (Dossey, 1993). Statistically significant data and case histories present strong evidence for the power of prayer. However, regarding attempts to develop a physical model for prayer, Larry Dossey wrote:

Conventional forms of energy are an insufficient explanation for what we observe in spiritual healing experiments. In them the "energy" does not fade away with increasing distance, and it cannot be shielded, as we would expect if ordinary forms of energy were involved. (Dossey, 1993, p. 198)

Scientific evidence shows that praying can heal, "but we simply don't know how the mind of one person can engage in 'action at a distance' to bring about the healthful changes" (Dossey, 1993, p. 198). Dossey clearly pointed out the need to find and describe other physical systems that could effectively transport healing information.

I suggest that "dark matter" could present a model whereby information (energy) could be transported over distances unshielded by visible matter. The properties of "dark matter" in the form of the subtle bodies may allow directed information (energy) transport from one person's subtle body to another's. The role of the etheric body is to "act as a receiver, assimilator, and transmitter of prana" (Tansley, 1984, p. 23). The prana in turn may affect the gray matter of the brain or organs and stimulate action on the psychoneuroendocrine pathway or the psychoneuroimmunological pathway, or possibly other more direct pathways through the subtle body. "Hands-on" healing or therapeutic touch can operate similarly, by directly transferring information from one physical subtle body to another. Qi (chi) would be "dark matter" and/or the energy transmitted by "dark matter." The subtle bodies may supply a simple and direct vehicle for healing.

Physical Properties of the Subtle Bodies

With at least 90 percent of the matter in this universe such a great mystery, scientists today cannot state what is *not* possible. Depending on the properties of "dark matter(s)," things believed to be impossible today may become very ordinary tomorrow. From the phenomena described above, we can conclude a few things about "dark matter" and "dark matter" bodies.

First, the physical properties of "dark matter" must be quite different from the physical properties of visible or luminous matter. The "sense" of time, space, and matter may be quite different, but related, requiring new concepts. Scientists think that the detection of "dark matter" will provide evidence for a "new physics," but they may not realize how "new" this physics may be. Second, "dark matter" must be composed of stable "atoms" or "particles" capable of manifesting into a structure, such as a subtle body. Third, "dark matter" can transmit and receive energy, allowing the transmission of some type of energy (qi) in a way analogous to but quite different from visible matter's transmission of electromagnetic waves.

Fourth, the "dark matter" of the type composing the subtle bodies would be nonbaryonic and without electrically charged particles, or it would surely have been noticed a long time ago, because in NDEs the body weight would then significantly diminish as the bodies separated. Mystics have always taught that the matter from the other planes was much less dense than the visible matter. The reason visible matter is so heavy is not due to charge or to electrons, but to nucleons—protons and neutrons—that make up the nuclei of atoms. These particles are unusually massive and are responsible for more than 99.95 percent of our mass. The electron is only 1/1,836 as massive as the neutron or proton. It would appear that the "dark matter" of our bodies does not have these massive particles like nucleons, but is composed of much less dense particles that make up probably less than 0.1 percent of the mass in our body. But small masses can have very significant effects, as demonstrated by the low mass electron, which is responsible for nearly all electrical phenomena we observe.

Fifth, the subtle bodies must be composed of several unique forms of "dark matter," which make up the envelopes or sheaths of the subtle bodies of decreasing density. These subtle bodies are as much a basic part of our being as our organs or bones. Our total being would actually be a combination of interpenetrating "dark matters" and visible matter. The bodies somehow interact, forming a complete being.

Sixth, the "dark matter" bodies have their own senses—being able to hear and see during NDEs or out-of-body experiences—but it would appear that these senses are much more expansive, capable of perception far beyond our normal experiences and therefore difficult to explain and verbalize. This may be due to a change in the sense of time, space and matter.

Seventh, self-awareness moves with the "subtle bodies" during NDEs, suggesting that it has more to do with our self-awareness than does our visible body. Scientists have assumed and even attempted to prove that the mind is the source of self-awareness (Crick, 1994), but it is possible that the mind is more like a machine that can interact with the "dark matter" subtle bodies, and is not as such the creator of self-awareness. Paracelsus wrote:

Man has also an animal body and a sidereal body; and both are one, and are not separated. The relation between the two is as follows. The animal body, the body of flesh and blood, is in itself always dead. Only through the action of the sidereal body does the motion of life come into the other body. (Tansley, 1984, p. 23)

Eighth, the subtle "dark matter" bodies are capable of experiencing thoughts and emotions directly. Communication through thought is often mentioned in NDE accounts. With our dense physical bodies out of the way, the awareness of the activities of the mental and emotional bodies is more available. It appears that "dark matter," in the form of a subtle body, is capable of transmitting thought as an "energy" in a way perhaps similar to charge transmitting electromagnetic waves. With this transmission prayers and thoughts can be transmitted over distances, and benefit individuals through the subtle "dark matter" bodies, which in turn can affect the brain and organs of the visible body. C. W. Leadbeater wrote that thought has to be transferred through several sheaths or subtle bodies to reach the gray matter of the brain (Leadbeater, 1987), indicating the deeply unconscious nature of thought transfer. The "dark matter" bodies may be the *physical manifestation of our subjective or unconscious "invisible" world.*

Ninth, it would appear that qi or prana is primarily an energy property of the "dark matter" bodies, and not of luminous matter. Traditional sources classify qi into many categories, suggesting that qi is a generalized term referring to different types of "dark matter" and/or the energy transmitted by "dark matter." Qi can be "cultivated" through meditation and movement, which can in turn affect the visible body. Healing, it would appear, can occur through actions performed on the visible body or actions performed directly on the subtle "dark matter" bodies. Many alternative approaches to health are techniques that affect the subtle bodies, which in turn affect the visible body. Acupuncture, although performed on the visible body, more directly affects the etheric subtle body, which in turn can affect

the visible body. Qi movements operate similarly, affecting the subtle bodies directly, and then indirectly affecting the visible body.

Finally, we are not totally in touch with our subtle "dark matter" bodies in our "normal" state of mind. We may experience these subtle bodies more fully under unique conditions, or develop the ability through proper meditation and other techniques.

Insights into "dark matter" bodies may well be obtained through mystics, shamans, and esoteric teachers who have written books on this subject. Several books on kundalini describe the subtle bodies in considerable detail, informing the reader of this very significant phenomenon, both from an Eastern perspective (Mookerjee, 1991; Rinpoche, 1992) and from a Western view (Leadbeater, 1987; Steiner, 1989; Mindell, 1982; Tansley, 1984).

Summary

At the beginning of this paper I mentioned that mystical teachings from all cultures speak of the creation of the universe involving perhaps seven distinct types of matter and/or consciousness, and that humankind is composed of interpenetrating subtle bodies made up of these distinct types of matter. In the past there was no scientific basis for such an idea; yet today, with the discovery of "dark matter," we now know that there is matter in the universe that we cannot easily detect, and that can interpenetrate with our visible bodies. It is extraordinary that the mystical teachings have had such a concept as "interpenetrating matter," since until "dark matter" was discovered over the past 15 years, no such matter was thought to exist or was even suggested by anyone in the scientific community.

The universe may have been created by a sequence of events, terminating in the Big Bang of our visible matter, rather than a single energy event that created time, space, and matter. The transition from "no space," "no time," "no matter" to the Big Bang and our present awareness of time and space may have been a more gradual process involving several events, and each event may have involved a unique form of "dark matter" associated with *a different sense of time and space*. Art may be very important in the phenomenological exploration of this "dark matter," because it provides a multisymbolic language and serves as a bridge between the visible and the invisible, thus providing a portal of access.

Scientists today believe that people are composed of matter created by the Big Bang and then processed into the atoms of the elements in the stars. This is true for our visible body, but in addition to this body, a much older tradition says that we also have subtle bodies composed of matters created at different stages in the development of the universe, which predate the Big Bang. If we are composed of "dark matter," if we have in addition to our visible body, subtle bodies or "sheaths" of interpenetrating unique forms of "dark matter," all of which in turn interpenetrate with our visible body, phenomena such as NDEs and out-of-body experiences can be regarded as physical experiences of our subtle "dark matter" bodies. From the point of view of physics, "dark matter" is just as real and just as physical as visible matter.

There is evidence dating back to the earliest recorded history of humans that there is more to the universe and there is more to us than we are aware of and can see with our ordinary eyes. Western science has pursued an exploration of the visible or luminous form of matter at the exclusion of other human experiences of more subtle matter. This focus has been double-edged, producing incredible scientific knowledge and technological achievements concerning visible matter, but unfortunately losing track of a much greater picture.

Now that "dark matter" has been discovered and our knowledge of electromagnetic radiation-producing matter is so great, we need to pursue an exploration of "dark matter" as vigorously as we have visible matter. We can no longer escape the conclusion that humankind is composed of more than we can see, and has several "dark matter" bodies that are a necessary part of us, but are not fully experienced in our daily life. Descriptions of this subtle body abound, and include literature from all ages and all cultures, too numerous to list, and scientific evidence for this phenomenon increases daily. The mystical teachings provide the clearest and most complete model for explaining both the experiential phenomena mentioned and the scientific evidence associated with them.

Physical scientists are certain that "dark matter" exists because they can observe the gravitational effects it produces. But they are uncertain about what this "dark matter" is, and have not yet considered the possibility of its existence before the Big Bang. Although the evidence for subtle "dark matter" bodies is substantial, physical scientists may still require hard physical evidence. We cannot easily detect "dark matter" with our luminous matter, with our instruments or machines, because the only physical property of "dark matter" the

scientific community has recognized is its gravitational property. This might suggest that upon death a small but detectable weight loss might occur. But the etheric body, the astral body, and the mental body do not, as such, continue after death, and they are the most dense of the subtle bodies—though still not very dense relative to the visible body. These bodies may remain with the visible body and dissipate gradually, leaving the causal body, the soul, and still finer forms of matter to depart.

Weight losses on the order of a few ounces have been reported upon death, but the scientific value of these reports is questionable. Carlos Alvarado (1980) has reviewed efforts to detect subtle bodies and weight loss at death or during out-of-body experiences (OBEs). He concluded:

The evaluation of these old studies can be as difficult and ambiguous as that of more recent OBE experiments. Some of them can be criticized on methodological grounds. . . . In some cases it has not been possible to replicate the originally reported phenomena while in others there has been no attempted replication. Under these conditions the anomalous results of these studies, although sometimes impressive, do not have too much scientific value. Though the studies we have discussed fall short of presenting good instrumental evidence for the existence of an "astral body," they still may be of some interest. If nothing else, they provide a sense of historical continuity with modern studies and a reminder of the methodological difficulties of this type of work. (Alvarado, 1980, p. 7)

However, a recent news report in the London-based magazine *I-to-I* reported that German scientists had succeeded in weighing the human soul:

The human soul weighs 1/3,000th of an ounce, according to researchers at the Technical University of Berlin. They weighed over 200 terminally ill patients just before and immediately after they died. In each case, the weight loss was the same—1,300th of an ounce.

In a letter in German science journal *Horizon*, Dr. Becker Mertens said his team had taken into account other possible explanations of weight loss (such as air leaving the lungs), but that "the inescapable conclusion is that we have now confirmed the existence of the human soul."

The challenge now was to "figure out exactly what the soul is composed of." Mertens believes the soul is a form of energy, but admits that attempts to identify this energy have been "unsuccessful to date." (Dallas, 1993, p. 11)

Valuable clues for obtaining further physical evidence might be acquired through the writings on this subject from those who have had direct experience with the subtle "dark matter" bodies. Perhaps true mystics will in time be viewed as our first "dark matter" scientists, because they obtained objectivity with "dark matter" just as scientists have with visible matter. Currently, however, scientists know very little about the physical behavior of "dark matter," and because its sense of time and space may be different, it will not be easy to establish this physical evidence; yet as we move into the 21st century, it has the promise of an extraordinarily exciting adventure.

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BOOK REVIEW

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Dying to Live: Science and Near-Death Experience, by Susan Blackmore. London, England: Grafton, 1993, 291 pp., £6.99 (Distributed in the United States by Prometheus Books, \$23.95).

Susan Blackmore is an English parapsychologist of skeptical leanings who, thanks to this book and her frequent media appearances, is quickly becoming the critic near-death experience (NDE) lovers love to hate. And, as she herself has confessed (Blackmore, 1992), she fully expects many people to hate this book because it seeks to give a purely materialistic and reductive explanation for the NDE, and one that deprives it utterly of any implication of life after death. As a result of her provocative and uncompromising views and her interest to make them more widely known, Blackmore has cheerfully thrown herself into the unrewarding role of spoilsport at the NDEs' garden party, the Queen Skeptic on television talk shows and documentaries, and, not surprisingly, has lately made something of a career as the combative heroine for such professionally debunking organizations as the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP), on whose Executive Council she now sits. With opinions and affiliations like these, it would be understandable that persons sympathetic to the NDE and its spiritual import would be motivated either to avoid Blackmore's book in droves or, if they were to read it, to trash it unmercifully.

Neither response, however, at least in my judgment, is warranted. This is a book that, like death itself, demands attention, and that offers not only a bracing challenge to persons interested in the NDE,

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but unexpected rewards for those who make the effort to follow Blackmore along the road that leads ineluctably at the end to her severe and stoic conclusions.

Before I review the intellectual journey that Blackmore conducts for her readers, I need to say a little more about her aims in writing this book. Blackmore aligns herself from the start with the time-honored tradition of skeptical inquiry, which seeks to rob reports of religious, mystical, or even paranormal experience of any aura of transcendental revelation. Any suggestion that such experiences derive from "other worlds," or any reality other than that which is humanly constructed, is an anathema and must be completely rejected. In this respect, Blackmore is following the historical example set by none other than Sigmund Freud himself in the early days of psychoanalysis. In a famous incident described in his autobiographical memoir, *Memories, Dreams, Reflections* (Jung, 1961), Carl Jung recalled that he was urged by his mentor never to abandon the sexual theory of psychoanalysis lest their work be overcome with "the black tide of mud of occultism" (Jung, 1961, p. 150). Blackmore is engaged in a similar struggle today against a formidable and large array of NDE enthusiasts, and her book is an attempt to strip them of every argument used to support the claim of the NDE's transcendental meaning.

The principal object of her contentiousness, of course, is the widespread assumption that the NDE suggests, or even proves, a life after death. From Blackmore's perspective, this claim is absolutely insupportable and her book means to demonstrate why this implication is not only a false but a completely meaningless promise. Naturally, with this aim so obvious from the start, it is no wonder that many readers, hoping for and wanting to believe the opposite, would defect from Blackmore's proposed journey at this point.

To lay the foundation for her thesis, however, Blackmore must first establish something else: the total inadmissibility of any kind of dualistic thinking about the NDE. Of course, dualism itself is no longer in fashion in most contemporary scientific discourse, and Blackmore, as her book's subtitle intimates, yokes herself to today's prevailing trends in science in order to buttress her position. One must not think, despite the popular tendency to do so (she even uses the phrase, "the dualist temptation," early in her book, as though it is something to be feared), that there is any "soul" or independent center of consciousness that can detach itself from the body at death or at any time. Such ideas are merely the products of an untenable

dualistic mode of thought that must be rooted out at all costs. Nothing is to be gained by perpetuating such illusions in a modern age. And with nothing left to separate from the body at death, there can naturally be no possibility of survival and therefore no life after death. As Blackmore puts it in her stark conclusion, "We are biological organisms, evolved in fascinating ways for no end at all. We are simply here and this is how it is. . . . There is no one to die" (p. 263-264).

Although these assumptions are not stated openly at the beginning of her book, it is soon obvious that they underlie Blackmore's entire inquiry into the nature and meaning of the NDE. And like her historical predecessors of similar persuasion, Blackmore conducts her examination of the NDE chiefly by trying to provide a neurological explanation of all of its major features and in this way attempt to slam the door soundly on all transcendental interpretations. Her reasoning is classic William of Ockham in relation to any would-be contemporary Aquinas of the NDE: if the facts of the NDE can be quite satisfactorily accounted for, at least in principle, by the theories and findings of empirical science, there is no need and no justification for any extrascientific, much less metaphysical, assumptions. In this respect, Blackmore also follows in the footsteps of those early critics of religious experience whom William James (1902/1958) once and forever branded "medical materialists" and against whose reductive dismissals of such experience he contended, not altogether successfully, with his customary elegance.

This, then, is Blackmore's initial stance: she is going to attempt to provide a thoroughgoing, purely materialistic explanation of the NDE by dissecting each of its major components with the hand of modern neuroscience. But this is only half her aim. Blackmore, I must advise you, for all her toughmindedness, is very far from a naive reductionist, and her efforts to analyze the NDE in this way are not meant to destroy it, but to reveal its hitherto largely unsuspected and momentous implications for the nature of consciousness and personal identity. She may begin her undertaking with the tools of the neuroscientist, but she will leave us with the insights of the Buddha, and that is what makes Blackmore's contribution to our understanding of the NDE so original and so deserving of our scrutiny and thought.

With this as prologue, then, to Blackmore's assumptions, methods, and aims in this book, let us now examine some of her specific propo-

sitions about just how the NDE is to be explained and what, in her view, it really tells us about ourselves.

To begin with, Blackmore, following the example of Karlis Osis and Erlendur Haraldsson in their well-known book on deathbed visions (Osis and Haraldsson, 1977), offers us a contrast between two competing general hypotheses about the NDE. One she calls simply "the afterlife hypothesis," while the other is labelled "the dying brain hypothesis." The first, and clearly the most popular, she says (at least among the lay public), is supported by four considerations: (1) the consistency of the NDE across persons and places and through history; (2) the reality of the experience; (3) the paranormal features of the NDE; and (4) the power of the NDE to transform the experiencer's life. But already here the attentive reader will feel that Blackmore is subtly loading the dice against those who are open to the transcendental possibilities of the NDE.

None of the four considerations she mentions, *as she herself immediately points out* (p. 5), necessarily entails the presumption of an afterlife as such. It is of course perfectly possible to acknowledge the existence of all four of these factors without committing oneself to an afterlife position. Therefore, it would have been fairer and more accurate for Blackmore to label this view of the NDE something like "the transcendental hypothesis," or perhaps "the literalist hypothesis," and to state clearly that this understanding merely leaves open but does not compel an afterlife interpretation. But Blackmore's purpose here, one feels, is not merely expository but rhetorical. Like Ronald Siegel, the psychopharmacologist who years ago began to play the same kind of role in NDE circles that Blackmore occupies today (e.g., Siegel, 1980), she wants to paint a black-and-white contrast at the outset between "believers" in the NDE and skeptics, and insinuate that the former also believe that NDEs clearly imply an afterlife. Although this correlation is surely made by many, with various degrees of conviction, it is not made by all of those who are prepared to acknowledge that the NDE is an authentic experience. After all, as Blackmore surely knows, many of her colleagues in the field of parapsychology itself do not necessarily subscribe to a belief in life after death.

The other hypothesis, that of "the dying brain," we already understand, is the one that will elicit Blackmore's sympathy and the one she will try to defend. It, too, is supported by the consistency argument, but here the consistency of the NDE is said to derive from the fact that everyone has a structurally similar brain that mediates

the experience of dying in much the same way. Blackmore also gives a second reason for this hypothesis, namely that all the features of the NDE can occur in the absence of a near-death crisis. By and large, I agree with this proposition, but I cannot see why it has a special pertinence to the dying brain hypothesis. Indeed, many researchers like myself who reject a purely materialist view of the NDE would have no difficulty in acknowledging that coming close to death is only one way near-death-like experiences occur.

In any case, once Blackmore has stated, however cogently, these adversarial positions, she is about ready to roll up her sleeves and get to work. First, however, some preliminary reviewing of the near-death literature is necessary in order to establish that there is at least a reliable phenomenon to be explained and to consider the various factors that affect the occurrence of the NDE. I won't comment on this section of Blackmore's book—which takes up the first two chapters—since this will be familiar territory to virtually all readers of this journal, except to mention two related important points that affect her subsequent presentation. One is that she rejects the notion that the NDE is a unified phenomenon and that it occurs in much the same way regardless of the circumstances that bring it about, the "invariance hypothesis." The second is that she believes that certain features of the NDE, such as noise, the tunnel, the light, and "other beings" are more likely to occur when the brain has been directly affected by some kind of insult or by drugs; whereas feelings of peace, mystical revelations, the life review, and positive aftereffects can manifest in the absence of any toxic condition to the body. One could certainly quibble with the tenability of this classification. For example, it seems odd that she would place the phenomenon of the light in one category while assigning mystical features to the other. As is well known, the literature on mystical experience is replete with light phenomena, and many writers on the subject have stated that an encounter with an ineffable, radiant light is at the very core of such experiences. Consequently, the classification that Blackmore makes here seems arbitrary and suggests at least the possibility that it may have been formulated mainly for the convenience of the theorizing that is to come later in her book, rather than for any sound empirical or logical basis.

However that may be, she is now ready to explore the neurological underpinnings of NDEs and functionally equivalent experiences, and most of the remainder of her book is given over to a detailed examination of these phenomena from that perspective. Here, I can only

hope to give something of an overall summary of her argument, but before doing so I need to say that there is a great deal in Blackmore's book here that is forcibly and ably presented, and her chapters are rich with interesting experimental data and ideas for research that will advance our understanding of NDEs.

Blackmore begins by attempting to show that features of NDEs, such as the noise, the tunnel, and the light, may stem from a variety of disturbed brain-related states. For example, the noise sometimes described by NDErs may have its origin in stimulation of the cochlear region of the ear, which is highly sensitive to cerebral anoxia. Alternatively, a portion of the temporal lobe, which seems to mediate sounds as pitch, could be implicated in reports of unusual "transcendental" music. Both the tunnel and the light may be understood, Blackmore says, as reflecting an irradiation of the visual cortex, which could occur in a particular fashion because neuronal disinhibition mechanisms can be activated by anoxia (though Blackmore is clear that anoxia is only one possible trigger for NDEs, and then maybe only an indirect cause). Blackmore's presentation here is strong on detail, though it is not overly technical, and she offers theoretically-minded readers a great deal of information and speculation to ponder concerning the possible neurological basis of these effects.

Blackmore offers similar explanations for other features of the NDE. The feelings of peace and well-being, which so often permeate these accounts, are traced, not unexpectedly, to the role of a massive release of endorphins on coming close to death, and frightening NDEs to morphine antagonists such as naloxone. The sense of being out of body is the brain's retrospective reconstruction of a plausible reality based on lack of sensory input and a temporary breakdown of the body image. Since there is nothing at all that can leave the body (for that would imply dualism), the notion that the soul has escaped the body's confines is pure, if understandable, illusion. What about the claims people sometimes make that they can see unlikely objects in improbable locations during these alleged out-of-body episodes? Blackmore devotes a chapter to exploding these claims, and finds the evidence completely unconvincing or, at best, inconclusive.

Two chapters are devoted to the life review; the second one has moments of brilliance and overall was one of the best in the book. Blackmore explains the life review by showing that endorphins lower the threshold for seizures in the temporal lobe and limbic system and, together with the outpouring of certain neurotransmitters, cause memory-mediating structures, such as the hippocampus, to release

a flood of stored images. The hyperreality of the NDE is merely a mental model based on a dropping away of all sensory input and the resultant heightening of internal brain-mediated awareness. The timeless quality of NDEs owes its existence to the fact that eventually the everyday model of the self, which mediates a sense of time, itself breaks down.

And so on. It is neither possible nor necessary to indicate here how Blackmore seeks to explain within a consistent neurological framework every single facet of the whole skein of the NDE. It is sufficient, I think, merely to offer a sampling of her treatment to suggest the nature and value of her approach. The questions that call to us next are: what are we to make of her contribution? and what is a fair assessment of it?

It may surprise readers—or even Blackmore herself—that I myself very much resonate to the kind of neurological explanation for the NDE that Blackmore offers in her book. Indeed, in my own lectures on the subject, I use a schema very similar to hers in its main outlines, and postulate many of the same links that she does. I have also sketched a version of this theory in my most recent book *The Omega Project* (Ring, 1992), where the interested reader will again note many points of commonality with Blackmore's model. (Blackmore herself, though she references my book, never seems to mention these conjunctions, probably because she insists in casting me—in a friendly enough way, to be sure, and never with meanness—in the role of one of her antagonists.) In this respect, we both ally ourselves with an emerging cluster of similar neuroscientific models of the NDE (e.g., Jourdan, 1994; Morse and Perry, 1990; Persinger, 1994; Saavedra-Aguilar and Gómez-Jeria, 1989).

Where I part company from Blackmore, however, and where other investigators generally sympathetic to a neurological treatment of the NDE would too, is in what kind of explanatory status to accord to these models. For me, there is a fundamental ontological ambiguity about the neurological approach to the NDE that must be acknowledged. Simply put, it is this: does the brain state associated with the onset of an NDE *explain* the experience or does it merely *afford access* to it? In other words, to explicate the latter possibility, does the brain state Blackmore posits for the NDE give rise to an awareness of a self-existent transcendental order that would be occluded from us when we are in our normal waking state of consciousness? Blackmore of course would answer with an emphatic “no,” and would and must deny that there is any such transcendental domain at all.

But many, like myself, would disagree with her—as would most NDErs—and would, at the very least, be forced to leave the matter an open, and ultimately unresolvable, question.

For example, the writer Richard Heinberg, has commented:

The right temporal lobe appears to be the place in the brain where religious experiences are registered. Does that mean that ecstatic visions are ultimately a form of hallucination—or is the brain once again merely mapping a reality beyond itself? Perhaps the right temporal lobe is a gateway into a realm from which most of us are ordinarily cut off. (Heinberg, 1992, p. 3)

And another student of extraordinary states of consciousness and shamanism, the Welsh writer Paul Devereux, has seen even more clearly into the indeterminism of this issue:

The modern mind likes to feel sure whether or not it is dealing with a neurological construct or a neurological window into another reality. It will, alas, have to live with the ambiguity, because there is as yet no way of truly deciding between the two possibilities. . . . Whether the vision . . . is a neurological imprint or an actual glimpse into another level of reality hardly matters: the *experience* is what counts; it is that which has the power. (Devereux, 1992, pp. 110 and 113)

Even those who, like Blackmore, have articulated their own neurological models of the NDE, are aware of the explanatory limits of such formulations. For instance, after presenting his own neurological framework for understanding the NDE, the French physician Jean-Pierre Jourdan felt compelled to note:

The hypotheses I propose concern certain characteristics of brain function that could *allow* a non-ordinary experience and could possibly help us understand some of their long-term effects; but I do not claim that they explain the experience itself. Unusual perceptions, difficulty telling others about one's experience, and deep changes in one's concept of space and time during non-ordinary experiences suggest that they are perceived without the usual cortical tools of perception and cognition. In numerous cases, the acquisition of information supposedly unobtainable rules out any hypothesis that these experiences are hallucinations or purely neurological phenomena. (Jourdan, 1994, pp. 197-198; italics added)

Finally, I should mention that some neuroscientists who could be expected to be fully sympathetic to Blackmore's position nevertheless shy away from her uncompromising reductionism. Michael Persinger, for instance, whose research Blackmore cites, is one who has explicitly denied that specifying the neurological basis for NDEs necessar-

ily calls their validity into question (Persinger, 1994), and elsewhere has written:

I do not perceive a conflict with those researchers who believe NDEs are real rather than artifacts of the brain's construction. . . . If indeed structure dictates function, then the type of microstructural changes correlated with the NDE could forever alter the NDErs' detection of what comprises reality. For the transient changes that occur during an NDE might allow the brief detection of information that has been traditionally regarded as parapsychological. (Persinger, 1989, pp. 237-238)

Frankly, I find this kind of professional diffidence admirable, and I rather deplore the lack of it in Blackmore's book in this regard. She treats an open question as if it were a closed case, and makes the unwary reader assume that a neurological treatment of the NDE is, in principle, tantamount to a full explanation for the phenomenon. It is not. It is only a perspective, and like others, it has its uses. But it can make no claim to replacing those other perspectives, even if it should prove right in all its particulars. It can only illuminate some of the mysteries of the NDE—and for this we should be grateful—but it will not and cannot be the final answer to the mystery of the NDE itself.

Just as there is an air of dogmatism in the way Blackmore approaches neurological questions about NDEs, so there are also other features of her book where there seems to be a premature closing of the doors on matters having to do with the empirical correlates of the phenomenon. Take, for instance, her consideration of the paranormal concomitants of the NDE, to which she devotes a chapter. As we already have seen, Blackmore cannot easily accommodate paranormal events given her approach and philosophical commitments, though, to her credit, she has been fair enough to concede elsewhere that there is some evidence on behalf of psi that she and other critics cannot yet explain away (Blackmore, 1992, p. 169); and at the end of this book candidly states that "If the evidence changes in the future and truly convincing paranormal events are documented then certainly the theory I have proposed will have to be overthrown" (p. 262). Accordingly, in this chapter—with the amusing if somewhat snide title of "But I Saw the Color of Her Dress"—Blackmore does her utmost to call into question all of the evidence pertaining to possible veridical perceptions during NDEs. In this connection, she reviews reports of such claims ranging from Sabom's pioneering study (Sabom, 1982) to the now famous and often told incident originally

described by Kimberly Clark (1984) concerning the sighting of a tennis shoe on the ledge of a hospital by a migrant worker who could not possibly have seen it there.

Blackmore ends the chapter by apparently exposing as myth the stories that have circulated that blind persons have also reported being able to see during their NDEs. Instead of accepting these accounts at face value, as many people would be inclined to do, Blackmore suggests alternative interpretations based on such factors as prior knowledge, fantasy, blind luck (pun intended) and sensory-cuing, any or some combination of which would enable experiencers to construct or reconstruct a plausible scenario of their situation while close to death. Interestingly, the late D. Scott Rogo, in his book on NDEs (1989, pp. 179-192), considered many of these same factors in connection with his discussion of the sensory cuing hypothesis, and reached a conclusion opposite to that of Blackmore. In cases where these factors are improbable, it is always possible to question the authenticity or reliability of the original report, and Blackmore is correct that some cases when checked out, don't.

However thick the clouds of doubt about these stories and however cogent the reader may find Blackmore's alternative interpretations, further studies since the time of the composition of her book appear to undermine her position. For example, Madelaine Lawrence and I have recently presented several more cases of the "improbable shoe" variety (Ring and Lawrence, 1993) and have provided some evidence of external corroboration of these alleged perceptions in each instance. But more than that, together with Sharon Cooper I have recently launched a major study of NDEs in the blind, which was a special target of Blackmore's skeptical pen. Although we have so far interviewed only nineteen such persons for our study, the findings are already clear beyond dispute. Blind persons, even the congenitally blind, do indeed, almost without exception, claim to see during their NDEs. And what they report seeing are things of this world, such as their physical bodies or items of clothing, as well as visions of "the next world" (if I may use that phrase for convenience, and merely descriptively, not ontologically). We will be attempting, of course, to provide a measure of external corroboration for these apparently eyeless perceptions that the blind assert they have had while close to death.

Such data, especially those supported by independent witnesses, would obviously constitute a challenge for Blackmore's position, since they would appear to provide the basis for a strong claim for the

objectivity of NDEs. And what this would imply is of course what most contemporary scientists and philosophers, and certainly Blackmore herself, would be loath to consider: namely, that there is some conscious aspect of ourselves that can indeed separate itself from the body under conditions of extremity and not in any way be limited by the handicaps of the physical body. Doubtless such a finding, if upheld and replicated, would spur an immediate search for alternative explanations, as the ugly specter of a seemingly safely interred mind/body dualism might threaten once again to rise up and disturb the sleep of today's monist majority. In any event, it will be interesting and instructive to see how Blackmore will respond to the data on NDEs in the blind when our study is published.

Parenthetically, some of these cases may also raise questions about Blackmore's tunnel theory since a few of our interviewees have described going through a tunnel as a part of their experience. Blackmore acknowledges, however, that blind persons should be able to have such an experience as long as their blindness is of cortical origin (p. 90). Whether or not this is the case for our tunnel travelers is still to be determined, but our data will in any case be relevant to some of Blackmore's many testable propositions from her theory.

And more such studies of alleged out-of-body perceptions are already in the pipeline or are actually underway. For example, Janice Holden is planning a major investigation along these lines in a large Dallas hospital, while another such study is currently being conducted by my colleague, Madelaine Lawrence, at Hartford Hospital. Additionally, a team of researchers in the Netherlands, headed by Pim van Lommel (personal communication, May 15, 1993), has been working on an extensive research project concerned with NDEs and involving hundreds of respondents, and they, too, will be examining their cases for evidence of such perceptions. Of course, the findings from these studies are not yet available, but they, too, will prove relevant to Blackmore's position, one way or the other. At least it is reassuring to know that within a relatively short time we should have a fresh abundance of data to draw on whenever we wish to evaluate avowals of the kind "but I saw the color of her dress."

The chapter on paranormal aspects of NDEs also helps to bring into relief another more general shortcoming of Blackmore's book that might be attributed to her own self-confessed intellectual predilections: its selectivity. For example, anyone who sifts through the now voluminous NDE literature will find many studies and stories of apparent paranormal knowledge during or following an NDE

(Atwater, 1988; Farr, 1993; Grey, 1985; Greyson, 1983; Kohr, 1983; Morse and Perry, 1992; Ring, 1984a; Sutherland, 1992/1995, 1993), quite apart from the material bearing on claims of veridical perceptions we have just considered. Some of these are quite astonishing, such as reports of NDErs who allege that during their encounter with death they saw and correctly recognized (deceased) siblings they never knew they had, or examples of apparent precognitive knowledge of future events that later took place.

I am not maintaining, of course, that such statements can always be independently verified, but the fact that they are so widespread among NDErs, to say nothing of the more extensive body of research on paranormal correlates of NDEs itself, makes it seem very curious that Blackmore essentially ignores this entire domain of data. Instead, she contents herself with repeated assertions that merely deny paranormality or just chalks up apparent instances of it to temporal lobe instability.

And it is not just with respect to paranormal aspects of NDEs that Blackmore is revealingly selective. Another instance is that, whereas she gives a great deal of attention to the tunnel phenomenon (which she acknowledges is not even a feature that is especially connected with NDEs *per se*), she devotes surprisingly little, relatively speaking, to the light. Of course, as a scientist Blackmore is concerned to assay an explanation for the light reported by NDErs, but an explanation limited to why certain colors are perceived during the experience hardly does justice to the subjective sense of the phenomenon itself!

Certainly from the standpoint of the overwhelming majority of persons reporting this aspect of the NDE, their encounter with the light is the very essence and most important element of their experience, "the heart of the body" of the NDE, we might say. But for the most part, other than in a *pro forma* fashion, Blackmore's treatment of this crucial feature of the NDE gives little indication of the power of this light to confer upon the individual a sense of total knowledge, absolute acceptance, unconditional love and complete perfection, nor does it fully acknowledge the feeling that the encounter with the light may be for many NDErs an ontologically shattering experience of "ultimate reality" (a term that Blackmore would find meaningless, anyway, and which she is at pains in her seventh chapter absolutely to deny).

It is this kind of treatment of the NDE, in fact, that will probably anger or even repel many readers of her book, especially NDErs

themselves, for the perspective that Blackmore takes throughout her book is unremittingly that of the scientist who seeks to analyze and explain the phenomenon by examining its various components, and not one who enters empathetically into the subjective nature of the NDE. It is commendable that Blackmore, unlike other critics of NDEs whose knowledge is largely limited to what they have read on the subject, has taken the trouble to interview NDErs (though she never states exactly how many she has talked with) and collected other cases through the mail. But I doubt that most readers will feel that she has done much more with these testimonies than to pass them through her own skeptical filters in order to use them for her admittedly tendentious aims. As a result, she gives us a book where the scattered remains of the NDE are all laid out for us to see but where the NDEr himself or herself is largely absent.

Nevertheless, it is important that these criticisms not obscure the real and considerable virtues of Blackmore's book, which become increasingly evident as she makes her way toward her conclusions. Throughout her book, as the reader will become aware, she has been laying the basis for a merger of philosophical materialism, cognitive psychology, modern neuroscience, and Buddhist thought on the nature of the self, and by the time her book closes, she has succeeded in bringing these strands together in a most compelling manner. Instead of an independent soul or personality that survives death, for example, Blackmore argues that all there is are mental models for such a self, which are in turn a construction of the human brain, and which will dissolve like so many sugar cubes in water when the brain itself ceases to function at death. Thus, brain-generated models of self and reality are the sum of what we believe and may hold dear, but there is absolutely no reason to think they will persist after death. Moreover, what happens during the NDE is that these models of self and reality begin to unravel, and it suddenly becomes clear, in a moment of dawning undeniable realization, that there never was a permanent, separate self at all. To quote Blackmore directly,

There was only a mental model that said there was one. . . . My conclusion is that the NDE brings about a breakdown of the model of the self along with the breakdown of the brain's model processes. In this way it can cut right through the illusion that we are separate selves. It becomes obvious that "I" never did exist and so there is no one to die. (pp. 254 and 259)

This is a conclusion that, as Blackmore herself understands, few persons, especially those who are partial to the NDE, will welcome

and most will want to reject vehemently. But this may be mere prejudice based on many centuries of the Western tradition that has inculcated and caused us to hold fast to the idea of an independent soul that survives death. As Buddhism teaches, however, and as some current thought in neuroscience and cognitive psychology would contend, this ingrained, unthinking conception of self may be in error. Blackmore's book will make every openminded reader reflect uncomfortably on this matter, and, to me, this is perhaps its most significant contribution to our understanding of the NDE and its implications. Certainly it is what distinguishes it from all other skeptical treatments of the NDE I have so far encountered.

Does that mean that I buy Blackmore's Buddhist-tinged hermeneutics of the NDE? Not necessarily. Although I myself have long been sympathetic to Buddhism itself, I think that her reading of NDEs in this respect is forced. For instance, Blackmore claims that the sense of self begins to dissolve under the impact of the NDE. That may be true in some cases, but for the most part, I found that NDErs maintain that their feelings of personal identity tend to persist during their experience (Ring, 1984b). This is a finding that has been upheld by other researchers, too. In one recent study of NDErs by Regina Hoffman, for example, it was found that "individual experiencers repeatedly emphasized that the self-identity within the experience was a familiar and entire 'me' "(Hoffman, 1993, p. 214).

Another problem I see is that Blackmore wants to attribute all the transformative effects of NDEs to the breakdown of the self-system. But there is no independent evidence whatever that this is what mediates these widely acknowledged changes, and Blackmore herself offers none. The fact is, no one knows exactly what factors are responsible for which effects or even if there is a single underlying cause, such as kundalini, for the transformative pattern following NDEs. We are at least beginning to get some research directed to this issue, such as that of Emilio Tiberi (1993), which emphasizes the emotional component of NDEs, but we are still very far from anything approaching a definitive understanding of the dynamics involved. Here, then, Blackmore has merely advanced her own opinion on the matter, but it seems based largely on considerations having to do with her wish to present a logically consistent explanation for this aspect of NDEs.

And then of course even a moment's reflection on Buddhist thought would be sufficient to remind us that this is a tradition based on an elaborate afterdeath model, as indicated, for example, in the familiar

Tibetan Book of the Dead (Fremantle and Trungpa, 1975). In this connection, it is instructive to note how a Tibetan teacher of this tradition, such as Sogyal Rinpoche (1992), treats the NDE and its implications for life after death. Indeed, a greater contrast can scarcely be imagined between the Rinpoche's book and Blackmore's in this respect!

I point this out only to make it obvious that there is nothing inherent in the Buddhist canon that would lead inevitably to Blackmore's conclusions about the survival question, and much that would contravene it. It is of course the Buddhist teachings on the nature of the self and on impermanence that lend themselves best to the thesis Blackmore wishes to defend with respect to the NDE. Even so, it is debatable how convincing a case she has made in this regard. What we find in this book instead is just how convinced Blackmore herself is that she is right.

But her readers can make this judgment for themselves. To give Blackmore her due, she has written a courageous book, and one must respect her greatly for that. It takes guts to write a book one knows will cause many readers to rise up in fury and that strikes with such an iron fist against some of our most cherished notions about ourselves and our prospective immortality. But Blackmore didn't write this book to become popular. She wrote it to kindle debate on the NDE, to offer a new and radically different way of understanding this phenomenon, and to stimulate new lines of research so as to put her own and others' theories to the test. In all these respects, she has, in my opinion, succeeded admirably. That is why, for all its shortcomings, I regard *Dying to Live* as one of the truly seminal contributions to near-death studies, and recommend that every person with a serious interest in the NDE make sure to read it and grapple with the challenges that the author has posed so provocatively for us.

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Letter to the Editor

Out-of-Body Vision in Darkness

To the Editor:

According to psychologist Celia Green (1968), out-of-body vision in darkness may take one of two forms. While some of her survey subjects simply said that they were able to see clearly, others reported that their surroundings were illuminated as though with a night light and they were thus able to see. No source of light was seen in either form. Green noted that the latter type was more common among her subjects than the first. Many investigators regard the sense of illumination as a psychological construct—in other words, a hallucination.

I would like to draw attention to an instance of the experience of a sourceless light that seems to cast doubt on the above view. It was cited in a study of the experiences of two survivors of a mining accident (Comer, Madow, and Dixon, 1967). The miners, hereafter called Mr. A and Mr. B as in the original paper, were trapped in a chamber more than 300 feet underground when their mine caved in. They were unhurt and conscious. They were in the chamber for five days without any conscious contact with the outside world. During this period they experienced a variety of visual phenomena, but these ceased on the sixth day when surface rescue workers made contact with them. The miners do not seem to have had an out-of-body experience (OBE).

Mr. A's visual experiences included the following. Right from the beginning of his entombment he could see his hands and his companion's face, and he also could tell the time by his watch. Three days after the accident it appeared to him that the cavern was illuminated by a bluish light that had no visible source. It seemed to him that the strength of the light fluctuated according to his need to see; it was brightest when he wanted to work with things such as timbers for shoring up places in the chamber.

Mr. B spoke of seeing "lights" instead of the pervasive illumination reported by Mr. A. However, he could see well enough to work along with Mr. A, and like his companion he also felt variation in the

strength of the lights. According to him, the lights came on as they wanted to work and faded when they stopped working in order to rest.

The miners' statement that they worked with timbers is significant. It suggests that they could actually see them as well as the places in the walls and/or the roof of the chamber that needed strengthening. Also, it could mean that Mr. A might not have been imagining that he could see his hands, his watch, and his companion's face. In short, the miners' feeling of illumination in the dark chamber cannot be dismissed as hallucination, or some other kind of mental fabrication.

What can be the explanation? I would suggest considering that the feeling of illumination resulted from a reduction of the visual threshold. The absolute threshold of vision is not constant, but continually fluctuates under the influence of various factors. Among these factors are adaptation of the eyes to darkness and the need or motivation to see. Both factors would have played a role in the case of the miners, as they were in the underground chamber for several days and they needed to see the timbers in order to work with them. It is possible that the second factor was largely responsible for the miners' impression of an increase in the strength of the illumination as they wanted to work and its decrease as they rested. There could be a third factor as well, conducing to lower the threshold. It has been found that sensory deprivation may decrease the threshold for the specifically affected system (Zuckerman, 1969). Since the visual system was, of course, one of the affected systems, this could also have contributed to a fall in the visual threshold.

It seems to me that a decrease in the perceptual threshold could also be the explanation for the out-of-body experiencer's sensation of a sourceless light. I have pointed out that sensory deprivation, in the sense of reduced input of patterned information to the brain, is a common denominator in all contexts in which the OBE is known to occur, and out-of-body vision may well be one of the ways in which the brain attempts to compensate for the reduced input (Krishnan, 1985). It is then reasonable to expect that there may be a reduction in the sensitivity threshold of whatever receptors come into play in out-of-body sight.

Apart from the sourceless illumination, the miners also perceived visions similar to those reported by near-death experiencers. Some of these visions made them feel certain that they would be rescued. These included Pope John (who was seen several times), a big garden with beautiful men and women that Mr. B felt he was not yet ready

to enter, a person holding a tablet with a record on it, a man on either side of Mr. B, and a cross. I have suggested, adducing reasons, that such images seen by near-death experiencers could be indicators of recovery and they could have been generated by the experiencers' subconscious knowledge of their state of health (Krishnan, 1985).

In the case of these miners a similar explanation would seem to apply; that is, the images could have been engendered by subliminal perception of ground tremors and/or sounds caused by surface rescue operations. There are good reasons for my making this suggestion. One is the view that, like certain animals, human beings may also be able to sense even extremely weak geophysical phenomena such as crustal vibrations that precede earthquakes by several days or months (Bigu, 1979). Another reason is Mr. A's statement that he heard it raining overground and he feared that the underground chamber might be flooded. If he could have heard rain falling, it is not unlikely that he was also subliminally sensitive to sounds of rescue work.

I should point out that there is no independent corroboration for some of the statements of the miners, and I have assumed that they are likely to be correct. For example, the investigators did not seem to have physically verified whether the miners actually worked with timbers and confirmed that they did not hallucinate such activity. As is known, hallucination of movement and other activity can occur (Green and McCreery, 1975). Similarly, Mr. A's statement that he heard rain overground has also not been checked to find out whether or not he was having an auditory hallucination. In future research into effects of isolation and/or sensory deprivation an effort must be made to verify the claims of the subjects.

There is yet another aspect of the miners' NDE-like visions that may be worth looking into. The miners claimed that some of the visions they saw at the same time were similar. These shared visions included Pope John in papal dress; a doorway leading to a flight of stairs, up and down which people were walking; a cross; and two men in mining clothes and hat, working side by side with a light. Shared or collective visions (or hallucinations) are not uncommon in situations of sensory deprivation or isolation, as accounts of experiences of shipwrecks, for example, have shown (Anderson, 1942). One of the explanations is the power of oral suggestion. That is, if one of the percipients happens to speak about his or her vision, some of the listeners may also see it.

This view may perhaps be adequate for those shared visions about which the two miners spoke to each other as they were witnessing them, but not for those they did not talk about. For example, Mr. B did not speak to his companion about the vision of two men working with a light, when he first saw it. In fact, he came to know that Mr. A was also seeing it only when the latter suggested to him that he might ask the workers (visionary figures) for a light. How did they come to see the same vision at the same time? If there had been no communication between them at a conscious level, by word or gesture, then a possibility we might consider is whether they were in contact subliminally.

Some investigators have suggested that it might be useful to look in the field of bioradiations for a solution (Bigu, 1979; Smith and Best, 1989). The rationale behind their suggestion is this: just as sunlight contains a great deal of information about the processes and elements that produce it, so also the electromagnetic radiations from the human body are likely to hold information about their origin. The problem at present is that, bioradiations being a comparatively new field of inquiry, methods of decoding any information they may contain have not been fully developed. However, there have been some successes. For example, Harold Saxton Burr (1972) found that every living being is surrounded by what he called an electrodynamic field, or life-field, which is measurable and which reflects various processes like, in the case of human beings, ovulation and internal disease states.

Another more recent finding that has relevance to the issue of subliminal interaction between the two miners is that every subjective (mental) event (emotions, thoughts, imagery, and the like) appears to be accompanied by a characteristic brainwave pattern that is similar in virtually all normal people (Hutchison, 1991). Said another way, mental activity is encoded in brainwaves. Whether it is encoded in any other form of bioradiation is at present not clearly known. Anyhow, studies in biocommunication suggest that subliminal contact taking place as in the case of the two miners could be the result of the information-carrying radiation field of one person modulating the field of another.

What I particularly want to emphasize is that we are more likely to find a satisfactory explanation for phenomena like the shared visions of the miners by assuming that a physical process might be underlying them than by invoking nonphysical entities or mechanisms that are not amenable to any empirical method of study. It

seems that nonphysicalist explanations are attempted because it is believed that the kind of phenomenon cited here is unconstrained by space and time. But that belief is questionable. Only experiments involving astronomical distances can decide the issue, and they have not been done so far.

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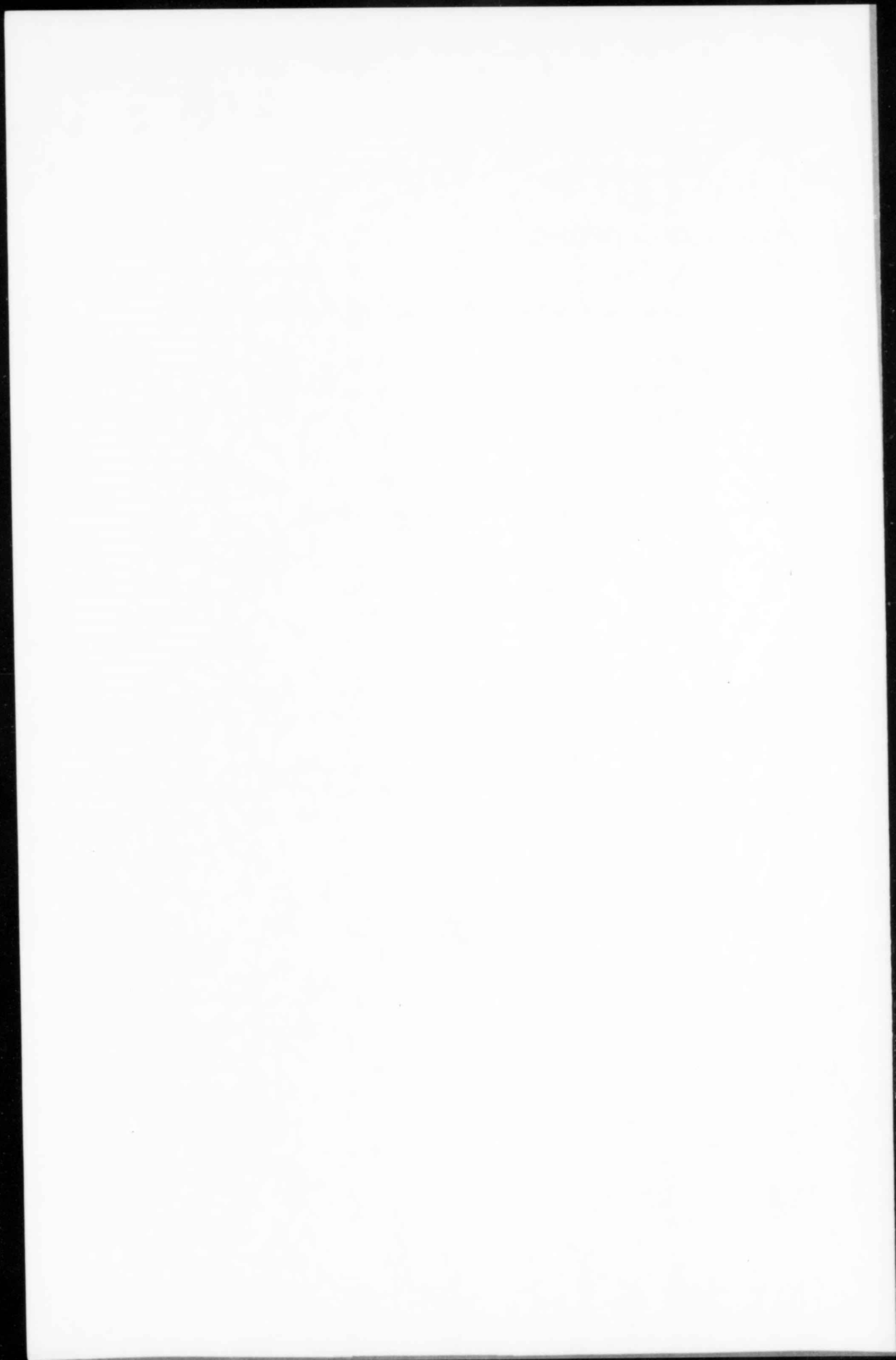
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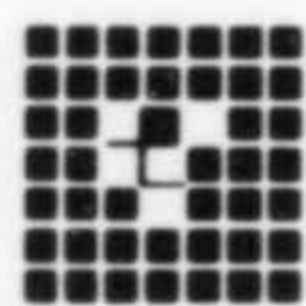
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