

Near-Death Experiences and Systems Theories: A Biosociological Approach to Mystical States

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Near-death experiences, transcendental experiences that frequently occur on the threshold of death, precipitate profound personality transformations that have defied explanation in terms of current psychodynamic and neurophysiologic models. A biosociological approach based on information and systems theories can elucidate anomalous features of both near-death phenomenology and the bipolar aftereffects of these mystical experiences. This biosociological model makes testable predictions about near-death experiencers and suggests fruitful future directions for the scientific study of mystical experience.

Near-death experiences (NDEs), mystical states of consciousness experienced on the threshold of death, have been reported by people who have come close to death, or who have anticipated imminent death, but then unexpectedly recovered or escaped injury. A Gallup poll estimated that five percent of the American adult population, which now amounts to more than 13 million persons, have had such an experience (Gallup, 1982).

NDEs often lead to profound and lasting personality transformations. They have been shown to foster a devaluation of conventional measures of material and social success and an increased emphasis on altruistic and spiritual concerns (Bauer, 1985; Flynn, 1982; Greyson, 1983a; Noyes, 1980; Ring, 1984). Furthermore, although people who attempt suicide have a subsequent suicide rate much higher than the general population (Pedersen, Awad, and Kindler, 1973), it appears that persons whose suicide attempts precipitate NDEs paradoxically have a greatly reduced suicidal risk (Greyson, 1981, 1986). It is not rare for near-death experiencers (NDErs) to seek professional help as their altered values, beliefs, attitudes, and interests strain interpersonal relation-

ships and precipitate intrapsychic conflicts and as they struggle to reconcile pre- and post-NDE mindsets and lifestyles (Clark, 1984; Greyson and Harris, 1987; Lee, 1978; Moody, 1977; Oakes, 1981; Serdahely, Drenk, and Serdahely, 1988; Walker, 1989).

The NDE may offer insight into the psychology of dying and the nature of death, and it may also have clinical implications for both physical and psychological recovery from close brushes with death. Furthermore, it provides a model of therapeutic change achieved during a brief experience (Bates and Stanley, 1985; Roberts and Owen, 1988). The investigation of near-death experiences thus may contribute not only to our understanding of the dying process but to our care of terminally ill patients, our ability to help grieving families, and our approach to suicidal patients.

Despite their clinical import, however, we have developed no clinically useful theory of NDEs. Existing psychological theories (Greyson, 1983d; Grosso, 1983; Noyes and Kletti, 1976b; Sagan, 1979) and neurophysiological theories (Carr, 1982; Jansen, 1990; Morse, Venecia, and Milstein, 1989; Saavedra-Aguilar and Gómez-Jeria, 1989) have not led to clinically useful predictions or treatments, nor do they encompass such phenomena as "hellish" NDEs, both positive and negative outcomes of the experience, and apparent paranormal effects during the NDE.

Walsh (1980) suggested that applying Western scientific models to mystical states results in a paradigm clash in which unrecognized paradigmatic assumptions necessarily lead to erroneous conclusions. Mystical traditions assume that there are multiple states of consciousness, some of which are "higher" than our everyday consciousness; and that these altered states cannot adequately be described verbally but must be experienced, as through meditative disciplines or spontaneous mystical experiences like the NDE. Western behavioral science, by contrast, assumes that our everyday state of consciousness is optimal, and that all other states are pathological; and that nothing can be experienced that cannot be also described verbally.

Walsh argued that these contrasting basic assumptions render scientific theories unhelpful in the understanding of mystical states. Systems theories, however, avoid that kind of paradigm clash because they are basically paradigmless. They make no assumptions about content, but focus instead on structure and process. For that reason, some form of systems theory may be the most useful model for understanding human behavior. Such models foster study of altered states of consciousness, since their focus on movement of information within systems avoids the trap of a mind/body dichotomy. Spradlin and Porterfield (1979) described such an approach, which they called biosociological, drawing on general systems theory, information theory, communication theory, and learning theory.

In this paper, I apply the biosociological approach to NDEs, and by extension to mystical states generally. My intent is not to dismiss neurophysiological or psychological conceptions of the NDE, but to account for some features of the NDE that are inexplicable in terms of current models. The goal of this approach is not to establish an etiology for the NDE, but to enhance our ability to describe the phenomenon, predict its outcomes, and plan appropriate therapeutic interventions.

Relevant Basic Assumptions of Systems Theories

Systems theories maintain that the relationship between parts is as important in determining the properties of an object as are the parts themselves. For example, the crystalline structure of a grain of salt is not a property of either the sodium or the chloride ions that comprise it, but of their relationship to each other. Similarly, life is a property of the relationship between certain atoms and molecules. Systems theories, by focusing on relationships rather than component parts, render meaningless the debate over whether certain behaviors are due to neurochemical or psychological factors.

A system is defined as any group of things that relate to each other (Miller, 1965; Rapoport, 1976). The parts of a system, and their relationships, can be viewed as coded information, which flows continuously within the system and between the system and its environment.

Information, in systems theories, is viewed as the power of organization within an object. It is the information stored within an object that gives it its unique properties (Miller, 1965); conversely, objects differ from one another by virtue of the information they contain. Information must be carried by matter/energy; and conversely, any amount of matter/energy, because it has some form and function, must contain information.

A systems approach, then, is concerned with matter/energy as regulated by the flow of information. One of the advantages of systems theory is that it can be applied to any information, whether it be coded in force fields, molecular configurations, or complex languages.

Analogic and Digital Data Processing

All organisms interact with their surroundings, or, in systems theory terms, process information from their environment. Information can be moved within a living system by a variety of codes: ionic, hormonal, electrical, or interorganismic. Biological evolution can be viewed as the development of increasingly complex coding systems, with the potential for processing larger amounts of information.

As primitive cells in colonies evolved into multicellular organisms, some cells specialized to process new data, and eventually evolved into neurons comprising a central nervous system. In that process, a core activating system evolved to regulate the activity of other subsystems in the central nervous system. This activating system controlled the state of arousal of the organism, thereby influencing its information processing and other behaviors. Those primitive activating systems evolved into brain centers concerned with emotion, which adjust the intensity and quality of our response to information.

The cell's data processing can be divided into two modes, one continuous and the other interrupted (Bogen, 1974). Input from a stimulus is transmitted along a neuron's dendrites in discrete bursts to the cell body, where those bursts are summated in continuous fashion. When the sum of bursts reaches a critical level, the coded information is relayed to other cells by discrete bursts along the cell's axon.

The most widespread current terms are *analogic* for the continuous mode of information coding and *digital* for the interrupted mode (von Foerster, 1951). In the analogic mode, data are continuously integrated into a maplike picture, based on gradients of energy. The digital mode interrupts that continuum and processes data into discrete units. This is similar to breaking a waveform into multiple points: while with more points, the curve can be coded with increasing accuracy, interrupting the continuous curve into discontinuous separate units always produces distortion.

Despite this inherent distortion, converting data from analogic to digital coding provides certain advantages. First, digitalizing data facilitates coding in memory. It is easier to cue memories stored as symbols than memories stored as sensory images.

A second advantage of the digital coding system is its efficiency in exchanging data among individuals. Digital data can be arranged in the linear patterns of language and linear logic. Coded information about one event in space and time can be associated with data from a subsequent event; and if the sequence recurs, the data can be coded to show a cause-and-effect relationship. Thus digital coding allows us to extrapolate from known data to anticipated data.

We are continually converting coded information from an analogic format to a digital and back, depending on what data manipulations we wish to perform at the moment, and on whether our momentary needs for information processing require greater accuracy or greater efficiency. The relationship between these two data processing modes can be described as the analog-to-digital ratio, which may change from moment to moment.

The Self as a System

Despite our elaborate language, we still use many other more primitive, largely analogic codes. The vast array of information we code analogically, including our physiological processes, emotional states, innate drives, and instincts, which cannot be digitalized and put into the linear patterns of language, we call "unconscious." The process of reprogramming analogic data into a digitalized sequence, allowing greater flexibility in coding new information, is called "insight" (Spradlin and Porterfield, 1979). Thus the psychodynamic goal of "making the unconscious conscious" involves recoding analogic data into a digital format.

The collection of digitally coded data about our bodies, thoughts, and feelings we call our "self." Our digital operation continually exchanges information with other code systems within the body, but it differentiates those other parts from itself. However, the analogic data encoded in ions, fluids, and cells of our bodies are as much "us" as the digital code involved in speech (Watts, 1966). Singling out the digital data pool and calling it alone the "self" is a distortion. However, we do that because, being digitally coded, it can be aware of itself; and doing so allows us to code relationships with other humans.

Because it allows us to condense information into symbols representing a great deal of compressed data, the digital system allows us to transmit information to people in other places and times, thus escaping the need to learn from personal experience. With language, we can use the digitalized self as a reference point for coding subsequent data. By using a digitally coded language to conceptualize ourselves, we can differentiate ourselves from our environment. By coupling two advantages of digital coding—linear logic and subject-object differentiation—we can code relationships between ourselves and our surroundings, and anticipate future relationships.

Since the digitalized self is in a sense an arbitrarily delineated system, it must be continually defended and reinforced with selected data from our surroundings. Once we code our selves as separate from others, we begin a continual search for information to validate that self-concept. We spend our lifetimes reifying this digital self, trying to establish our selves by the external validation of careers, possessions, and social status.

Near-Death Experiences

The clinical phenomenology of the near-death experience is not easily explained in terms of psychodynamic or neurophysiologic models. Anomalous elements of the NDE that have resisted scientific explanation include a sense of timelessness; ineffability; an experience of cosmic unity; paranormal

phenomena; response triad of hyperalertness, depersonalization, and mystical consciousness; atypical "hellish" experiences; and both positive and negative aftereffects, including profound value change and decrease in both death anxiety and suicidality. A biosociological approach can elucidate these anomalous phenomena by focusing on the way data are processed during the NDE.

As noted, emotional arousal influences the intensity and quality of our information processing. At any given time, our analog-to-digital ratio is dependent on our state of arousal. Both underarousal and overarousal shift that ratio toward the analogic side. When we become drowsy or when we become excited, we have difficulty putting data into a logical sequence of words.

As underarousal approaches unconsciousness, all digital operations are suspended, and we process data only in the analogic mode. Similarly, in an overaroused state, the analog-to-digital ratio may approach infinity. NDEs differ from other altered states in that, since they generally occur during either unconsciousness or the most intense hyperarousal, they involve a more extreme degree of shift to analogic operations.

Timelessness

One of the most commonly reported phenomena in NDEs is a feeling that time stopped or that the concept of time became meaningless (Greyson and Stevenson, 1980; Hartocollis, 1983; Noyes and Kletti, 1976a). It is our digital operation that is responsible for a sense of time, as it allows us to project predictions about future events. Digitalization is necessary for transcending the bounds of immediate experience.

The extreme shift to analogic functioning seen in NDEs eliminates the temporal abstractions of the passage of time and of past and future. Analogic operations are timeless, and can be experienced and coded only as in the present.

Furthermore, the digital-to-analog conversion in the NDE that eliminates temporal distinctions also blurs the self-object dichotomy, redefining the self so that it is no longer restricted to the perishable body; in other words, so that it is immortal. Immortality, then, as experienced during the NDE, is a consequence of shared data processing.

Ineffability

Since emotion and level of arousal are analogic functions, it is difficult to describe them in words, which are a digital function. Vague verbal abstractions like love, hate, fear, and anger, can be appreciated by the analogic system but are hard to define in digital codes. Because the NDE is characterized by an extreme shift toward the analogic mode of data processing, which is

not expressed verbally, NDEs are felt to be ineffable, or incapable of translation into words.

Near-death experiencers (NDErs) frequently state that they were made aware during the experience that they would not be able to remember, upon recovery, much of the insight they had acquired in the NDE (Ring, 1984; Smith, 1983). A psychoanalytic interpretation of this amnesia would imply that these insights are repressed as psychodynamically unacceptable. A systems theory explanation is simply that certain aspects of the analogic NDE are lost to consciousness because they cannot be coded digitally.

Cosmic Unity

A sense of cosmic unity or oneness with the universe is reported definitively by over half of all NDErs, and equivocally by 80% (Greyson, 1983c, 1990). In order to explain the occurrence of this oceanic state in NDEs, we need first to understand how the self becomes differentiated.

Digitalization allows us to view our data processing system as having delineated boundaries. We think of our selves as discrete from the rest of the universe because we have coded our selves that way. But coding our selves as discrete entities does not necessarily make us discrete entities.

The self as a discrete system must be maintained by new input that validates and reinforces its separateness. By coding our selves as bounded, we think of our selves not only as unique, but also as finite. We become aware that the self has a beginning and an end, and that certain circumstances could terminate its existence. We react to the transience and tenuousness of the delineated self by sharing information, by exchanging data that will reinforce our sense of self, and by creating larger-self systems of which we are a part, and which will survive the individual self.

A larger system of shared information with which the individual self can merge provides a sense of security against the threat of termination. That larger data pool can be a family system, a community, or a cultural system. Since information-systems theories define the self as an array of interacting coded information, the interaction of coded data exchanged in a group can be viewed as a larger-self. These "group selves"—shared data pools processed jointly by many individuals—are just as much entities as are individual selves.

The individual self can be regarded as a temporary crystallization that emerges periodically from the group solution. The self historically develops by differentiating or crystallizing from the group solution of the family. As the individual self develops, it continually tests whether some larger group self will still validate it.

In our digitalized effort to differentiate the self, we try to conceptualize it not as a dynamic system but as a localized entity like the brain. Guided by

neurophysiological models, both Sherrington (1940) and Eddington (1947) eventually abandoned efforts to localize the mind in a delineated neural constellation. However, systems theories view mind as a property not of neurons themselves but of the relationship between neurons, just as the crystalline property of salt is a property of the relationship between ions.

Heisenberg's uncertainty principle suggests that if the mind is a collection of information, then its boundaries cannot be localized (Bronowski, 1973). This uncertainty is reflected in Spradlin and Porterfield's definition of mind as

a continuum of related information, a relationship that encompasses all the data processed within the individual, including data stored during billions of years of inorganic evolution and eons of biologic evolution, that is, data stored in chromosomes as well as all the data processed from the experiences the individual has shared with others throughout the transient period we call a lifetime. (1979, pp. 20-21)

This approach regards the mind as a data pool containing the information necessary for the individual's functioning. The self as a dynamic open system, in which there is continual data flow among its subsystems, and between it and its environment, can be viewed as a data bank that continually changes with the input of new information.

Since information continually flows among open systems, the individual mind can be viewed as an arbitrary delineation in the universal information continuum (Spradlin and Porterfield, 1979). This notion, similar to Sinnott's identification of mind with biologic organization (Sinnott, 1961), regards the mind, usually confined within the boundaries of the physical body, as expandable beyond those boundaries when data flow between it and the environment.

When the self processes data interchangeably with other data processing systems, it cannot be differentiated from them, and thus conceptually merges with them. In the NDE, information processing shifts dramatically to the analogic mode, in which categorical delineations dissolve, and the crystallized individual self can no longer be differentiated from the surrounding solution. In that state, the near-death experiencer cannot differentiate him- or herself from anything else, and therefore conceptually merges with the entire universe.

Paranormal Phenomena

Various paranormal phenomena, including alleged extrasensory and out-of-body perceptions and precognitive visions, have been singled out as posing particular problems for current explanatory models of the near-death experience (Greyson, 1983b; Grosso, 1981; Kohr, 1982, 1983). These anomalous aspects of the NDE have been regarded as inexplicable in scientific

terms (Grosso, 1981; Ring, 1981), as evidence for the objective reality of the NDE (Osiris and Haraldsson, 1977; Sabom, 1981, 1982), and as critical to an understanding of the true nature of the NDE (Ring, 1982; Stevenson and Greyson, 1979).

If we regard the individual mind as a transient crystallization from the larger information pool or from the universal group solution, then the NDE may be viewed as a dissolving of the individual mind back into that group solution, in which all data from the universal pool can be processed without regard to its origin.

Our species has developed such a complex system for the exchange of information that it appears at times as if all human minds act together as one open interacting system of thought (Thomas, 1974). If we view the mind as an arbitrary delineation within a larger data pool, then we can consider the idea that the mind might function outside the spatial confines of the body.

Information-systems theories define the self as a property of related data that can expand if data fit its previously organized coding patterns. Seen in that perspective, what appears to be extrasensory communication between one self and another is simply a temporary redefining of the limits of the self so as to include data emanating from another self, or from the universal group solution. By allowing a transient free flow of data between the self and the environment, the NDE may include what appear to be extrasensory events and seemingly limitless information exchange.

Hyperalertness, Depersonalization, and Mystical Consciousness

Noyes and Slymen (1979) submitted phenomenological elements of the NDE to a factor analysis and derived three discrete factors: hyperalertness, depersonalization, and mystical consciousness. This triad is understandable as the three predictable responses of the self as a system faced with anomalous data.

As noted above, once the self is established as a differentiated system, we begin a continual search for new data to validate that self-concept. In attempting to satiate this information hunger, the self is modified by new data, which also influences how data are perceived and coded (Spradlin and Porterfield, 1979). The digitalized self tries to exclude from consciousness data that do not validate its differentiation, while it accepts data that are readily synchronized with information it already has. The self system is used as a reference point in processing information in a predictable sequence, while unpredictable relationships are dismissed, as when we say, "I was not myself."

Data that increase the individual's security are integrated into the self system, while data that do not fit—that question the self's differentiation—are

excluded or repressed. Input from the environment during the NDE is processed in an analogic mode in which self-differentiation is impossible; thus data acquired during the NDE are not synchronous with the digitally coded self system. Spradlin and Porterfield described three characteristic behaviors stimulated by such dissynchrony: anxiety, depression, and psychosis (1979). These three synchrony-seeking behaviors correspond closely to the three NDE factors identified by Noyes and Slymen.

Spradlin and Porterfield described the first synchrony-seeking behavior, anxiety, as "hyperalert searching activity." This is analogous to Noyes and Slymen's "hyperalertness" factor, characterized by unusually rapid and vivid thoughts, and heightened perception with increased visual and auditory acuity.

Spradlin and Porterfield's second characteristic synchrony-seeking behavior, depression, was described as "frustrated withdrawal." This is analogous to Noyes and Slymen's "depersonalization" factor, which includes a slowing of time; loss of emotions or a sense of being walled off from one's emotions; feelings of unreality and of distance from the environment; detachment from one's surroundings and from one's own body; and diminished vision, hearing, and bodily sensations.

The third synchrony-seeking behavior described by Spradlin and Porterfield, psychosis, was characterized as "chaotic and fragmented patterns of communication." Spradlin and Porterfield noted that an individual who developed a new reality system that programmed information more efficiently than the culturally validated self system would be diagnosed as psychotic if he or she were unable to synchronize this new method with that of the social system.

Analogously, Noyes and Slymen's "mystical consciousness" factor is characterized by a sense of revelation or great understanding; a sense of harmony or unity with the universe; strange colors, visions, or bodily sensations; and a sense of being controlled by some force external to the self system—in other words, an alternate reality system that would be regarded as psychotic if the individual experiencing the NDE could not synchronize it with that of the social system. Thus, if the NDE is viewed as an event in which the digitalized self is confronted with dissynchronous data, the three major factors of NDE phenomenology can be seen to be the three characteristic behaviors elicited by synchrony seeking.

Hellish NDEs

While the majority of NDEs are reported to be positive, pleasant experiences, a sizable minority contain elements that are decidedly unpleasant, distressing, nightmarish, and frankly hellish (Atwater, 1988; Clark, 1984; Flynn,

1986; Gallup, 1982; Grey, 1985; Lindley, Bryan, and Conley, 1981; Rawlings, 1978). While some distress, particularly in the early stages of the NDE, can readily be explained in terms of psychological set and fear of loss of control, the blatantly hellish NDEs are best explained in terms of the degree of differentiation of the self.

As noted above, coding our perceptions and thoughts in the digital paradigm of words produces some unavoidable distortion. Once we have established a cognitive set—a linear arrangement of our digital operations—we avoid dissonance by making our perceptions fit the expected patterns. That is, our labels influence the way we perceive. Our digital symbols make us think of ourselves as unique, and we digitalize ourselves as good, bad, intelligent, attractive, etc. Since these labels are meaningful only if they are consensually validated, our efforts to differentiate ourselves are paradoxically dependent on the group, a process Spradlin and Porterfield (1979) call alienated dependency.

Selves as systems differ in their degree of differentiation. Its degree of differentiation influences a self system's flexibility in processing data, its tolerance in accepting data that do not fit its expected patterns, and the intensity of its reaction to dyssynchronous information. In an overly differentiated individual, all new information is screened by the rigid self system, and few contradictory data are allowed to be processed.

The overly differentiated individual, relying heavily on the digital paradigm, screens out information that is presented as emotion because that information is essentially analogic. Any data that cannot be digitalized produce a feeling of unpredictability, lack of control, and anxiety, resulting in increased efforts to force those data into a digital code. Since analogic information from the NDE cannot be digitalized, the overly differentiated survivor of an NDE attempts to force that information into dichotomous digital categories, such as prototypical classification into heavenly or hellish experiences.

New data derived from the NDE may be so threatening to a rigid self system that they are rejected as unprogrammable. They are either screened out entirely, as may occur in the 60 to 70 percent of near-death survivors who recall no NDEs; or they are rationalized as hallucinations dystonic to the self. The individual may ultimately resort to a defensive overdifferentiation in which he or she cognitively forces the NDE memory into the contrasts of a digital code, using rigid black-and-white, good-versus-evil terms. This construction of hellish experiences out of unacceptable new data is an example of what Spradlin and Porterfield called "excuse clauses" (1979, p. 99)—data designed to maintain the integrity of a threatened self system without requiring a major adjustment in the system.

Birth Memories

A popular psychological theory attributes NDE imagery to birth memories (Sagan, 1979), even though the newborn's immature central nervous system cannot program much information about the birth process (Becker, 1982). The infant has not yet developed the digital skills necessary for coding memories and referencing them with a self system (Spradlin and Porterfield, 1979). Since the differentiation of the self is dependent upon the acquisition of digitally coded memory patterns and socially validated roles, the newborn could neither code data digitally nor reference them with a self system.

However, any analogically coded information received during the birth process might be retrieved in a state-dependent manner, if the individual should ever again be in a position to function in a purely analogic mode. Hence, while in normal digital functioning birth memories may be irretrievable, in the NDE they may be recalled and re-experienced—only to be relegated to the ineffable once more when digital operations are restored (Grof and Halifax, 1977; Tien, 1988).

Aftereffects

Regardless of their etiology, NDEs have captured the attention of psychiatrists because of their potency in transforming personalities, attitudes, beliefs, and values. Neither neurochemical nor psychological models satisfactorily account for the profound alterations in mindset and lifestyle, the paradoxical decrease in both death anxiety and suicidal ideation, and the occasional undesirable aftereffects of NDEs. A biosociological approach elucidates the unique vulnerability of the NDEr to transformation.

If our cognitive knowledge is viewed as a "crystal" of digitalized data surrounded by a "solution" of analogically coded information, including emotions and instincts, then there is a dynamic interaction between the solution and the crystal. The crystal tends to dissolve when our emotional state is elevated, and to "recrystallize" when our emotions subside, similar to the way chemical crystals dissolve and recrystallize with changes in temperature or acidity of the surrounding solution. Our cognitive set is vulnerable to realignment if our emotional state is elevated to high levels, since our digital data sets, once "dissolved" by emotion, might "recrystallize" in a slightly different arrangement (Sargent, 1961).

When we develop a sufficiently high pitch of emotion, we can realign our whole conceptual set; this in fact is one function of religious rituals and revivals. Likewise, the grieving following loss of a loved one often makes it easier to reorient relationships in our environment and data within our self system.

Integrating the NDE and its insights requires loosening the grip of the digital paradigm that has proven vital to humankind's survival. However, efficient as digital operations are, limiting their use does not preclude a productive and meaningful lifestyle. It is the ability to form stable and rewarding relationships with others that is important in productivity and meaningfulness, and that ability is based not on efficiency but on our flexibility for rearranging data.

Productivity therefore does not lie in unlimited digitalization, but rather in maintaining flexibility in data processing capabilities. The rigidity of an overly differentiated self can be as detrimental as the disorganization of an underdifferentiated self. In the NDE, the self becomes less differentiated as the analog-to-digital ratio increases; that dedifferentiation can be a therapeutic breakthrough for an overly differentiated individual (Furn, 1987; Miller, 1987).

Values Changes

NDErs often lose interest in material possessions, personal power, and personal fame (Bauer, 1985; Flynn, 1982, 1986; Greyson, 1983a; Noyes, 1980; Ring, 1984). These interests are all vehicles for validating the self through external consensus. Ownership can be viewed in systems theory as an interaction in which we define objects and relationships as property, such as "my" house, "my" friend, "my" idea. Defining these objects as property gives the impression that we control the relationship. However, the "owned" objects actually control us by delineating and defining the boundaries of our selves.

The threat of losing what we "own" thus endangers our selves, putting us at the mercy of the property at risk. We commonly seek to protect our selves from such losses by frantic acquisition of more property, be it money, prestige, or scientific data. But those new acquisitions only rigidify our self boundaries further, increasing the risk of potential loss. In an NDE, through the boundaryless analogic operation one transcends the rigid delineation of the self system. Once that happens, those definitions of self no longer carry the same importance, and the NDEr stops caring about the rigid maintenance of ego boundaries.

In fact, NDErs often lose interest not only in material goods, but in personal power and fame. They become more interested in broadening the self system's boundaries by information exchange than in narrowing those boundaries by further differentiating the self as a system. Causes, including religious and political affiliation, lose their importance, since they too serve to delineate or differentiate the self system. Thus the NDEr may paradoxically shun traditional religious rites and dogma while simultaneously experiencing an awakening of spiritual interests.

Decrease in Death Anxiety

The most pervasive aftereffect of the NDE is a reduction or complete elimination of death anxiety (Atwater, 1988; Flynn, 1986; Gallup, 1982; Ring, 1984; Sabom, 1982). While this phenomenon can be rationalized by several psychological models (Greyson, 1983d), it is an outcome predicted by information-systems theories.

Our investment in religious systems is inspired by our awareness of the transient nature of our digitalized selves, by our mistaking those digitalized self systems for us, and by our fear of the unknown. This fear, coupled with our self system's information hunger, results in a mixture of emotions including loneliness, awe, anxiety, and reverence. We are driven by that emotional state to try to understand the interface between our selves and what we code as not our selves. Our attempts to digitalize that task have led to myths, mechanisms for shaping the unknown into discrete entities such as deities and forces that allow us to imagine cause-and-effect relationships. These religious or cultural myths, like the myth of the digitalized self, are coding devices.

Digital operations permit not only self-differentiation, but also the realization that this differentiated self has a beginning and an end, and can therefore cease to exist. Only the digital operation can code the concept of its own death. The analogic coding system cannot differentiate itself from other information exchange systems; it has no beginning or end, and is therefore conceptually immortal. Since the NDE is an analogic experience, there can be in the NDE no death. The NDEr has experienced a timeless state in which there is no way even to code the concept of cessation, and no basis for death anxiety.

Thus the digital system is by its very nature finite, while the analogic is eternal. In the NDE, with its extreme shift to the analogic mode, we transcend the digitally coded self system and become an immortal being—that is, an analogically coded entity without beginning or end. Though the digital system terminates, the analogic merges with the universe of information flow. If our self as a system can expand to process data beyond the conventional limits of the digital self, then our self as a system can survive bodily death.

Decrease in Suicidality

Most psychological models predict that the NDE, by "romanticizing" death and reducing death anxiety, should increase suicidal thinking (Kastenbaum, 1979; Shneidman, 1971; Van Del, 1977). However, the NDE appears to diminish the risk of suicide (Buckman and Greyson, 1977; Greyson, 1981;

Ring, 1984; Ring and Franklin, 1981–1982; Rosen, 1975, 1976), and the reason most often given by NDErs is that personal failures and losses that had led to suicidal ideation no longer have the same import after the NDE (Greyson, 1983e). This apparent paradox is understandable in terms of a biosociological model.

People often consider killing themselves because they make themselves or others miserable. The statement "I am a burden to others" often implies the opposite problem, that is, "Others' expectations are a burden to me." Suicide is an attempt to avoid the guilt arising from not fulfilling the expectations of a rigidified self system. The self as a system incorporates unreachable expectations from the real or fantasied expectations of others, and embellishes them in an attempt to achieve security. The search for security may include acquisition of power and prestige, which paradoxically increases expectations and responsibility, producing more insecurity.

The guilt arises from a combination of self-love and self-hate, and that paradox may produce a fight-or-flight pattern in which the flight increases our isolation and further differentiates our selves, while the fight is directed at the punitive self system. Suicide is thus an angry response to oppressive expectations (Spradlin and Porterfield, 1979).

When a suicide attempter has an NDE, his or her self is dedifferentiated so that it no longer seeks property with which to delineate and define itself. Loss of status, power, or possessions is no longer relevant to the enlarged analogic self system; oppressive expectations to pursue them are decathected, and the individual no longer feels guilty or, consequently, suicidal.

Negative Aftereffects

Despite the NDE's potential for effecting positive changes in the individual, interpersonal and intrapsychic difficulties are not rare following an NDE, and may lead to significant anxiety and depression (Atwater, 1988; Greyson and Harris, 1987). Differences in the degree of differentiation of the self as a system can account for the variety of positive and negative aftereffects of the NDE.

The well differentiated person is aware of the relativity of the self system and of how the self system influences data processing. This flexibility allows the well differentiated person to handle a much broader range of information, to use the self system as a working construct rather than a finite entity, and to shift its boundaries continually to incorporate new data.

The underdifferentiated person—who may often be labelled hysterical—is influenced by emotion from the analogic system and has little facility in using the linear logic of the digital operation. Interactions with others are unpredictable, based more on affect than on reason. By contrast, the overly

differentiated person—who may often be labelled compulsive—uses the rigid digital paradigm to screen out analogic data that are difficult to code.

The outcome of an NDE depends in part on how differentiated the self system was prior to the experience. Overly differentiated, well differentiated, and underdifferentiated self systems differ in their flexibility in processing data that are dyssynchronous with the self. A major outcome of the NDE is to dedifferentiate the self as a system. As noted above, that can be therapeutic when the NDE moves the individual from an overly differentiated state to a well differentiated one, decathecting rigid props to the self system.

Negative outcomes may result in two ways. First, an already underdifferentiated individual may become even less differentiated as a result of an NDE, producing anxiety as he or she frantically attempts to reorganize a new self concept.

Second, negative outcomes may result if the new data derived from the NDE are so threatening to the rigid self system that the individual retreats to a defensive overdifferentiation, leading to a cognitive restructuring of the NDE memory in absolute digital terms. Such attempts to translate the analogic NDE into a digital code require considerable distortion. Categorization of the experience either as a meaningless hallucination, based on a medical model, or as an afterworld experience, modeled after cultural myths, requires forcing the NDE into previously established digital paradigms, and does not allow processing of any new information acquired from the experience.

Conclusion

The biosociological model is a working hypothesis drawing upon systems and information theories to explain certain phenomena; it is not an assumption of ultimate truth. This model should be judged, as should any data coding system, in terms of its efficiency in coding data and its flexibility in allowing new data to assimilate with or counteract data already programmed.

A model is no better or worse than its ability to describe and predict the relevant phenomena. Near-death phenomena have not yet been adequately described by any model (Gabbard and Twemlow, 1981; Sabom, 1982). The information-systems approach is the first comprehensive model that, for example, accommodates negative NDEs as well as the more common peaceful experiences; predicts the paradoxical decrease in church affiliation among NDErs who become more religious after the experience; and explains the paradoxical decrease in suicidal ideation despite the decrease in death anxiety.

Furthermore, testable hypotheses of yet unexplored aspects of the NDE can be derived from a systems approach, such as the expectation that "hellish" NDEs would occur predominantly in individuals who are overly differentiated, and the prediction that NDErs would utilize repression less than

would near-death survivors who do not recall NDEs—a prediction directly opposite that derived from psychological models that view the NDE as a defense against the threat of death.

Implications for Science

Through evolution, human beings have become specialized in the digital coding of data, a specialization that at least temporarily favors survival. Other animals, such as dinosaurs and saber-toothed tigers, have specialized with temporary increases in survival efficiency followed by extinction when conditions changed. Our specialty allows us to process more information than any other animal. That information allows self-differentiation, with associated fear of death and suffering and the development of a social self, again with differentiation.

A system of information coding, whether it be religion, art, or science, is neither right nor wrong, but only more or less efficient in coding data and more or less flexible in allowing new data to assimilate with or counteract data already programmed. Religion, art, and science are techniques for moving information from the analogic system to a digital coding system. But efficiency in programming routine data may inhibit the introduction of new information, leaving the programming paradigm obsolete if there are marked changes in the types of information available for processing.

Originally, religion was an expression of much creative behavior. But when religious systems sufficiently reduced information hunger and insecurity about relationships to the unknown, they became digitalized into ritual formulas and dogmas that inhibited further investigation. As science has come of age, it too has set up boundaries that exclude data processing systems like parapsychology and metaphysics, paradoxically developing a scientific dogma that may prove as inflexible in handling new information as religious dogma (Greyson, 1989).

The inflexibility of our dependence on digital coding and our associated emphasis on dualistic paradigms lead some to suggest that we return to a simpler analogic system (Spradlin and Porterfield, 1979). However, we cannot give up our digital operation any more than a saber-toothed tiger could absorb its fangs. Our hope lies not in giving up the acquisition of information, but in intensifying that process. We must acquire enough information to understand that our self-referencing system, and all the data we program, are relative.

New data derived from NDEs and other mystical states do not fit into the data processing paradigm of technological Western society. An inflexible science would respond by excluding these data. However, we can also choose to increase our flexibility in handling these new data, developing a greater ability

to synchronize analogic and digital data processing systems, or a greater facility in digitalizing these new, largely analogic data.

Like the individual self, social self systems can realign their data processing patterns in discord before the discord becomes symptomatic. Western cultural patterns are now undergoing such a realignment (Ferguson, 1980). We suffer from a type of information hunger that our technology has not been able to satisfy. This dissatisfaction was manifested in the altered states drug subculture of recent decades, and the turn toward Eastern mystical religions and born-again fundamentalist Christianity.

During the past century, the boundaries between Eastern patterns of data processing, which minimize the subject-object dichotomy, and the digital operations of Western cultures have become less distinct. That blurring of boundaries may be due to the emphasis of 20th-century physics on the relativity of data processing concepts such as time and space; but whatever its source, it reflects a decreasing rigidity of our reliance on digital operations.

That shift in data processing may make it easier for us to integrate the new knowledge acquired from NDEs into our individual self systems and into our social self system, and it may have implications for the concept of an imminent "global NDE" (Grosso, 1985; Ring, 1984). That is, when enough of us have integrated NDEs and similar mystical experiences, our social self may become flexible enough to incorporate these new data into its self concept and our species may undergo a profound transformation of its own.

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