

Journal
of
Near-Death Studies

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Volume 21, Number 3, Spring 2003



Journal of Near-Death Studies

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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.

The **INTERNATIONAL ASSOCIATION FOR NEAR-DEATH STUDIES** (IANDS) is a worldwide organization of scientists, scholars, healthcare providers, near-death experiencers, and the general public, dedicated to the exploration of near-death experiences (NDEs) and their implications. Incorporated as a nonprofit educational and research organization in 1981, IANDS' objectives are to encourage and support research into NDEs and related phenomena; to disseminate knowledge concerning NDEs and their implications; to further the utilization of near-death research by healthcare and counseling professionals; to form local chapters of near-death experiencers and interested others; to sponsor symposia and conferences on NDEs and related phenomena; and to maintain a library and archives of near-death-related material. Friends of IANDS chapters are affiliated support groups in many cities for NDErs and their families and for healthcare and counseling professionals to network locally. Information about membership in IANDS can be obtained by contacting IANDS, P.O. Box 502, East Windsor Hill, CT 06028-0502, USA; telephone (860) 644-5216; fax (860) 644-5759; e-mail office@iands.org; Internet website: www.iands.org.

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SUBSCRIPTION inquiries and subscription orders should be addressed to the publisher as follows: For all countries (including subscription agents in North and Latin America): Kluwer Academic Publishers, Journals Department—Distribution Centre, PO Box 322, 3300 AH Dordrecht, The Netherlands; tel: 31 78 657 6000; fax: 31 78 657 6474; e-mail: orderdept@wkap.nl. For "non-trade" customers only in North, South, and Central America: Kluwer Academic Publishers, Journals Department, 101 Philip Drive, Assinippi Park, Norwell, MA 02061, USA; tel: 1 781 871 6600; fax: 1 781 681 9045; e-mail: kluwer@wkap.com. Subscription rates:

Volume 21, 2002–2003 (4 issues): Print or electronic, EUR 397.00/USD 398.00. Print and electronic, EUR 476.40/USD 477.60. Individual subscribers certifying that the journal is for their personal use (print only): EUR 62.00/USD 62.00.

ADVERTISING inquiries should be addressed to the Advertising/Sales Manager, Kluwer Academic Publishers, 101 Philip Drive, Assinippi Park, Norwell, Massachusetts 02061, USA—telephone (781) 871-6600 and fax (781) 871-6528.

INDEXED IN Family & Society Studies Worldwide, Health Instrument File, International Bibliography of Periodical Literature, Parapsychology Abstracts International, Psychological Abstracts, PsycINFO Database, Sage Family Abstracts, Social Work Research and Abstracts, and Sociological Abstracts.

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JOURNAL OF NEAR-DEATH STUDIES (ISSN: 0891-4494) is published quarterly in the Fall, Winter, Spring, and Summer by Kluwer Academic/Human Sciences Press, P.O. Box 322, 3300 AH Dordrecht, The Netherlands. Annual subscription price U.S. \$398.00. Air freight and mailing by Publications Expediting, Inc., 200 Meacham Avenue, Elmont, N.Y. 11003. Periodicals postage paid at Jamaica, N.Y. 11431.

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U.S. POSTMASTER: Send address changes to *Journal of Near-Death Studies*, Kluwer Academic/Human Sciences Press, 233 Spring Street, New York, N.Y. 10013-1578.

Editor's Foreword

The *Journal of Near-Death Studies* has served as the official scholarly publication of the International Association for Near-Death Studies (IANDS) for the past 22 years. During that time, it has survived changes in title, frequency, and publishers, each change reflecting growth in the field and offering opportunities for reassessing our priorities. The next issue of the Journal—the Summer 2003 issue—will be the last one published by Kluwer Academic/Human Sciences Press for IANDS. Our 15-year association with Human Sciences Press has been a fruitful one, witnessing the expansion of our readership base and increasing acceptance by the broader academic community as an authoritative resource in the field of near-death studies. We anticipate continued growth and sophistication in our new publication arrangements, as well as greater fiscal efficiency.

Those readers who obtained the Journal as a benefit of membership in IANDS will see no interruption in their service. However, those readers who obtained the Journal through a subscription from Kluwer Academic/Human Sciences Press should contact IANDS directly in order to continue receiving future issues. IANDS can be reached by mail at P.O. Box 502, East Windsor Hill, CT 06058-0502; by e-mail at office@iands.org; through its Internet website at www.iands.org; or by telephone at (860) 644-5216.

Our lead article in this issue is an empirical study by nursing educators Linda Morris and Kathleen Knafl, exploring the meaning of near-death experiences (NDEs) not only for experiencers themselves but also for the critical care nurses who provided care for them. In semi-structured interviews, they found that NDEs transformed the lives of patients and changed the nurses who cared for them, both personally and professionally. Our second article is a theoretical paper by transpersonal psychotherapists Thomas Beck and Janet Colli, presenting a quantum biomechanical model for the life review that often occurs in NDEs. Beck and Colli utilize recent advances in physics and consciousness studies to develop a unifying paradigm of the quantum hologram as a non-local storage site for memory, which may be accessed more readily during NDEs.

We also include in this issue a book review by physician Jeffrey Long of biophysicist and Buddhist scholar Deno Kazanis's *The Reintegration*

of Science and Spirituality: Subtle Bodies, "Dark Matter," and the Science of Correspondence, a wide-ranging attempt to explain NDEs and other anomalous phenomena through the concept of dark matter. Finally, we conclude the issue with a letter to the editor by Swedenborgian scholar Leon Rhodes, describing a type of shared NDE in which more than one person comes close to death in the same accident and become aware of each other and describe similar events.

Bruce Greyson, M.D.

The Nature and Meaning of the Near-Death Experience for Patients and Critical Care Nurses

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ABSTRACT: This study was designed to develop a conceptual framework for the near-death experience (NDE), reflecting its nature and meaning for the patient and the critical care nurse. The study used naturalistic inquiry to examine the question: What is the nature and meaning of an NDE and how has it influenced the individual's view of the self, the future, and feelings and beliefs about life and death? The NDE Scale (Greyson, 1983) was used with patients and semi-structured interview guides were used with both nurses and patients to explore the NDE from a comprehensive perspective. An NDE was defined as the report of "unusual" recollections associated with a period of unconsciousness during either serious illness or injury, or resuscitation from a cardiac or respiratory arrest. The sample included 12 patients who experienced an NDE and 19 nurses who cared for patients who experienced NDEs. This study highlighted the emotional aspects of the NDE. Patients described how the NDE transformed their lives and nurses reported how their experiences with patients changed them personally and professionally.

KEY WORDS: near-death experience (NDE); qualitative research; aftereffects; unconsciousness; spirituality; spiritual distress.

Linda L. Morris, Ph.D., RN, C, is the President of Nursing Education Consultants of Darien, IL. Kathleen Knafl, Ph.D., FAAN, is a professor in the doctoral program at the Yale University School of Nursing, where she is pursuing a program of research related to family response to childhood chronic illness. This paper is based on a presentation at the International Association for Near-Death Studies Annual Conference, Seattle Pacific University, July 27, 2001. Reprint requests should be addressed to Dr. Morris at 8305 Highpoint Circle, Suite A, Darien, IL 60561.

Despite the abundance of writings in the lay press on the near-death experience (NDE) and related phenomena, it is a poorly understood event in the intensive care unit. One may wonder why there is such interest in a topic that is so difficult to explain. In the literature, the definition of what constitutes an NDE is unclear. Patients may be considered "near-death" as a result of several factors, such as cardiac or respiratory arrest, and severe shock or trauma. However, a common attribute of such states is a period of unconsciousness that is not the result of anesthesia. To the observer, these patients do not (or cannot) respond, but it is during this period of unconsciousness when some survivors have reported unusual recollections, some of which have been verified by others.

Many people claim that the NDE is "proof" of an existence beyond death because some survivors claim to have experienced "the hereafter." Other researchers claim that the NDE is merely the sensory manifestation of a dying brain (Blackmore, 1988, 1991) or produced by erratic electrical misfiring in the brain (Carr, 1982) or chemical imbalances (Jansen, 1990). Still others lie in the middle, convinced that there is something compelling in the stories of those who have experienced another dimension, but unable fully to understand it. Despite the wide range of skepticism and sometimes sensationalism, those who have had an NDE are, nonetheless, often changed by it. Their experiences also affect people who hear the stories of those who have had NDEs.

Although exact numbers cannot be known, many survivors of cardiac arrest have experienced an NDE; however, critical care personnel have inadequate knowledge to manage these patients. And it is clear that these patients need a supportive person to listen to their stories and understand their concerns (Garrison, 1989; James, 1994). It is estimated that 1,000 sudden cardiac deaths occur in the United States every day (Emergency Cardiac Care Committee and Subcommittees, 1992). Featherston defined sudden cardiac death as "an unexpected witnessed death of an apparently well person resulting from cardiac dysfunction and occurring within 1 hour of the onset of new symptoms" (1988, p. 242). Results of successful resuscitation in the hospital have not been systematically reported due to several factors; however, several informal sources list survival rates at 53 percent (C. McLane, personal communication, February, 1993), 60 percent (D. Knudsen, personal communication, May, 2000), or 67 percent (Morris and Fachel, 1992). Considering that these figures do not take into account the numerous factors involved, such as cause or lengths of survival, these

numbers are quite similar. If these figures are representative, then a large number of persons each year are surviving clinical death.

Literature Review

Survivors of NDEs have significant psychosocial issues to resolve after the acute event. One of us (L.L.M.) conducted a preliminary integrative review of the literature on survivors of cardiac arrest and myocardial infarction, concluding that the major issues were linked to resolving the meaning and addressing the emotional sequelae. In other words, survivors of cardiac arrest and myocardial infarction, a large group of patients who experience NDEs, need the support of caregivers who are well-informed regarding their emotional needs.

The early literature on the NDE, through the early 1980s, described features associated with the experience itself, such as a light, a tunnel, and an *out-of-body experience (OBE)*. The literature of the later 1980s reported on the aftereffects of the experience. The integrative review of the literature included 13 studies that discussed the features associated with an NDE, only two of which (Greyson and Stevenson, 1980; Morse, Castillo, Venecia, Milstein, and Tyler, 1986) described examination of medical records as a method to confirm inclusion criteria. Eight of the studies used convenience sampling methods, two studies described a purposive sampling approach, and one study (Atwater, 1988) described a random selection of cases from the archives of the International Association for Near-Death Studies. The remainder of the studies did not describe the sampling method.

Two studies included interview of a secondary source such as a family member or physician to support the primary source. Twelve of the studies used a questionnaire, but reliability data were absent in all but two (Greyson, 1983; Ring, 1980).

Gender and ethnicity seemed to be factors in reporting NDEs. Stuart Twemlow and Glen Gabbard (1984-85) reported that 65 percent of their sample of 339 near-death experiencers were female, and that male respondents tended to have NDEs much more commonly as a result of accident or physical injury than did females, who more often had an NDE as a result of illness. With two exceptions, most authors did not report the ethnic composition of samples. Bruce Greyson and Ian Stevenson (1980) reported that all their subjects were Caucasian; and Kenneth Ring (1980) reported that 95 percent of his sample of 102 subjects were Caucasian and 5 percent were African-American.

NDE Features

The features of the NDE have been a topic of inquiry since 1975, when the popular book *Life After Life* (Moody, 1975) was published. In this work, Raymond Moody first described the NDE after interviewing 150 persons resuscitated from cardiac arrest or who otherwise came close to death as a result of severe accident or injury. He found a consistent pattern of features, which later came to be known as the "core experience" (Ring, 1984), including the following features. There is an initial sensation of peace and serenity, while seeing the self as separate from the physical body (an *out-of-body experience*, or OBE). Upon leaving the body, all pain is gone. The disembodied self enters a tunnel or darkness, traveling at great speed and encountering a light at the end of the tunnel, which seems to radiate love. Others come to greet and welcome the person to his or her new environment. While in the light, the individual experiences a life review or panoramic memory, which is observed objectively, yet experienced with the original emotions. The person then reaches a border or limit. Some are given the choice to return, whereas for others the decision is made for them. Upon return to the body, the pain, if previously present, returns.

Numerous studies have been conducted since this landmark work, and most have had consistent findings. Three studies also provided a measurement tool to measure the *depth* of NDEs, based on the number of characteristics reported (Greyson, 1983, 1985; Ring, 1980). The most notable exception to the consistency in the literature was a study of experiencers in India, who were less likely to have OBEs and had a tendency to have residual marks on the body after the experience (Pasricha and Stevenson, 1986). Other notable exceptions were the reports of frightening or "hell-like" NDEs (Bush, 1994; Greyson and Bush, 1992; Rawlings, 1978, 1993; Ritchie, 1978). These experiences are not as well reported as the core experience.

Limitations in the Studies of Features

There were several limitations that were noted in the studies that reported the features of the NDE. First, the method of subject recruitment was often self-selection. In many cases, it was the subject's response to a notice in a magazine that qualified them for the study, whether or not they were truly "near death" at the time of the incident. Being near death is very subjective, especially in our common language. To say "I

almost died" can mean anything from acute embarrassment to being in a "near-miss" accident to being hospitalized in intensive care as a result of trauma or disease. In most cases, the state of near-death was not described, nor was it corroborated.

Another limitation of these studies was the skewed sampling of gender and ethnicity. Participants tended to be Caucasian and women, and there seemed to be no effort to obtain a representative sample of men and women of varying ethnic backgrounds.

In addition, there was no description of the instruments, which were presumably interview guides. In qualitative research, the instruments of data collection provide the basis for understanding the nature of the interview. Without a description of the instruments, it was impossible to determine whether the interview protocols were appropriate for the research questions.

Studies of Meaning and Aftereffects

There were eight studies of meaning and aftereffects included in the integrative review of the literature. All of them used an interview or questionnaire method of obtaining data. All of the studies described a positive outcome of the NDE. Three studies described a decreased fear of death (Bauer, 1985; Grey, 1985; Noyes, 1980). Half of the studies found that the subjects had a calmer and more accepting attitude toward others and life in general. Other studies reported a strengthened belief in life after death, a renewed sense of purpose in life, or a re-evaluation of priorities (Bauer, 1985; Ring, 1984; Ring and Valarino, 1988). Taken together, these studies of the meaning and aftereffects of the NDE pointed toward a process of changed values and beliefs as a result of the experience. There was less concern with material things and more concern with relationships following the NDE. Another term that could describe this outcome was increased *spirituality*, which is defined as pertaining to the "spirit or soul as distinguished from the body or material matters" (Guralnik, 1980, p. 1373). This view coincided with an interesting concept analysis of spirituality (Haase, Britt, Coward, Leidy, and Penn, 1992), which found that the three outcomes of spirituality were a purpose and meaning in life, guidance of values and behavior, and self-transcendence, which reaches out beyond reality and allows the individual to rise above personal and material concerns. This description of spirituality fits well with the studies of meaning and aftereffects of NDEs. The present study was built on these studies of meaning and aftereffects.

Specific Aims of This Study

The NDE is a very personal and individual experience that has great meaning to those who experience it. Critical care practitioners care for people at significant moments of crisis in their lives. They hear stories from their patients who have experienced NDEs. NDEs hold great meaning for the patients as well as the practitioners who care for these patients. Although the subjective experiences of the patients and the nurses regarding the NDE are described in this study, it was the degree to which people were changed and the way in which they were changed that is the major focus.

For this study, a *near-death event* was the condition that caused the patient to be near to death: for example, cardiac or respiratory arrest, severe shock, or trauma. The term NDE referred to the report of features associated with a period of unconsciousness due to a near-death event.

This research was designed to develop a conceptual framework for the near-death experience reflecting its meaning and significance for the patient and the nurse. The study used naturalistic inquiry to examine the question: What is the nature and meaning of a near-death experience and how has it influenced the individual's view of the self, the future, and feelings and beliefs about life and death? Specific aims that guided the collection of data included: (1) describing the experience of the patient surrounding the period of unconsciousness; (2) describing the nature and meaning that this experience holds for the patient, in terms of the individual's view of the self, the future, and relationships with others; (3) describing the experience of critical care nurses in caring for patients before, during, and after the period of unconsciousness, which was not linked to anesthesia; (4) describing the nature and meaning that this experience holds for the nurse, in terms of the nurse's view of the self, the future, and the caregiver role; and (5) comparing the responses of nurses and patients with regard to perception, meaning, and significance of these experiences.

One goal of this study was to address some of the shortcomings of previous research on the subject. Subjects were sought purposefully, rather than relying on self-selection as in many of the previous studies. Second, the state of near-death was specifically defined and subjects who met the criteria were included. Third, the state of near-death was verified in most instances. Fourth, there was an equal sampling of men and women, and a sample of ethnic diversity was purposively sought. Finally, the instruments used were clearly described.

Study Design and Methods

This study used the qualitative approach of naturalistic inquiry (Lincoln and Guba, 1985), which is the process of exploring naturally occurring phenomena in order to gain understanding. For the purpose of this study, an NDE was defined as the report of "unusual recollections associated with a period of unconsciousness during either serious illness or injury, or during resuscitation from a cardiac or respiratory arrest." In order to enhance completeness of the topic and validity of the findings, triangulation of methods was used. This included the use of intensive interviewing in conjunction with a structured instrument, the Near-Death Experience Scale (Greyson, 1983), in order to elicit the perspectives of both patients and nurses. Credibility of the findings was enhanced by the use of multiple sites, multiple subjects, and multiple modes of data collection.

Participants

Participants were recruited from eight hospitals within the Chicago metropolitan area. Multiple sites were targeted to assure a diverse sample with regard to demographic characteristics, including ethnicity, gender, and socioeconomic status. The patient sample included 12 adults, age 18 and older, who had either survived and had recall of a cardiac or respiratory arrest, or who had survived a serious illness with a period of unconsciousness that was not linked to anesthesia. The nurse sample included 19 critical care nurses who had cared for at least one patient who had experienced an NDE. Thirty-five audiotaped interviews were conducted and transcribed verbatim. An additional group interview consisted of nurses' discussion at a continuing education program for nurses on NDEs that one of us (L.L.M.) led.

Patients. The patient sample included six men and six women. One subject who had no recall of the experience was used for comparative purposes. Patients were recruited from eight hospitals within the Chicago metropolitan area. The patients ranged in age from 24 to 73 years, with a mean of 48.1 years. The age of the men ranged from 32 to 73 years, and the age of the women ranged from 24 to 66 years. Six patients were married, four were divorced, and two were single. Ethnic background included eight Caucasian subjects, two African-American, one Asian, and one Syrian. Religious affiliations included

eight Protestants, two Christian, one Jewish, one Catholic, and one patient who did not identify a religious affiliation.

The events that precipitated the NDE included a combination of acute and serious health problems, as well as traumatic events. The serious health problems included septic shock, hypovolemic shock, diabetic coma, and hepatic coma. The acute events included cardiac arrest, ventricular fibrillation, respiratory arrest, respiratory distress, and ruptured ectopic pregnancy. The traumatic events included a bicycle accident in which one patient was hit by a truck, and a stab wound to the heart.

Nurses. The nurse sample included 19 critical care nurses. All of the nurses indicated that they had cared for patients who had an NDE. Their age ranged from 31 to 53, with a mean of 43.6 years. Religious affiliations included 9 Catholics, 8 Protestants, and 2 who did not affiliate with any particular religion. Years of experience in nursing ranged from 3 to 26, with a mean of 16.4 years.

Procedure

Six patients were interviewed within one month of their NDE and six patients were interviewed within two years of the experience. In order to examine the process of recovery from the event, three of the patients from the first group were interviewed a second time, four to six months after the event. For comparative purposes, one of us (L.L.M.) also used theoretical sampling for one interview in selecting a subject who experienced a near-death event but had no memory of the period of unconsciousness.

All 12 patients were asked to sign an informed consent agreement and were assured of the voluntary nature of the study. Arrangements were then made for a taped interview and completion of the NDE Scale.

In seven patients, the medical records were reviewed in order to provide background information so that potential confounding variables (such as drugs, length of arrest, and type of near-death event) could be identified. The records of the remaining patients were unavailable for review, most often because the patient was cared for at a nonparticipating hospital.

Patients and nurses were interviewed at a time and place of their choice. One of us (L.L.M.) conducted all interviews. The interview guides were used in a flexible manner, with the primary objective of encouraging all subjects to recount their experience in detail.

Separate interview guides were developed and pilot tested for patients and for nurses. The patient interview guides were developed to explore the period of unconsciousness as well as the meaning and significance of the NDE. A follow-up interview guide was developed to determine whether participants' feelings and beliefs changed over time.

The nurse interview guide explored a variety of issues related to life and death and patients' thoughts and feelings surrounding resuscitation. Questions on the interview guides reflected the aims of the study, the literature, and our clinical experience.

For this study, the purpose in utilizing the Near-Death Experience Scale (Greyson, 1983) was to provide a foundation for the depth of the NDE itself. The NDE Scale was based on previous work (Noyes and Slymen, 1978-79; Ring, 1980) and was developed in order to provide a specific measure of depth of and NDE. The final NDE Scale of 16 items was derived from responses of 67 individuals describing 74 NDEs. Four item clusters were identified: cognitive, affective, paranormal, and transcendental. Cronbach's alpha was .88 for the entire scale and ranged from .66 to .86 for each cluster. Test-retest reliabilities after four to six months were .92 for the entire scale and ranged from .79 to .95 for each cluster.

Data Management and Analysis

Each of the 35 interviews was transcribed verbatim, resulting in more than 900 pages of transcripts. Each line of text was analyzed for content and meaning and assigned an appropriate descriptive code, based on the aims of this research. Codes were then further reduced and grouped, first into major themes, and then into major category domains. Two categories of themes were *short-term meaning* and *long-term meaning*.

In order to verify consistency and reliability of coding, three transcripts were checked with a doctorally prepared colleague with expertise in qualitative technique. Coding two transcripts each, the initial reliability rate of the interviewer (L.L.M.) and the expert was 76 percent. In order to ensure completeness and reliability of coding, we reviewed all of the transcripts and recoded each one. This was a helpful exercise, in that we were able to correct several instances of codes that were too specific, and several additional codes were added. The expert was asked to code a third transcript, which was compared to that of the interviewer. The final percent agreement was 96 percent.

Ethical Considerations

This study was approved by the Institutional Review Board (IRB) of the University of Illinois at Chicago and by each cooperating hospital. Each participant signed a consent form prior to the interview and completion of the NDE Scale. Participants were assured that their identities would be kept confidential and that no identifying information would be published in any reports resulting from this study.

A pilot study showed that there were some strong emotions elicited, including crying, from the interviews. We assured the participants that they were free not to answer any questions that made them uncomfortable, and that they were free to terminate or reschedule the interview at any time. However, none of the participants indicated that he or she wished to end the interview prematurely.

Confidentiality was assured by assigning each participant a code number. A master list of participants' names and code numbers was kept in a locked office in the event that a participant needed to be contacted for further information, or scheduled for a follow-up interview.

Results

Patients' Level of Consciousness

All 12 patient participants experienced a period of unconsciousness; however, in many cases, it was difficult to assess the duration of the unconsciousness because the documentation in the medical record often did not specifically identify level of consciousness. For seven of the 12 patients, the interviewer (L.L.M.) reviewed the records and corroborated the patient's account of the experience. The remaining five medical records were not available, most often because the patient was not recruited through a hospital.

Patients' NDE Scale Scores

Eleven patients completed the NDE Scale (Greyson, 1983), which was used to identify relative depth of the NDE. Determination of depth was made by an assessment of the number of features that were experienced during the NDE and the degree to which they were experienced.

The mean score of these 11 participants on the NDE Scale was 14.5 (S.D. = 6), with a range of 4 to 25. The mean score on the Cognitive Component of the scale was 2.2 (S.D. = 2), with a range of 1 to 6; the

mean score on the Affective Component was 4.2 (S.D. = 2), with a range of 0 to 8; the mean score on the Paranormal Component was 3.3 (S.D. = 2), with a range of 0 to 8; and the mean score on the Transcendental Component was 4.8 (S.D. = 2), with a range of 0 to 7. These scores are comparable to those reported by Greyson (1983) on his index sample of near-death experiencers.

Cronbach's alpha was .72 for the entire NDE Scale, .47 for the Cognitive Component, .46 for the Affective Component, .78 for the Paranormal Component, and .49 for the Transcendental Component. These reliability scores were significantly lower than those reported by Greyson (1983), with the exception of that for the Paranormal Component. The comparatively low alphas in this sample reflect the small number of patients studied. Therefore, one must interpret our results with caution. Nonetheless, these results do indicate that there was wide variability in the NDEs of these patients, demonstrating that their experiences were quite diverse.

Patient Interviews

The experiences of the patients in this sample suggested that the NDE was a combination of physical, sensory, and emotional events. In general, the patients in this sample had similar experiences to those previously reported in the literature, which also described NDEs as a combination of sights, sounds, emotions, and sensations.

Men and women equally experienced a border (or point of no return), an OBE in which they felt separated from their physical body, and the sense that they were dying or dead. Eleven of the 12 subjects experienced the presence of deceased relatives and voices during their NDE. Men were more likely to experience a light and a tunnel. Women were more likely to experience presences and colors during their NDE. Only one man experienced extrasensory perception (ESP) during his NDE; however, three women experienced ESP as an aftereffect of their NDE.

The number of features that each patient experienced was compared to his or her score on the NDE scale, and no significant correlation was found ($r = .04$). In other words, a patient who experienced a large number of features with the NDE (such as a light or a tunnel) did not also have a high score on the NDE scale. The reason for this lack of correlation is unclear. One might expect that a large number of features would correlate with a higher score on the NDE scale; however, this was not the case. One possible explanation may be that the subjects

did not correctly complete the instrument. Although it appears to be self-explanatory, the subjects may have been confused about the features and terms identified in the scale. In this study, instruments were reviewed and analyzed after interviews were completed, so it was not possible to ask patients to explain their responses on the NDE Scale. Had they been reviewed and discussed during the interview, the correlation might have been higher.

The features reported in this sample correspond directly with those reported in the literature and reflect the features described above in the core experience. In all cases, the patients reported that they believed that they had been changed as a result of having had the experience. We present direct quotes from participants in the following sections to illustrate the degree to which they were changed.

Meaning and Significance of the NDE for Patients

Figure 1 depicts a model illustrating the meaning of the NDE and the significance that the patients attributed to it. *Meaning of the NDE* indicates the way in which the subject interpreted or explained the experience, or the features of the experience. *Significance of the NDE* indicates the priority that the NDE or its aftereffects assumed in the subject's life. The patients were sometimes not sure how to interpret the events of their NDE; however, the experience was often very emotional and personal for them.

As shown in the Fig. 1, the data support conceptualizing the meaning of the NDE as an awakening, both because of the depth of emotion and the resultant struggle to find meaning in the experience itself, as well as find meaning in their life's purpose. This awakening was the beginning of an exploration into new ways to understand the world.

Patients' Search for Understanding

Immediately after the NDE, the initial phase of this awakening was characterized by frustration. Patients reported that they realized that something very powerful had just happened to them; however, they did not know how to interpret it or what its meaning was. Participants reported that they were frustrated in the search not only for meaning of the experience, but also for the meaning of life in general. The theme of this initial phase was *a search to find meaning in the NDE*. Seven patients also reported that they believed that they had received a special favor from God, a sign, or a "second chance." They believed that

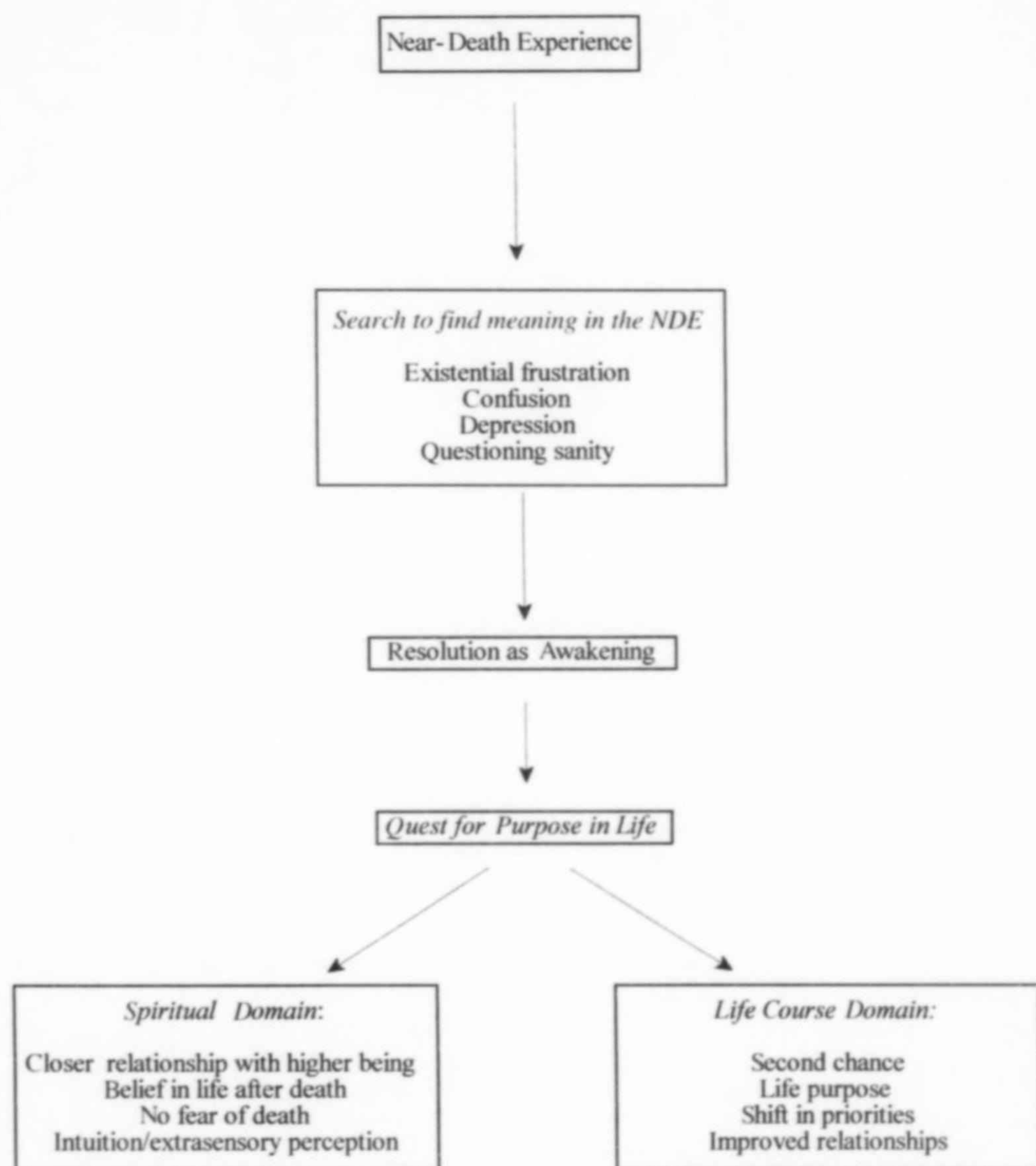


Fig. 1. Model of the Meaning and Significance of Patients' NDEs

they were chosen for a special purpose, and because of that, put some pressure on themselves to live their lives differently:

But I, I feel like I should be doing something better . . . in terms of, you know, having a tremendous . . . I got a tremendous present, and how am I supposed to use it? 'Cause I'm supposed to use it; it's not just to get. So I'm uncomfortable not knowing how I'm supposed to use it.

Characteristics of this phase of frustration were feelings of confusion, feelings of depression, and questions regarding their own sanity. Although all patients expressed some confusion following the NDE, their confusion manifested in different ways. Three patients were confused because they were unsure that the experience occurred, and others were unable to identify its meaning in their lives:

Well, at first I was very confused. I didn't understand this. It was very confusing to me. I couldn't—well, did I really experience this? Did this really happen? Or was this because of drugs, or, or all the other? . . . And I think—in some ways, in the beginning, maybe I was afraid to accept that maybe this was something that really was very spiritual and really had happened—and very confused by that.

Other common feelings after an NDE were depression and questioning their sanity. Three patients reported that they were depressed or were in some way troubled by the NDE. In one patient, this depression was related to delay in the progression of his physical recovery as well as the NDE. However, two other patients expressed a more “free-floating” sense of depression that they could not relate it to anything in particular:

The thing that troubles me most is that it's very hard to keep focused on what I would call the meaningful and the spiritual, the religious—I don't mean that in a formal sense—but the spiritual aspects of life. It's very hard to keep focused on it—and, that makes me unhappy. Second of all, I'm just in a generally lousy mood, which also makes me unhappy, because I know that it's just such a waste to be in a bad mood about stupid things. But I can't seem to shake either the bad mood or—it's like, it's like, circular. I don't know whether the bad mood's caused by my lack of focus on spiritual things, or my lack of focusing on spiritual things is caused by the bad mood. But clearly, they're related. So—I'm uncomfortable. I'm also uncomfortable with the notion that, you know, what I do has no societal value in my mind.

The NDE caused people to contemplate spiritual matters, and some even questioned their sanity. One patient seemed surprised and relieved to hear that the interviewer had heard several similar stories from other patients and said, “You mean, I don't have a screw loose, then?” More commonly, patients were afraid that others would view them as crazy.

Patients developed their own personal resolution to this “existential frustration,” which then became a sort of awakening into a new way of looking at the world.

Patients' Beliefs About the NDE

Overwhelmingly, patients reported that they believed that their NDE was confirmation that there is some sort of continued existence after what we know as death. The only patient who was not firmly convinced of the idea of life after death expressed these thoughts:

I don't see it as personally productive to think about whether there's life after death. Because the moment that you die, I believe that you think that there's life after death. . . . It doesn't matter if it's true, because it happened. So, who cares if what happens is that you're really in another level of existence—or you just think you are in the last moment that you can think. 'Cause either way, the last moment that you can think about it, it's a pleasant experience. Does it matter if it's really true?

Telling Others About the NDE and Patients' Advice to Health Professionals

Patients were asked about the reactions of others with whom they shared their experiences. Five of the patients reported that they learned to be cautious when sharing their experience with others, and shared them only with people who were likely to believe them.

When asked what advice patients would give to health professionals, some strong feelings were elicited. Patients reported that talking about the experience helped them. Patients reported that they believed that it was important for professionals to realize that patients may initially be confused about the experience, and that it was especially important *not* to minimize the experience by labeling it an hallucination. Whether or not the professional believes in the "reality" of the NDE, the patient participants felt the need for the professional to validate the experience and recognize it as one that was "genuine." When health professionals labeled the experience as an hallucination, it was interpreted as minimizing the experience, and patients no longer were comfortable talking about their experience to that person. Finally, the patients were very uncomfortable hearing information that was said in their presence, even though they were unconscious. They wanted health professionals to realize that, even though they may have appeared unconscious, they were often nonetheless able to see and hear what was going on around them. One subject overheard a nurse making a comment during her cardiac arrest, "Why don't they just let her die and put

her out of her misery?" She wanted health professionals to understand how she felt:

I felt unworthy of life. I didn't like her. I thought, God, maybe I should die. Maybe I'm just—be a lot of trouble to these people, you know. I felt like maybe I was in the way.

Validation of the reality of the NDE by health professionals was important to those who experienced it.

Patients' Quest for Purpose in Life

As patients resolved their frustration, they entered a new phase we called the *Quest for Purpose in Life*. This phase included the more long-term aspects of meaning of the NDE. During this phase, subjects considered their NDE as a significant awakening into a new way of thinking. They became very interested in, indeed almost obsessed with, learning their purpose for being on this earth. This quest consisted of two primary domains: the *Spiritual Domain* and the *Life Course Domain*.

The *Spiritual Domain* revolved around the subject's relationship with a *Higher Being*. Patients described themselves as having a closer relationship with God, spending more time in prayer and development of their spiritual side, having a firmer belief in the existence of life after death, and having no fear of death. In addition, four subjects developed a new sense of intuition or extrasensory perception since their NDE. These patients reported that they were able to see events in the future, and they did not have this ability before their NDE.

The *Life Course Domain* reflected responses in which patients described the NDE as a turning point in terms of how they lived their lives and treated others. Their responses reflected the NDE as a "second chance" for them, an opportunity to clarify their life purpose, change priorities, and improve relationships with others. It is interesting to note that, although all of the patients knew that they had a purpose in their life, none of them could identify what their given purpose was, even though most were certain that it had to do with relationships with others:

I just had the generalized knowledge that I have a purpose, and—I'm supposed to try to figure out what the purpose is. . . . I'm not uncomfortable with the notion that I might never know what the purpose is.

While considering the effect of the NDE on the patient, one may wonder whether it was the NDE itself or the state of being near to death that changed the lives of the subjects. To begin to explore this idea,

one subject was interviewed who clearly had experienced a near-death event, specifically a near-drowning accident, but who had no memory whatsoever of the period of unconsciousness. She reported that she was grateful to be alive and that she did not suffer any permanent complications from the accident. She also considered herself a much nicer person, less self-centered and more expressive of appreciation. So this patient did have some changes in attitude as a result of the accident. However, the changes in attitude were due to her full recovery and gratefulness in being alive. The patients in this sample also expressed gratefulness, but the depth of their emotions went far beyond just being grateful and appreciative. Their attitudes, beliefs, and lives were transformed.

Nurses' Accounts of Unusual Experiences Near Death

Nineteen nurses were interviewed and asked about their experiences with patients who were near death or who had NDEs. The nurses' accounts showed that their own experiences were also a combination of physical, sensory, and emotional events. When telling their stories, it seemed that the nurses added more specific details of an unusual nature in order to describe the events more fully, even though they could not explain them. One nurse told the story of a patient who experienced an OBE during a cardiac arrest; however, she added an intriguing detail:

So she described this whole scene. And I says, "Well, where were you?" And she says, "I was, like, flying above everybody." And so, she described, typical of what you would see if you're doing, like, we'd do CPR on her. Now, I'm not there. I'm just describing what she's saying. And then she said something that was kinda funny. She said, "There was a penny on top of one of the cabinets; but you'd have to climb up to see." And I happened to mention this to another nurse who talks about things like I do. And she actually looked up there and found it.

Several nurses provided descriptions of patients for whom they had cared during a cardiac arrest, and the patients later related to them that, even though they were clearly unconscious, they remembered things that the nurses had said during the event. One nurse told the story of a patient who was aware of the conversations during her cardiac arrest:

And I was in doing her bath, and she said, "You were there yesterday." [Pause.] I was, like, yes—she was—you know, it was just like, "Do you remember anything?" She said, "You were up on the table with me, pounding on the chest, and I was above you." And she told me—I was wearing a skirt that day, because one of the doctors made a remark

about don't wear dresses to work anymore. . . . And she just relayed the whole conversation that we'd had during this code, about my clothes.

Physical Phenomena Experienced by Nurses

The nurses' experiences were consistent with those that patients reported. Like the patients, nurses experienced a variety of sights, sounds, emotions, and sensations related to patients who were near death.

The sights described by nurses were most fascinating. Nurses reported seeing glows around their patients and visible presences at the bedsides of their patients. Five nurses observed a visible glow around their individual patients when they were near death. In four cases, this glow was blue in color. Another nurse in the pilot study mentioned a bluish-green glow around her patient just prior to a turning point in his recovery. She spoke of the eerie nature of the glow, which was clearly present despite the full light of day and was observed by another nurse. Other nurses also mentioned that they experienced a glow around their patients:

See . . . I don't wanna say I, like, actually saw an internal light bulb on. But you have the presence, or the feeling of really light and airy, without the breeze actually blowing. . . . It's almost like standing in the shadow of a light, of a light. . . . I would say a glow . . . like a nightlight. . . . It was around her . . . but not, like, just her. It was, maybe her bed and . . . her space, kind of thing. And then, it, like . . . it's almost like you don't want to believe it, 'cause nobody will believe you? So, you're almost denying it yourself.

Two nurses also described seeing "presences" at the bedsides of the patients while they provided care. One of them also described the blue glow around the patient and was able to confirm with the patient that there was a presence at her bedside:

There's someone in there. But we went in there, and she did, she had a blue glow all over her and it was—the room was filled with it. And she had, like her grandmother sitting next to her, holding her hand. . . . I don't know if it was her grandma, her mother, who, who it was. But she was just sitting there, holding her hand and—providing her comfort. . . . And I went up to her, and I said, "You know, you have someone sitting here taking care of you." And she looked at me, and she just shook her head yes.

Other nurses described visitations from patients for whom they had cared. Two nurses described visits by their patients while they, the nurses, were sleeping. Both nurses initially referred to these

experiences as "a dream"; however, one of them explained that she was present in the patient's room, saw the events of his code, and even noted the time at which it had occurred. She later related the story to her colleagues who confirmed that everything had occurred exactly as she had seen it:

When I went home the next morning, I was very, very tired. At 1:15, I was lying in bed. I presume I was asleep. I was sleeping on my left side, and I felt a tap on my right shoulder—a very strong tap. And I opened my eyes, and there was this young man standing by my bed, with a very intense look on his face. He didn't say anything; he just looked at me. And he—I got the impression that he was in trouble again. I then closed my eyes, and—was immediately in his hospital room [snaps fingers] and saw him code, and saw—at that time ACLS [advanced cardiac life support]—this was back in the mid-80's and ACLS wasn't very big. None of the nurses have a very structured regime of what to do, was totally foreign. Nevertheless, I remembered what had happened to him, drug by drug by drug; minute by minute by minute—and the fact that he had come back. I woke up at 2 o'clock. I took my shower. I went into work, figured it was a dream, just a dream. And I sat there, and I said, "Hey, guys, I had the strangest dream. I dreamed that Mr. So-and-so in Room 14 coded, and that this and this and this were done." And they just sat there. . . . They just looked at me in stunned silence, and told me that this man had indeed coded at 1:15 in the afternoon, and that everything that I had told them was exactly what had happened to him.

Two nurses had visitations during their own personal crises while they were patients themselves. These nurses described "angels" who were sent to comfort them during their own hospitalization. One nurse, after suffering her own cardiac arrest, being pronounced dead, and facing surgery the next morning, told the story of a woman with whom she talked and who gave her reassurance that she would be fine:

And I was walking down the hall, and this—this little old lady was sitting in a chair in her room, and I could see her through the door. And she kind of beckoned me in. So I came in to talk to her. And she had, you know, little statues of Mary and Jesus and little holy cards around. . . . And it was mostly me talking. . . . talking about, you know, my surgery in the morning. . . . She just said, you know, "Jesus will take care of you. You'll be fine. Don't worry about anything." And, I just felt. . . very calm. I felt absolutely reassured. . . . Several days after this experience, when I started to recover more, one of the nurses was walking me down the hall. . . . and we walked past the room where this little old lady was, and she was on a ventilator. And I could see her face; I knew it was her. . . . I was sure it was the same room. I'm looking, but it was her face; I knew it was—the same lady. And I said, "Oh, what happened to her?" You know, I was really shocked and distressed. And

they said, "Well, what do you mean?" I said, "Well, you know, I'd been talking to her before my surgery, and now she's on a ventilator." And the nurse said, "No, you weren't talking to her before your surgery." . . . And they said, "No, she was in a coma when she came in. She's been on a ventilator since she's been here. You didn't talk to her."

Nurses reported numerous other unusual experiences associated with patients who were near death. Two nurses spoke about hearing sounds in patients' rooms. One nurse heard sounds in the closet of her patient's room, which disappeared when she opened the closet door to check. Another nurse heard a noise in a patient's room down the hallway, which also disappeared when she checked the room.

Another tangible phenomenon reported by two nurses in this sample and one nurse in the pilot study was the presence of "cold spots" in the rooms. These nurses emphasized that these phenomena were not created by explainable causes, such as an open window. In both cases, the presence of these cold spots was corroborated by other nurses on the unit:

And I'd be, like, near these rooms, and I'd hear a noise or something—and think—I remember thinking, oh, maybe a patient got up and lost their way to the bathroom or something . . . you know, like the first two or three times that it happened, you know? . . . And I'd go in there, and there would be no one there. . . . I'd shine the light around, but as I passed, like—like, in between the bed, it would be, like, all of a sudden I'd walk, seriously, into a meat locker. It would be that cold—just in a spot—not the whole room. . . . I'd walk into a certain place, and it would be really, really cold . . . and other nurses . . . 'cause I know we talked about it, and other nurses . . . had said that they had felt the same thing.

Meaning and Significance of the NDE for Nurses

Figure 2 depicts a model of the meaning and significance that nurses attributed to NDEs of their patients. The NDE was a personal awakening for the nurses as well as for the patients. For many nurses, this was described as the first experience that opened the door of their scientific thinking into a realm beyond what they knew as reality.

As a result of their experiences with patients who reported NDEs and other unusual events, nurses struggled to explain in logical terms what had happened. One nurse expressed her awakening this way:

I—up to that point, I thought—very clinically. I didn't put any emotion into it. . . . And it was the first time I ever doubted physical medicine and started believing, maybe there was something else out there—something, some other force that we can't measure.

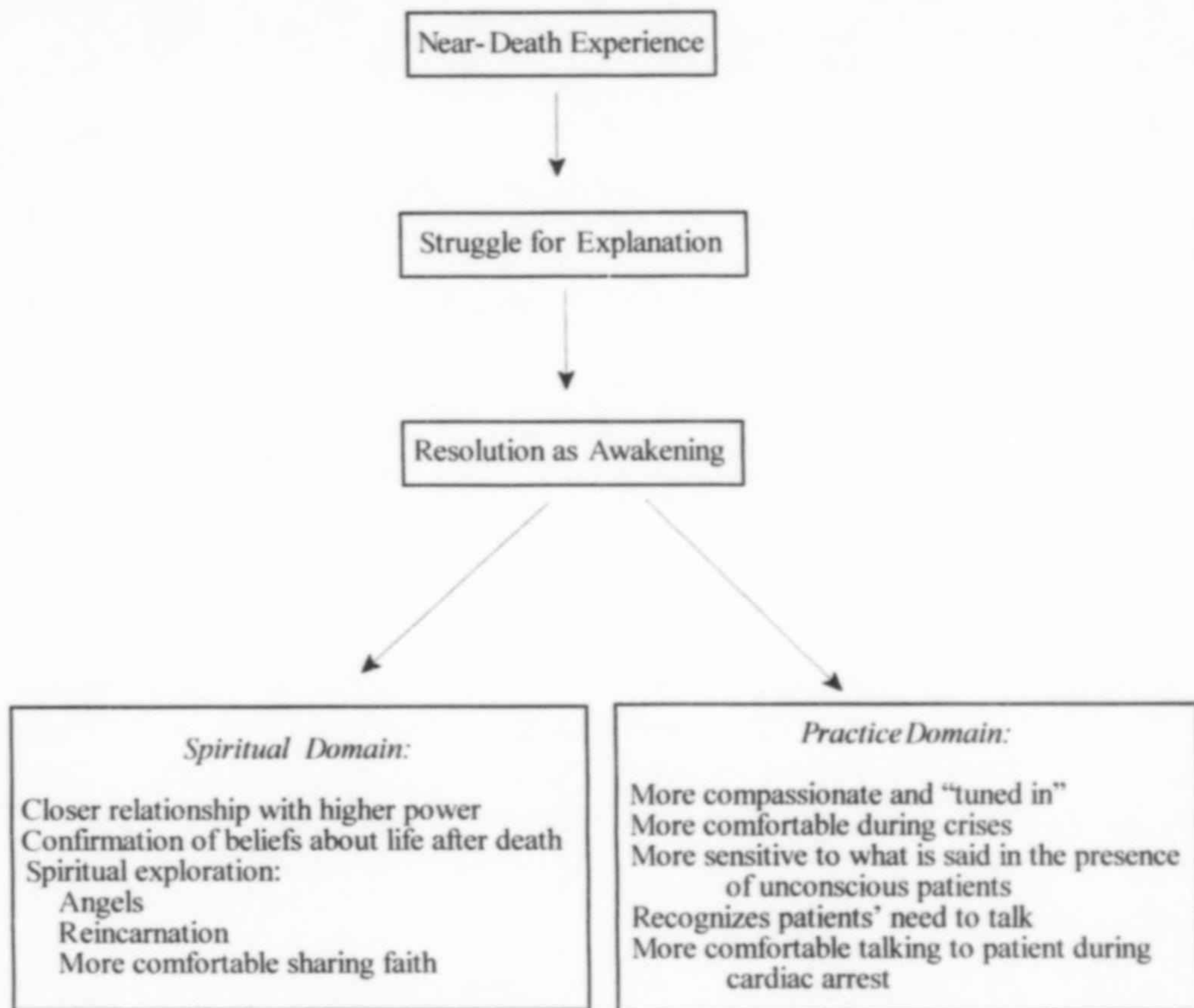


Fig. 2. Model of Nurses' Experiences

There were two primary domains regarding the meaning and significance of the experience described by the nurses: a *Spiritual Domain* and a *Practice Domain*. The spiritual domain encompassed their beliefs about God, faith, and life after death. The practice domain described how they incorporated their newfound beliefs and their experiences with NDEs into their role as a nurse.

Spiritual Domain. The Spiritual Domain reflected ideas that were deeply felt. Three nurses said that they felt a closer relationship with God as a result of their experiences. One former critical care nurse, now a psychiatric nurse, referred to herself as a "channel of God," which helped her better deal with her addicted patients:

I feel like I'm a channel of God, through me to get into that piece of their soul, and to cut through their crap—for them to, to be able to be more vulnerable, or to be able to deal with hard things—and to do

what they need to do to get better and to be happy. . . . I think it's a part of me that I just release to God and, and let it happen.

Most of the nurses reported a strong sense of personal spiritual exploration and spiritual openness as a result of their experiences. Several reported that they share their faith with their patients in many ways. Three nurses described themselves as open to experiences with guardian angels and expressed newfound beliefs in reincarnation, ideas that they had not previously considered seriously.

Practice Domain. The practice domain reflected the beliefs of the nurses regarding the ways in which they experienced emotional growth as a result of their experiences, and how this growth influenced their practice. All the nurses reported that they were more understanding of people in general, and of patients and families specifically. Nurses reported that they were more compassionate and sensitive to their patients' emotional needs, including the patients' need to talk about their experiences. Nurses reported that they felt more comfortable during a crisis, and they were more comfortable talking with patients and their families about death. They also mentioned that they felt more comfortable talking to the patient during a code. Nurses also reported that they were also more sensitive to what is said in the presence of their unconscious patients, including cardiac arrest victims.

Nurses were asked what advice they would give to other nurses and health professionals in general regarding patients who have experienced NDEs. The nurses as a whole felt that it was important to accept the NDE as reality for the patient, whether or not the nurse truly believed it. They agreed that the nurse's role was to not judge the patient's values, beliefs, and feelings but to accept them as important to the patient. The nurses also reported that they felt strongly that it was important to realize that patients may be able to hear and see events around them, even though they otherwise appear unconscious. The nurses who related the stories of NDEs among their patients were clearly shaken by them and made special efforts in their own practice to remember that patients may be more aware than they outwardly appear.

Discussion

This study was designed to explore the nature and meaning of the NDE from both patients' and nurses' perspectives. The data reported by nurses added important details to the stories of patients, which, up until now, have gone uncorroborated. In this way, the results reflect

the consistency of accounts across and within the patient and nurse groups. In this study, efforts were made to corroborate the sequence of events of the near-death event in the medical record, and nurses have corroborated some of the features experienced by patients.

The sample and sampling selection process in this study overcame the limitations of previous work in several ways. First, the inclusion criteria were specific, including only those who experienced a period of unconsciousness and some memory of that unconsciousness. Second, eight hospitals serving diverse populations were used to add a wide variety to the sample based on ethnicity, gender, and other factors. Third, we were able to verify the state of nearness to death with the medical record and/or with the patients' nurses. Finally, the research questions included the nurses' experiences in order to provide a more comprehensive view of the subject.

The findings reported in this study regarding the features of NDEs parallel those reported in the literature, with the exception of panoramic memory or life review, which was not reported by any patients in this study. The reason for this is unclear; however, patients were not specifically asked about any specific features of the NDE. Had they been asked specific questions, the results might have been different. The findings regarding the meaning of the NDE also corroborate those previously reported in the literature. The findings reported by the patients in this study were similar to those in a phenomenological study of meaning of the NDE conducted by Jann Devereaux (1995). In her study of 10 patients, Devereaux found 5 themes of meaning: a knowing of the Light/Source/God, absence of fear related to death and dying, enhanced relationship with self and others, a clarified purpose for living life, and an expansion of intuitive and psychic abilities. Devereaux included in her study patients who had their NDE at least one year prior to interview and who believed that the NDE had meaning in his or her life.

Our study differed methodologically from Devereaux's in two regards. First, both patients and nurses were recruited in order to capture the nature and meaning of the NDE from both perspectives. Second, Devereaux recruited patients who had an NDE one or more years prior to interview, so the more long-term effects were addressed, whereas we interviewed six patients within one month after their NDE and others up to two years after the event in order to capture the process of responding to an NDE. Yet, despite these methodological differences, there were similar findings of the long-term meaning to the subjects in both studies.

The explanatory models of the patients' and nurses' experiences illustrate the impact of the NDE on their respective lives. The patients reported frustration as they tried to find a meaning for the NDE. Their feelings manifested in confusion, depression, and feelings of fear that they may be, or others may see them as, crazy. As they resolved these feelings by talking about their experiences with interested and non-judgmental others, they came to believe that they had received a special gift and saw it as an awakening into a new way of looking at the world. Nurses, too, struggled to explain their experiences in terms of the familiar scientific model. As they realized that their experiences fell outside of the norm, they too, developed a new way of looking at the world.

Spiritual Distress

The nursing diagnosis of spiritual distress seems an appropriate label for the existential frustration the NDE produced in patients. Spiritual distress is defined as "disruption in the life principle that pervades a person's entire being and that integrates and transcends one's biological and psychosocial nature" (Kim, McFarland, and McLane, 1991, p. 63). Larry Renetzky (1978, p. 215) defined the human spiritual dimension as the need for meaning and purpose in life, the need for hope, and the need for belief in the self, others, and a power beyond the self. The NDE was the event that disrupted the person's view of the world. It was also the turning point that led to an awakening of the spirit, which in turn created in the person a different outlook on life.

Traditionally, nurses have not been accustomed to addressing the spiritual concerns of patients and have been quick to refer them to chaplains or ministers to meet these concerns (Ross, 1994). However, Carole Piles (1990) pointed out that the chaplain should not automatically be called when the patient mentions religious or spiritual concerns, because, to many patients, clergy represent holiness, and they may not necessarily be having holy feelings—especially if they are dealing with guilt or confusion. The literature shows that nurses are likely to be approached first with these spiritual concerns and must be comfortable enough to address such concerns with dignity, respect, and compassion.

Limitations of This Study

While this study was designed to overcome the shortcomings of previous studies in this field, there still remained some limitations, including

sample size and method of recruitment. These limitations were primarily issues of generalizability.

A sample size of 12 patients was a limitation in terms of quantitative data analysis. Because of this, reliabilities on the structured instrument were relatively low. However, the depth of data collected on these 12 patients and 19 nurses resulted in more than 900 pages of transcripts and hundreds more of coded passages.

Another limitation was the method of recruitment of subjects. Participants were self-selected volunteers who met the inclusion criteria. For patients, the primary criterion was that they had memory of a period of unconsciousness. One method to overcome this limitation was to review the medical record to validate the period of unconsciousness. Unfortunately, it was possible to review the medical records of only seven subjects. The remainder of them were unavailable for inspection, most often because the patients had their experiences in hospitals that were not involved in the study, two of which were out of state. Another recruitment issue was that of time span since the NDE. We initially intended to interview all patients within days of the NDE and conduct a second interview after four to six months in order to capture the dynamics of the aftermath of the NDE. After 18 months of data collection with only four patients recruited, we decided to increase the time frame to up to two years after the NDE.

Another limitation was that there was no mechanism to provide patient-nurse pairs in the sample. In this study, we were able to include only one patient-nurse pair. We might learn more about the nature of NDEs and be able to validate the total experience if there was an effort to include patient-nurse pairs.

A final limitation was one of sample bias. It is interesting to note that several of the nurse participants also had personally experienced an NDE at some point in the past. In fact, two of the original nurse participants experienced an NDE within two years of the interview, and were therefore included with the patient sample; and four other nurses in the nurse sample experienced an NDE longer than two years prior to the interview, and were kept in the nurse sample. This may be considered a limitation in that, since they may have been "sensitized" to the NDE, their responses may not have reflected the general population of nurses.

Implications for Practice

The findings from this study also supported the nursing literature on NDEs. Two nurse researchers, Janet Schwaninger (personal

communication, January 1993) and Margaret Garrison (1989), found that patients needed their stories of NDEs to be taken seriously, and that the most helpful intervention by health professionals was giving patients the opportunity to talk about the NDE in a nonjudgmental atmosphere. The patients in this sample also expressed the importance of caregivers being nonjudgmental. They wanted health professionals to realize that patients initially may be confused about the experience. They also emphasized that it is especially important not to minimize the NDE by labeling it as an hallucination.

The NDE was a meaningful experience for both the patient and the nurse. Nurses must realize that patients may be aware of what is going on around them, even though they may give the appearance of unconsciousness. Unconsciousness did not necessarily indicate lack of awareness; in fact, patients reported that the NDE produced acute awareness. While patients *appeared* unaware of events outside of themselves, they were often acutely aware of events—more aware than if they had been conscious.

Several patients in this sample were initially rather hesitant to share their experience with the interviewer, for fear of being thought of as crazy. They expressed the desire to talk about the experience with others, and stated that talking about it helped to put it into perspective and to reassure them. Patients were sensitive to having their experience minimized and reported being reluctant to discuss it with people who minimized it. Nurses and physicians can capitalize on this opportunity by asking all of their patients who have experienced a period of unconsciousness whether they have some memories of it. In speaking with patients, health professionals should remember that to refer to the NDE as a dream, an hallucination, or the result of certain drugs is to minimize it for the patient, and may make them less willing to talk about it. However, patients may say to the professional that they have had a "weird dream," which should be a clue that they may have had an NDE. Patients will often admit to a dream in order to get an idea of how the nurse or physician will respond. When patients know that they have an interested listener, they may then confess that they know that their experience was very different from a dream, yet they are unsure how to convey that to the listener.

Nurses, physicians, and other health professionals must be sensitive to the beliefs of the patients and allow them to come to an understanding of the experience that the patient is comfortable with. Many patients believe that they have seen a glimpse of what is to come; health professionals must respect this belief and allow their patients to express their

feelings about it. Whether or not we may share their interpretation of their experience, we must respect their feelings and beliefs.

This study suggests that the NDE produced a significant spiritual awakening in both patients and nurses, and it provided a unique message for both. The subject of NDEs has interested not only nurses, but the general public as well. Topics related to spirituality, transcendentalism, and Eastern thought are new to the Western world. New ideas that could potentially transform accepted beliefs about what we know as reality often are met with skepticism. The same is true of the NDE. It is only by continued repeatable and verifiable studies that we will come to realize that the boundaries between natural phenomena and "supernatural" are sometimes blurred.

Nurses and other health professionals are educated in the medical model that promotes scientific thought as the ideal. We have been trained to correct patients when they report seeing things or hearing things that appear to be a figment of their imagination. The findings from this study show that the optimal or therapeutic response for these patients is not correction of this "faulty" view. Patients reported that they wanted and needed confirmation of their experience by professionals. In addition, the experiences of the nurses were outside of their knowledge and expertise as well. They were hesitant to discuss their experiences because they feared they would be met with the same skepticism that their patients were met with—and this was not acceptable behavior or thinking for a professional person. As this study shows, there are scientifically unexplainable phenomena that do occur to patients who are critically ill. The NDE was a meaningful experience for both patients and nurses. It is important that we recognize that the NDE can be an awakening to a new avenue of spiritual exploration for both patients and nurses alike.

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A Quantum Biomechanical Basis for Near-Death Life Reviews

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ABSTRACT: Near-death life reviews pose a challenge to current memory research in terms of the sheer amount of instantaneous and empathetic information recall. Advances in quantum physics, biomechanics, holographic information theory, and consciousness studies support for the first time a fully realizable quantum biomechanical basis for near-death life reviews. We introduce the unifying paradigm of the quantum hologram as a non-local carrier of information. We further investigate the interrelated phenomena of non-local communications, and the electromagnetic zero-point field. Recent confirmation of the zero-point field lends credibility to vast memory storage capabilities outside the physical body. Microtubules are considered to be key components in non-local, quantum processes critical to human consciousness. Discovery of the liquid crystalline nature of the human body provides further support for our model. Microtubules, deoxyribonucleic acid (DNA), and the entire brain are described as communicating non-locally with virtually unlimited memory storage capacity.

KEY WORDS: near-death experience; life review; memory; non-local communication; quantum hologram; microtubules.

It has been said that the foundation of modern psychiatry was formed by the study of the impact of traumatic experience (van der Kolk and van der Hart, 1991). One issue of focus for memory researchers is traumatic memory retrieval. *Do overwhelming experiences leave fixed and indelible memories?* While overwhelming experiences make up only a portion of what is recalled during near-death life reviews, it is instructive to

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consider the perspective of current memory research. For if even traumatic memories are not fixed and indelible, how can other elements of the near-death life review be said to be accurate, much less *all* elements of the life review? We begin with a focused review of memory research, and then explicate three aspects of near-death life reviews that would be problematic to memory researchers of ordinary and even overwhelming experiences.

Introduction to Memory Research

Non-traumatic memories have been shown to be subject to alteration. The "misinformation effect," that is, how exposure to misinformation induces memory distortion, has been extensively studied in the laboratory. Elizabeth Loftus and Hunter Hoffman (1989) argued that misinformation can impair the original memory traces themselves. Memories have been found to be more easily modified when the passage of time allows for the original memory to fade:

Give us a dozen healthy memories, well-formed, and our own specified world to handle them in. And we'll guarantee to take any one at random and train it to become any type of memory that we might select—hammer, screwdriver, wrench, stop sign, yield sign, Indian chief—regardless of its origin or the brain that holds it. (Loftus and Hoffman, 1989, p. 103)

Loftus has most recently dedicated herself to the creation of "false" memories, experimentally "implanting" memories for nonexistent events that would supposedly have been traumatic had they occurred, such as being lost in a shopping mall as a small child (1997).

However, there are significant differences between such memories and the perceptions characteristic of posttraumatic stress disorder (PTSD). The opposing side of the debate focuses on the initial form traumatic memories take, that is, *dissociated* mental imprints of sensory and affective elements in the visual, auditory, olfactory and kinesthetic channels. Trauma is said to be "speechless terror," with narrative memory emerging only over time (van der Kolk and Fislser, 1995). One prominent researcher of traumatic stress has gone so far as to write:

As of early 1995, I could find no published accounts in the scientific literature of intrusive traumatic recollections of traumatic events in patients suffering from PTSD that had become distorted over time, naturalistically, or by manipulation, either in an experimental or in a clinical setting. (van der Kolk, McFarlane, and Weisaeth, 1996, p. 282)

However, inconsistent recall for specific features of combat memory has recently been demonstrated, thus challenging the notion that there is an indelible fixation in the mind of traumatic events (Southwick, Morgan, Nicolaou, and Charney, 1997).

Memory researchers have thus sought a closer look at brain regions that are activated in the retrieval of memories. The application of brain imaging techniques such as magnetic resonance imaging (MRI) allows the examination of the neuroanatomical correlates of both veridical and illusory memories (Gauthier, Hayward, Tarr, Anderson, Skudlarski, and Gore, 2002). Positron emission tomography (PET) scans measure changes in blood flow in the brain that indicate neural activity. PET scans of subjects who merely listened to lists of words showed that "accurate memories appear to retrieve sensory details that are not available to us in illusory memories" (Begley, 1996, p. 64; Schacter, Reiman, Curran, Yun, Bandy, McDermott, and Roediger, 1996). The "true" memories activated areas in the superior temporal lobe, the region that processes sounds of recently heard words. The implication is that retrieval of veridical memories activates the brain regions that originally processed the perceptual stimuli during encoding (the auditory cortex in this case).

However, sensory signatures interpreted as an expression of a distinctive memory trace present during the original event may *not* be readily traceable in the slower response measures obtained with MRI and PET scans. Such transient brain activity has been isolated with event-related brain potentials (ERPs) recorded with scalp electrodes. One study demonstrated differences in event-related brain potentials at the time of retrieval for true versus false memories (Fabiani, Stadler, and Wessels, 2000). Brain activity associated with memory for traumatic and emotionally charged events is only just beginning to be studied. But as memory is influenced by the biochemistry of the stress response, markers for memory veracity are being found in measurable physiological changes in victims of abuse (Cotton, 1994).

Yet the search for physiological markers of memory veracity is at odds with what many near-death researchers take for granted: that is, the veracity of entire life reviews. After all, the notion of the brain as a virtual "videorecorder" has been seriously challenged. Wilder Penfield's well-known work on electrical stimulation of certain brain sites during surgery on epileptic patients during the 1940s has since been re-evaluated. Note Penfield's 1969 account of the stable nature of the flashbacks:

It is clear that the neuronal action that accompanies each succeeding state of consciousness leaves its permanent imprint on the brain. The imprint, or record, is a trail of facilitation of neuronal connections that can be followed again by an electric current many years later with no loss of detail, as though a tape recorder had been receiving it all. (1969, p. 165)

However, a closer look at this widely cited research shows that these responses were relatively rare (3.0 to 7.7 percent of cases), and were vague descriptions, more likely reconstructions or inferences rather than actual memories (Loftus and Loftus, 1980). Indeed, by 1975 Penfield could be seen as more conservative, and did *not* regard the electrically stimulated impressions perceived by subjects as real memories, but rather as artificial.

Near-Death Life Reviews

Given this onslaught against the veracity of memory itself, how can near-death researchers defend the veracity of near-death life reviews, an experience said to entail *all* significant memories during a lifetime? Even if overwhelming experiences are remembered as dissociated sensory elements and not subject to distortion, as Bessel van der Kolk, Alexander McFarlane, and Lars Weisaeth (1996) argued, typical near-death life reviews are remembered as narrative, *explicit* memories. PET scans and MRIs of near-death experiencers (NDErs) during later recall of their life review could help resolve the issue of veridicality. However, the search for a physical substrate for near-death life reviews is also critical.

Melvin Morse and Paul Perry (1992) linked life reviews to the Sylvian fissure of the right temporal lobe, though they have been faulted (Wade, 1996) for relying on Penfield's work. They hypothesized an excitation of the body's electromagnetic field at death, which revives the fading right temporal lobe to record the NDE. However, few memory theorists would hold the right temporal lobe, normally associated with long-term memories, capable of recording the NDE accurately if it entails an entire life review. Also, some NDErs have no measurable brain activity (Rosenthal and Larson, 1978; Sabom, 1998). "Saying that the Sylvian fissure is capable of producing certain percepts under special conditions during life is very different from assuming that part of the brain dominates consciousness after death and that it functions in the same manner" (Wade, 1996, p. 232). Brain imaging techniques during later

recall of the near-death life review may provide a means for testing the Sylvian fissure hypothesis, as the formation of memories is a function of the brain regions activated, and recall would conceivably activate those same regions.

Even so, Morse's extension of the Sylvian fissure argument is at the forefront of the attempt to account for paranormal experiences and abilities arising from the NDE. But though Morse went well beyond Penfield's conclusion of strict localization of brain function, we believe he did not fully account for three singular aspects of near-death life reviews. We will present a non-localized memory theory evolved from Karl Pribram's view that the memory engram may be an interference pattern similar to that made by a laser in a hologram.

Prior to Morse, researchers focused on an underlying neurological mechanism for near-death life reviews, though Russell Noyes and Roy Kletti (1977) also cited Penfield's work as evoking vivid memory recall, which has not been borne out. Gordon Greene, in his search for a viable causal factor, added the additional concept of *hyperspace*, "any space with more than three dimensions" (Greene, 1981, p. 121). As time spatializes into a fourth dimension, we are said to be able to perceive *hyperspatially* and spontaneously, the whole of our lives. Though the concept of hyperspace correlates with modern-day physicists' concept of *nth-dimensional space*, Greene himself countenanced "the difficulty of obtaining more than just circumstantial evidence that higher spaces actually exist" (1981, p. 129).

More recently, Linz Audain (1999) attempted to link neurobiological concepts to the possibility of the existence of a hyperspace. Yet his attempt to spark "a long debate within the scientific community as to the nature of the interaction that exists between the neurological and the metaphysical" (Audain, 1999, p. 104) is likely to fail. Few physical scientists consider metaphysical subjects worthy of serious dialogue. As recently as 1994, an article in a respected physics journal (Stapp, 1994) cited an article in the *Journal of Parapsychology* in presenting a theoretical model that would allow for causal anomalies incompatible with well-established principles of physics. However, citing data from a parapsychology journal provoked opposition from the physics journal's editor, who expressed his strong opinion that henceforth such papers should not be allowed (H. Stapp, personal communication, February 8, 2002). Carl Becker (1995) has duly faulted Kenneth Arnette (1999) for applying scientific concepts to the nonmaterial substance he called "essence." Furthermore, the necessity of a dualistic approach has long been questioned (Krishnan, 1996). We intend to apply scientific

concepts in a *non-dualistic* manner to explain the existence of consciousness phenomena on a macroscopic level.

Given the malleable nature of *non-traumatic* memories, perhaps NDE researchers can profit from the lesson learned by memory researchers: that is, to differentiate between normal memory and memory in extreme altered states. For possibly near-death life reviews are not memories in the usual sense of the word, as suggested by Raymond Moody: "This review can only be described in terms of memory, since that is the closest familiar phenomenon to it, but it has characteristics which set it apart from any normal type of remembering" (1975, p. 64).

Three singular aspects of near-death life reviews cast doubt on their credibility when considered *solely* in light of current memory research and classical physics: (a) the sheer amount of sensory information and information recall; (b) the apparently instantaneous, panoramic presentation of memories; (c) the review of the experience as perceived by others. Advances in science support for the first time a theoretical basis for the underlying physical mechanism that would account for these three singular aspects of near-death life reviews. Examples of each will serve to illustrate the vast amount of data apparently in memory storage, and how the transparency of ego boundaries seems to allow access to collective memory.

Amount of Information Recalled

NDErs describe exactly what memory theorists such as Loftus have attempted to discredit: that is, that human memory can function like a videorecorder. NDErs frequently use terms like a "movie camera" or "tape recorder" to express that every single thing they experienced in their lives was recorded, though it may not have registered in consciousness at the time:

It was like watching my life from start to finish on an editing machine stuck in fast forward. The review took me from my conception, which felt like the blackness I experienced after my out-of-body experience, through my childhood, to adolescence, into my teens, and through my near-death experience over again. I saw my life. I relived my life. I felt everything I ever felt before. When I say "everything," I mean every cut, pain, emotion and sense associated with that particular time in my life. (Ring and Valarino, 1998, p. 22)

I not only relived [this incident] in my life review, but I relived every exact thought and attitude—even the air temperature and things that I couldn't have possibly measured when I was eight years old. For example, I wasn't aware of how many mosquitoes were in the area. In

the life review, I could have counted the mosquitoes. Everything was more accurate than could possibly be perceived in the reality of the original event. (Ring and Valarino, 1998, p. 170)

Instantaneous, Panoramic Presentation of Memories

Whether or not a temporal order of events is remembered, the three-dimensional, panoramic review occurs in what seems like an instant of time:

With regard to the question of time, everything happened instantaneously. . . . It is like an explosion, it is all there. When my life went before my eyes, it was not from my earliest memory at thirteen months. There was an enormous TV screen in front of me. . . . Way over on the left was my memory at thirteen months, and way over on the right was July, 1972, age thirty-eight. Everything in between was right there and I could see the whole thing, all at the same instant. (Ring and Valarino, 1998, p. 150)

Review of the Experience as Perceived by Others

The review is experienced from the perspective of all lives that intersected with one's own, from purely personal interactions to the transpersonal or collective level of consciousness:

I rethought every thought, I reexperienced every feeling, as it happened, in an instant. And I also felt how my actions, or even just my *thoughts*, had affected others. When I had passed judgment on someone else, I would experience myself doing that. . . . Multitudinous actions or thoughts, derived from my own meanness, unkindness, or anger, caused me to feel the consequent pains of the other people. I experienced this even if at the time I had hurt someone, I had chosen to ignore how that would affect them. And I felt their pain for the full length of time they were affected by what I had done. (Ring and Valarino, 1998, pp. 158-159)

I learned that time as we think of it doesn't exist, nor does the separation between us. . . . in fact, it was almost as if there was no "other." I say almost because I had self-awareness, but knew my awareness lived within an intricate pattern that existed eternally, everywhere. (Ring and Valarino, 1998, p. 176)

I experienced all of my experiences not only from my perspective but also from everyone else's, even those I didn't even know or interact with. . . . I then crossed the threshold of the birth of this body and this process of Review accelerated and I relived all former lives of my particular "soul," if you will. . . . Then I lived all lives being lived on this

planet. And finally, all lives being lived throughout the Universe, all the way to the Ultimate Awareness of All Creation. It was a truly incredible, indescribable experience. (Colli, 2001)

If veridical, these three aspects of near-death life reviews highlight the limited perspective of current memory research. The challenge such reviews pose cannot be overemphasized. However, perhaps these reviews are problematic only when considered in light of classical physics, and the laws underlying the ordinary world of macroscopic objects. The following sections examine how "extraordinary" experiences of ordinary humans take us beyond the scope of classical physics.

Quantum Biomechanics

In light of recent scientific developments, the experience of near-death life reviews can be seen to acquire new legitimacy. With the emergence of quantum biomechanics, a new understanding of the mechanism of life reviews may be articulated. Two mutually related concepts are crucial to the application of quantum biomechanics to the functioning of the human body: *quantum coherence* and *non-local communication*. We begin by describing lasers in order to explain the relevance these concepts have for consciousness, for quantum coherence and non-local communication occur within structures in the physical human body.

Quantum Coherence

This natural physical phenomenon involves large numbers of light (or matter) particles that cooperate collectively in a single state. The intense, narrow beam of a laser exemplifies *quantum coherence*. All of the emitted light particles, or photons, oscillate together at the same frequency and phase, resulting in a light beam of a single color. Driven by external stimulation, the laser reaches a critical energetic threshold, above which it undergoes a non-linear phase transition, an abrupt jump to a higher energy level. In laser light, all the photons lack individual identities and thus are said to be in the same quantum state (Marshall, 1989). By contrast, incandescent and fluorescent lamps emit *incoherent* light in all directions, in a broad spectrum of frequencies, resulting in white light.

Lasers undergo a phase transition in which many photons become coherent and are thus described by the same mathematical wave function. In quantum mechanical terms, such systems of coherent excitations are

called *Bose–Einstein condensates*. Bose–Einstein condensates demonstrate collective, macroscopic quantum states—*macroscopic* since the effects of some Bose–Einstein condensates can be directly observed, without the aid of magnification.

Non-local Communication

Quantum coherence between particles involves non-local communication, that is, interaction which is: (1) instantaneous, (2) independent of distance, and (3) impervious to shielding. Non-locality refers to processes in which signals propagate across any distance *instantaneously*. By contrast, signals that propagate in a finite period of time are called local signals; for example, the visible electromagnetic light to which our eyes respond (Goswami, 1993). Electromagnetic waves in the form of *incoherent*, white light, as in sunshine, or radio and television transmissions, exhibit none of these three characteristics. They traverse the distance between the transmitter and the receiver in a finite, measurable period of time; they diminish in intensity the farther they travel; and they can be blocked by appropriate shielding.

Non-locality is not to be confused with faster-than-light, or *superluminal* signal propagation. Superluminal signals (those propagating faster than 186,000 miles per second) would, despite their great velocity, still take many human lifetimes to cross our galaxy (Nimtz, 1998). Physicists have experimentally demonstrated non-local interaction between photons (Aspect, Dalibard, and Roger, 1982). These experiments demonstrate that non-local communication is possible across any arbitrarily large distance.

On the scale of human perception, evidence suggests that humans perceive by means of both local *and* non-local processes. For example, when viewing a nearby person, the eyes respond to electromagnetic waves, but the mind also seemingly responds to a non-local, instantaneous component (Mitchell, 1999). During remote viewing of the same person who is miles distant, only the non-local aspect is perceived by the viewer, which provides a dreamlike, unclear image. This is consistent with altered states of consciousness such as clairvoyance, precognition, and telepathy. The Central Intelligence Agency has engaged in “a multi-year, multi-site, multi-million-dollar effort to determine whether such phenomena as remote viewing ‘might have any utility for intelligence collection’ ” (Puthoff, 1996, p. 64). Dean Radin (1997) summarized non-local experiments across a range of phenomena. His statistical analyses demonstrated the viability of non-local perception. Self-reports of

near-death life reviews also suggest non-local perception, as they are said to be virtually instantaneous. All of the above experiences provide crucial support for the theory that the human body possesses the quantum biomechanical mechanisms necessary for non-local communication. However, until the current stage of scientific research, the scientific explanation for such phenomena has been lacking. Researchers are now beginning to connect these anecdotal reports to the underlying mechanisms on the molecular level.

On the molecular scale, non-local communication has been identified *within* the physical human body. We refer again to the laser—a Bose–Einstein condensate—whose core element can be a crystal. The resulting coherent beam of light carries enormous amounts of information, as in cable television. It has recently been discovered that living organisms, including much of the human body, are *liquid crystalline* in structure (Ho, 1999; 1998b). Liquid crystals are states of matter that encompass a wide range of fluidity, from solid crystal to semi-solid proteins to gel-like cellular fluids. Whereas the calcium phosphate crystals in bones are solid, the collagen in bone is semi-solid and is referred to as a liquid crystal. Biological organisms are largely composed of liquid crystalline materials such as connective tissue and cell membranes, plus other tissues that fill up the spaces between the organs. “The connective tissues of our body include the skin, bones, tendons, ligaments, cartilage, various membranes covering major organs and linings of internal spaces” (Ho, 1999). Liquid crystals, used extensively in calculator displays, possess properties that make them ideal for rapid intercellular communication. Within the coherent, liquid crystalline human body, intercommunication is *instantaneous and non-local* (Ho, 1998a).

As evidence of this, biomolecular *quantum tunneling* has been demonstrated in proteins and in deoxyribonucleic acid (DNA) in the human body (Stuchebrukhov, 1996; Wagenknecht, Rajski, Pascaly, Stemp, and Barton, 2001). Quantum tunneling refers to the instantaneous behavior of atomic-scale particles such as photons, electrons, protons, or hydrogen atoms that “jump” from point A to point B without traversing the distance in between. Physicist Guenter Nimtz (1999) has demonstrated quantum photon tunneling through a barrier, over a distance of about 5.5 inches. Actual signal traversal time within the barrier is instantaneous, *regardless of barrier length* (G. Nimtz, personal communication, April 6, 2002).

Another example of liquid crystalline substance is the intracellular cytoplasm, the fluid inside bodily cells. Microtubules are the principal organizing constituents of cytoplasm. Given that microtubules are

found within most cells, we now address the role that microtubules play in non-local communication within the human body.

Cellular Microtubules

Bose–Einstein condensation can occur with both light particles, or photons, and matter particles, such as protons, neutrons, and electrons. While Bose–Einstein condensates comprised of matter have been demonstrated only at extremely low laboratory temperatures (-459°F), lasers can operate at normal room temperatures (72°F). Quantum coherence also occurs in living organisms, including the human body, which maintains an internal temperature of about 98.6°F . Quantum coherence has been observed in specific biological structures called *microtubule networks* within nucleated cells (Hameroff, 1994). Evidence indicates that microtubules emit single photons of light and can be viewed as microscopic pulse-lasers within living cells (Popp, Li, Nagl, and Klima, 1983).

Microtubules are biological Bose–Einstein condensates that are considered to play an important role in human communications, memory recall, and learning. They may prove to be the fundamental elements of a non-local communication network that provide the basis for near-death life reviews. A brief description of their properties will shed further light on these remarkable miniature communications networks.

As the name implies, microtubules are microscopic. They are self-organizing, tubular protein structures present in nearly all eukaryotic cells—that is, cells that have a nucleus. Eukaryotic cells include most cells in the human body and throughout nature. Microtubules form a complex skeleton-like structure that physically supports the entire cell, giving it shape and resilience. However, beyond their physical attributes, microtubules provide a complex communications network within each cell that is essential for the cell's overall functioning. Indeed, the microtubule network is sometimes referred to as the cell's "brain."

Part of the cell's microtubule structure is the *microtubule organizing center*, which runs the cell's "machinery" and organizes most, if not all, cell functions, including critical cell division. In some neural cells, the microtubules can be nearly one meter long and arranged in bundles of hundreds or thousands. They might be compared to fiber-optic cables used for telephone communications, which consist of numerous thin wires bundled together. For a sense of proportion, a microtubule

one meter long would compare to a one-inch diameter garden hose over 600 miles long, though most microtubules are much shorter. On a molecular level, their complexity is incomprehensible. However, *on a quantum level*, the communication occurring within microtubules is a relatively simple process.

Quantum Effects of Microtubules

Communication at the level of microtubules has been described mathematically (Marcer and Schempp, 1997). A growing body of scientific knowledge supports the theory that microtubules possess three important properties related to *intercellular* and *intracellular* communications: (a) propagation of laser-like, coherent micropulses of light; (b) quantum, non-local information processing; and (c) emergent, collective, *macroscopic* properties arising from a critical level of coherence of quantum events.

Light Propagation. Microtubules propagate laser-like, coherent, single-photon micropulses of light that result from Bose–Einstein condensation. Evidence suggests that these individual micropulses of light effectively generate single-photon holograms, just as a laser beam, composed of countless individual photons, generates a hologram (Hirano and Hirai, 1986). *If trillions of microtubules in the human body each create single-photon holograms, the amount of holographically encoded information may be effectively unlimited.* However, unlike other Bose–Einstein condensates, these occur at body temperature. Their energy source is the 98.6° ambient heat bath of human cellular fluids, or cytoplasm, in which microtubules are immersed. Cells filled with cytoplasm are not simply minuscule bags of water with organelles sloshing around randomly. Rather, cytoplasm is a highly structured viscous fluid that has evolved to allow rapid communication through its unique electromagnetic and quantum properties—through microtubules. The human body is thus possessed of collective quantum effects throughout its entirety, including, most importantly, the central nervous system and the brain. The implication is that vast quantities of information about the state of the organism and its environment can be absorbed and re-emitted by single photons.

Non-local Communication. A second inherent property of microtubules is the quantum phenomenon of non-local communication, or so called “action-at-a-distance.” Peter Marcer and Walter Schempp (1997) described microtubule signal propagation within the human body as

occurring instantaneously. Non-local communication is implicated in many subjectively reported altered-state experiences such as near-death life reviews. Such reports are not in accord with classical concepts of linear time and space. *The microtubule network may provide the communication mechanism for instantaneous downloading of an entire lifetime of experiences that are "replayed" in a matter of moments, as if the process occurs at a highly accelerated rate.* Note that we are not referring to the familiar neurochemical signal propagation within the central nervous system, which travels at approximately 240 miles per hour. Indeed, we are referring to a related, yet clearly distinct, communications network.

Emergent Properties. Finally, consider that emergent, collective, macroscopic properties may arise from a critical level of coherence of quantum events. The laser, a room-temperature Bose-Einstein condensate, is an example. The photons arising from the absorption and re-emission of stimulating energy give rise to the collective coherent effect of an intense beam of light of a single wavelength. In this model, microtubules function as pulse-laser signal generators possessing weak electromagnetic fields that cross over between microtubules (Koruga, Hameroff, Withers, Loutfy, and Sundareshan, 1993). Cross-over between any two microtubules situated parallel to one another would result in interference patterns, similar to bands of dark and light. Encoded within the interference patterns would be enormous quantities of holographic information.

It is well known that anesthetics impair the functioning of microtubules, an effect that leads to loss of consciousness (Hameroff, 1994). Such evidence indicates that microtubules may represent the physical structures responsible for the emergence of consciousness. The net effect of countless bundles of neuronal microtubule "cables" would thus be the basis for a profound emergent collective, macroscopic effect: *consciousness*. Emergence refers to the occurrence of conscious awareness at a critical threshold—resulting from the cumulative effect of countless microtubules acting in a coordinated manner. Consciousness is thus said to result from collective quantum effects that occur in microtubule networks within the central nervous system (Koruga, 1995). Moreover, experimental research links microtubules to bioinformation processes such as memory and learning (Koruga, Hameroff, Withers, Loutfy, and Sundareshan, 1993). For example, in Alzheimer's disease, the cytoskeleton—the microtubule network—becomes entangled. The clinical symptoms of Alzheimer's disease, that is, cognitive defects in

learning and memory, have been produced in Gilbert Bensimon and Raymond Chermat's study by the drug colchicine, which causes selective destruction of brain microtubules (Bensimon and Chermat, 1991).

Near-death life reviews within the context of this model represent a specific, emergent, quantum effect that is both collective and macroscopic. Such a model provides a basis for understanding the following examples of non-local communication. Dreams contain a great deal of information and meaning that may require hours to order and integrate. Intuitive ideas are often "downloaded" in a fraction of the time they take to decipher and put into sequential order. A research subject of one of the authors (TEB) spoke of "thunderbolts" of information she "received" that took weeks to fully comprehend. A psychotherapy client of the other author (JEC) dreamt prophetically of her current husband ten years prior to their meeting. Although ordinary states of consciousness usually impede such awarenesses, once accessed through *non-ordinary* states, we order the data as it emerges into four-dimensional space-time. "Perhaps our brains (in particular, coherently oscillating cytoskeletal microtubules) discriminate, detect, and serialize synchronistic and non-local . . . quantum states which spontaneously and simultaneously emerge (from what Jung referred to as the 'collective unconscious')" (Koruga, Hameroff, Withers, Loutfy, and Sundareshan, 1993, p. 206).

Holographic Memory

Ervin Laszlo (1995) theorized that memory may be largely stored in a *collective, holographic memory field* that lies *outside* the boundaries of the physical body. Memories would then be accessed by the brain from that *ambient field* rather than being stored primarily within the brain, as classical neurobiology maintains. This accords with the perceptions of clairvoyants who claim to access information contained in the bioenergetic field surrounding each individual, such as personal imagery, and memories of significant events. The empathetic nature of the near-death life review, where one's thoughts and actions are reviewed from the perspective of others, may also exemplify information retrieval from an ambient field. This ambient field may also relate to Jung's concept of the collective unconscious, a vast pool of archetypal images.

The principle function of the physical brain may be to serve as a mediator for coherent coupling of numerous subsystems (Ho, 1998a). In the language of computer science, it would be comparable to a complex

operating system and central processing unit, albeit vastly more sophisticated than any computer currently available. Holographic memory, while stored globally, can be accessed locally, just as an image distributed throughout a holographic plate can be reproduced in its entirety by shining a laser through any part of the plate. The organism can be considered as having its own quantum holographic field (for transmission and reception) with which it communicates to the larger universal or collective field. Such a model would allow for the recovery of stored information from the larger field instantaneously and in unlimited quantities. Coherent systems display neither spatial nor temporal separation. Communication from one part to another occurs instantaneously, regardless of the distance (Ho, 1998b). Such memory recovery correlates with the description of many self-reports of near-death life reviews and may provide a realizable mechanism for them. To understand the nature of such field-to-field communication networks, a basic understanding of holography will be useful.

A *hologram* is an image of a three-dimensional object, created by first splitting a single, coherent laser beam into two beams. The split-off *object beam* carries the data content, while the *reference beam* holds the data location. When the two beams later intersect, a complex interference pattern of dark and light bands results. This pattern encodes the surface characteristics and location of the object being illuminated by the object beam. In order to retrieve the entire stored image, the reference beam is shined through any part of the holographic plate. The holographic technique packs data very tightly, storing extensive amounts of information in a small volume. Our *next* level of technology hopes to achieve holographic memory storage on a single 12-centimeter disk, estimated to hold one terabyte of data, the equivalent of 200 digital video disks (DVDs) (MacNeill, 2001).

Pribram first proposed that the brain stores information encoded as a hologram. Highly organized microscopic structures within the human body have been proposed as holographic storage media, namely, DNA, facilitated by liquid crystalline proteins and intracellular fluids (Marcer and Schempp, 1996). Holographic memory theory applied to living organisms would allow for the storage of vast amounts of information both *inside* the physical body and, as Laszlo suggested, *outside* the body in the ambient *zero-point field*. The zero-point field, described below, pervades the entire physical universe, including intergalactic space as well as the space within all physical matter. The localized field, in and around the body, would thus be coupled with the much larger global field. The empathetic aspect of the near-death life review

may be one of the most significant examples of holographic memory retrieval. Through this process, the physical brain would effectively have access to a "collective unconscious" with instantaneous communication (Ho, 1998a; Marcer and Schempp, 1997).

The Quantum Hologram

Quantum physics involves fundamental interactions between physical matter and light. At this level of material reality, particles behave in peculiar ways that are not intuitively obvious, such as spontaneously tunneling through barriers to emerge instantaneously on the other side. The mathematical formalism of quantum physics is the language used to describe the quantum hologram (Marcer and Schempp, 1999). Edgar Mitchell (1999), who has further applied quantum theory to consciousness, stated that the "discovery of the non-local quantum hologram . . . provides the first quantum physical mechanism compatible with the macro-scale three-dimensional world as we experience it."

In simple terms, *quantum holography* can be described as a novel information-processing paradigm that explains human intra- and intercommunication. Such interactions involve processes on *all cosmological scales*, from subatomic particles to the interstellar (Marcer and Schempp, 1999). Quantum holography requires us to reconsider our classical view of space-time. One functional example of a quantum holographic information retrieval system is the magnetic resonance imaging (MRI) machine that hospitals routinely use to obtain internal images of the human body. Quantum holography models the workings of neurons in the brain and central nervous system, whose microtubules emit single-photon pulses of light. According to this theory, single-photon pulses of light *holographically encode information*. Nature may thus have evolved its own quantum holographic system, which utilizes fundamental particles of light that may literally communicate with the whole universe. The other structure relevant to quantum holographic communication and memory networks is DNA.

DNA's capacity for virtually unlimited holographic compression of data has been described by Marcer and Schempp (1996). DNA is considered to be a universal medium, or template, for the recording of holographic information. Previously, it was believed that DNA's principle function was to provide a template for an organism's physical structure. However, DNA's main function is currently theorized to be not structural, but rather one of communication. "*DNA therefore defines*

the unique spectral signature or set of frequencies onto which potentially the entire experience or history of an organism can be written (and read)" (Marcer and Schempp, 1996, p. 54). The nearly three billion DNA base pairs contained in every human cell can be thought of as an extensive stack of compact disks, each of which possesses enormous data storage capacity. According to this model, DNA's total base pairs comprise a read-write system of *virtually unlimited capacity*. Yet an organically-based, quantum holographic memory system requires one additional concept: the *zero-point field*.

The existence of the electromagnetic zero-point field has been experimentally demonstrated by Steve Lamoreaux (1997). The zero-point field is also referred to as the *quantum vacuum*, implying that a plenum, or abundance of matter and energy, exists in interstellar space, which was previously believed to be an empty void. All of space, including the voids between atoms within "solid" matter, contains enormous energy potential. Matter and energy are continuously created and annihilated, emerging spontaneously out of, and disappearing back into, the zero-point field. It is now widely accepted by physicists that the quantum vacuum is the underlying source of all matter and energy in the universe. Theoretically the energy potential of the vacuum is enormous, perhaps exceeding that of nuclear energy potential (Sokolov, 1996).

Marcer and Schempp (1997) described a quantum model of self-organization from the dynamic quantum vacuum by means of an emitter/absorber model of holography. As each particle emits and absorbs packets of energy or information, propagated through the medium of the zero-point field, the entire history of the particle is stored and accessible. The zero-point field has been proposed as the memory storage medium for *all* particle interactions, including interactions on a macroscopic scale, such as human memory of life events. Based on the holographic principle, long-term memory retrieval from the ambient zero-point field occurs when interference patterns are reconverted into the image of those objects or events originally recorded (Laszlo, 1995). In this model, the brain and central nervous system are viewed not as memory locations themselves, but rather as organic processes that interact directly with the zero-point field on a quantum level. David Lorimer has intuitively observed that near-death life reviews require "an interconnected web of creation, a holographic mesh in which the parts are related to the Whole and through the Whole to each other by empathetic resonance" (Lorimer, 1990, p. 22). For the first time, a scientifically rigorous biomechanical model is available through which this process can be described.

Perhaps the most significant finding to come out of this body of research is the application of quantum mechanical theory to the macroscopic world perceivable by the physical senses, as summarized by Mitchell (1999): "Further, recognition that the quantum hologram is a macro-scale, non-local, information structure described by the standard formalism of quantum mechanics extends quantum mechanics to all physical objects including DNA molecules, organic cells, organs, brains, and bodies."

Conclusion

According to current memory research, it is implausible that one's life, replete with minute details, can be remembered in its entirety, let alone reviewed in a matter of seconds. Such life reviews become even less credible if they include perceptions of those same events as experienced through the senses of others. Yet vividly empathic life reviews are commonly reported during near-death experiences. Moreover, such experiences are often subjectively described as occurring "outside of time and space," which is consistent with the concept of instantaneous communication. Previously there has been no non-dualistic, scientific mechanism for explaining how such communication can occur in the physical human body. Quantum holographic theory may afford an explanation for the physiological mechanism of near-death life reviews.

Quantum holography provides a theoretical model within which the human body may function as a non-local communication network. Microtubules and DNA within the liquid crystalline body are the quantum-scale structures and physical mechanisms required for this level of communication, in terms of (a) the sheer amount of sensory information and information recall, as well as (b) virtually instantaneous information recall. The zero-point field may further provide the medium within which unlimited amounts of information may be written and retrieved by quantum mechanical processes. The vast amount of sensory information and recall necessary for near-death life reviews would thus be realizable.

While the microtubule and DNA communication network would provide the means for an *individual's* memories, mediation by means of the zero-point field would serve to explain (c) the review of events from the perspective of those with whom the individual had interacted. The zero-point field is not only the source of all energy and matter, but the continuum through which non-local communications may occur across

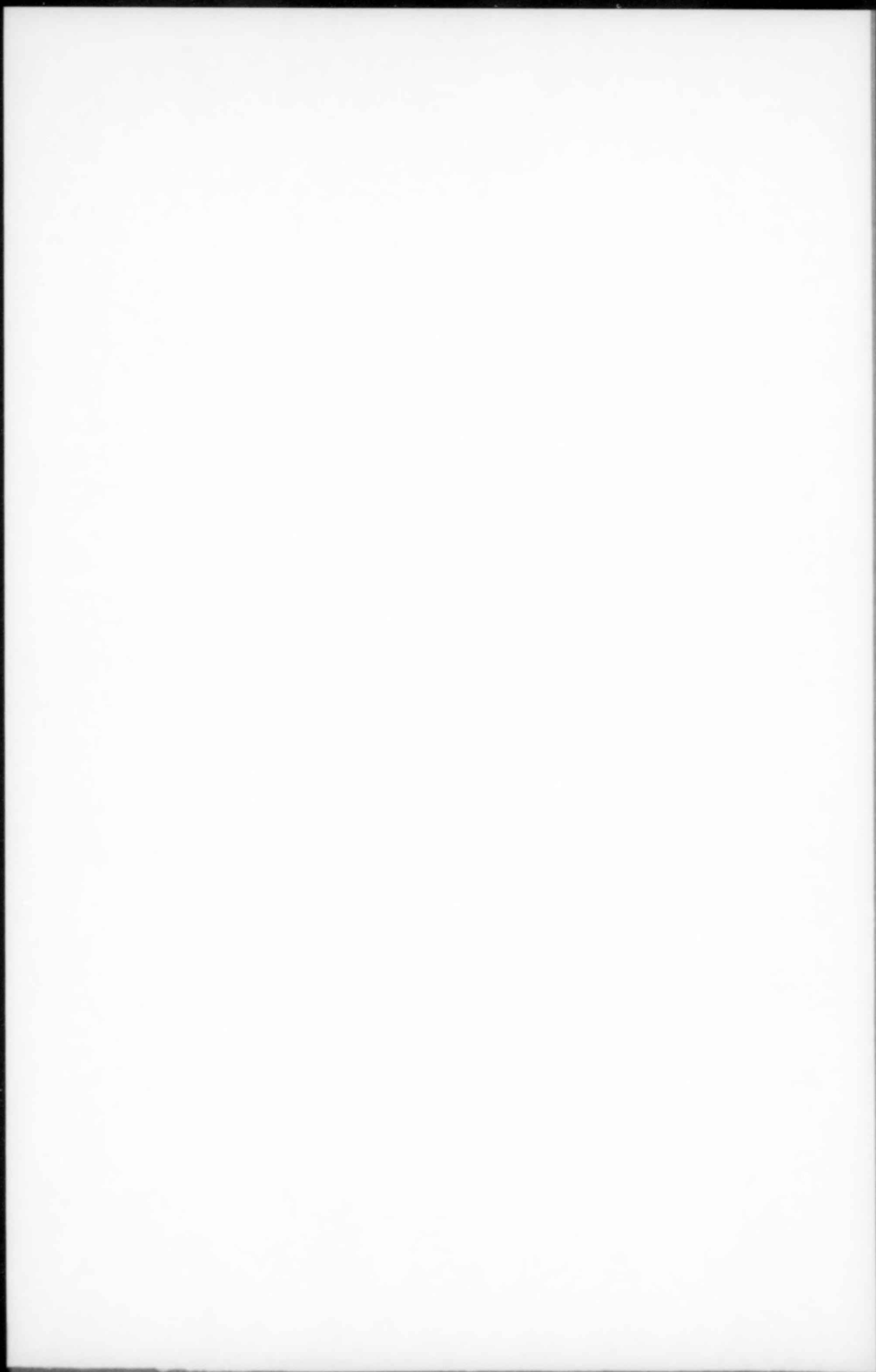
any distance. The zero-point field, being comprised of continuous quantum energy fluctuations, which are inherently non-local, would allow for instantaneous communication. This would allow sufficient "time" to elapse during the NDE for the entire life review to complete itself, despite the relatively short duration—in linear time—of NDEs. Moreover, a coherent zero-point field would be equally accessible to every human. Non-local communications mediated by means of the zero-point field would allow near-death experiencers to perceive their actions from the perspective of those with whom they interact, and so forth, until potentially "all lives being lived on this planet" are reviewed.

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BOOK REVIEW

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The Reintegration of Science and Spirituality: Subtle Matter, "Dark Matter," and the Science of Correspondence, by Deno Kazanis. Gainesville, FL: InstaBook, 2001, 137 pp., \$14.95, pb. (Second edition published 2002 by Styra Publications, Tampa, FL.)

The Reintegration of Science and Spirituality: Subtle Matter, "Dark Matter," and the Science of Correspondence is written by Deno Kazanis. Kazanis has a fascinating background. He received his master's degree in physics, and his doctoral degree in biophysics. In addition to his academic training, he has studied Tibetan Buddhism, Taoism and Waidankung, an intense form of quigong. With such a background, it is not surprising that Kazanis presents fascinating insights regarding the integration of his scientific and spiritual training.

I review this book from the perspective of a scientist, physician, and near-death experience (NDE) researcher. My perception is that Kazanis writes from a perspective significantly different from my own, heavily influenced predominantly by his study of Tibetan Buddhism and related teachings, and secondarily by his scientific knowledge of physics.

As part of his effort to integrate science and spirituality, Kazanis discusses the recent discovery of *dark matter*, one of the most mysterious discoveries of astrophysics in modern times (Rubin, 1998). As a necessary brief introduction to dark matter, astronomers have observed the outermost suns of spiral galaxies are revolving around the center of the galaxy more rapidly than can be accounted for by gravitational effects of observable mass. This, and other observations, led to the determination that approximately 80 to 90 percent of the gravitational force of galaxies is coming from matter that cannot be directly seen or detected by any

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known method. This dark matter may be either a form of conventional matter in a highly compressed and cool form, such as the remnant of a collapsed star; or a form of unknown atomic or subatomic particles; or both. These unknown particles might be substantially different from known matter. Current scientific understanding favors the hypothesis of unknown particles accounting for most dark matter.

This book's major theme is an exploration of the fascinating possibility that this dark matter is the link to a variety of unexplained observations, including NDEs. Kazanis does an excellent job presenting the concept of dark matter, as well as its possible link to such unexplained observations, in a manner that is both informative and easy to read. While some understanding of Eastern religion and science would be helpful to the reader, such background is by no means necessary to understand the material presented.

The *subtle matter* referred to in the book title is from Eastern mystical teachings regarding the unseen part of the universe that is at least partly understandable to those practicing certain Eastern religions. The *science of correspondence* referred to in the book title is "a functional metaphorical/analogical relationship between two logically unrelated objects or events. . . . This has to be experienced and cannot be intellectually grasped" (p. 86). The *science of correspondence* is a method of reasoning by analogy or metaphor. Clearly this is a difficult concept that is adequately explained in the book.

We start to see the difference between the author's and my own perspective of science and spirituality in the first sentence of the Preface, where Kazanis states: "Years ago as I was practicing Tibetan meditations which involved visualization of internal subtle structures of the human body (such as channels and chakras), I began to realize that there must be a physical basis for these structures" (p. iv).

Lacking any personal or professional background suggesting the existence of chakras, I asked myself what was known about any physical correlate of chakras, and whether chakras were accepted among conventional health scientists as real. I performed a literature search in The National Library of Medicine (NLM), an enormous searchable database of allied health science literature from all around the world, and in a variety of languages. Directly entering the term *chakra*, and searching NLM revealed only two articles that had the term *chakra* in the title (both Dutch journal articles from 1979), suggesting, consistent with my medical perspective, that the physical or physiological correlate of chakras is unknown to conventional health scientists. I then searched my database of 240 NDEs submitted to my web site

(www.nderf.org) for the term *chakra* and did not find the term. I then queried my NDE co-investigator, Jody Long, who is knowledgeable of, and personally believes in, the reality of chakras. Long had recently reviewed the aforementioned 240 NDE accounts, and could not recall any account describing awareness during any NDE of anything suggesting chakras.

The reader can quickly see the differences between the author's and my own belief systems. I do not claim either of our belief systems is superior to the other, but simply point out how differing belief systems make a consensus regarding the integration of science and spirituality difficult. This important concept is not discussed in the book.

Kazanis discusses a number of unexplained and controversial observations including astrology, herborology, and alchemy, and concludes: "Although science is unable to account for such events at this time, there is no reason for doubting that they can be accounted for, providing we expand our knowledge to include subtle bodies, subtle matter and subtle energy, which is, in essence, what science today calls 'dark matter'" (p. 118). This conclusion is difficult to accept given our very primitive understanding of dark matter. Basically, all that is known about dark matter is that it has gravity and does not interact with the known electromagnetic spectrum to allow it to be visualized. A conclusion linking dark matter to other mysterious phenomena seems very premature.

This brings up another concern. Relating dark matter to the realm of existence of a variety of phenomena (including NDEs) is an intriguing hypothesis, but I believe most readers will accept it is only a hypothesis. We are a long way from proving the validity, or lack thereof, of this hypothesis. One would expect a book about the integration of science and spirituality to be filled with such statement qualifiers as "possible," "perhaps," and "hypothesized," but there is a noticeable paucity of such qualifiers throughout the book.

By my perception, Kazanis represents the mystical teachings he is aware of as more reliable than science for the pursuit of spiritual growth. In the first chapter he states: "By turning inward mysticism has concentrated its exploration of the universe on those concepts which are of value to spiritual growth" (p. 20). Science is never similarly acknowledged as being of value for spiritual growth. At no point in the book did I encounter the recognition that the mystical teachings Kazanis discusses may need to undergo revision in the future as new understandings are developed. Yet Kazanis criticizes science for periodically, throughout history, representing its understandings as absolute and complete truth, only to be humbled by the next generation of scientific

discovery significantly changing accepted scientific understandings. Such criticism is certainly legitimate, yet this one-sided criticism of science does not help the difficult process of integrating science and spirituality. A substantial openmindedness and humility by all will be required by all to allow such integration. No single scientific or spiritual discipline has all the answers.

Kazanis, considering dark matter, makes the good point that "time-space relationships are dependent upon the type of matter one is conscious of, or experiencing. Clearly this would make it very difficult to communicate these experiences with only our usual sense of time and space" (p. 33). It is indeed a fascinating hypothesis that dark matter may be the unseen realm where NDEs occur. Such a hypothesis might account for the lack of direct visualization of NDEs in an out-of-body state, the NDEs' inability to interact physically with earthly objects, and the ineffable nature of many NDEs. Dark matter may have different laws of physics than our observable universe, perhaps at least partially accounting for the consistent observation by NDEs that the experience involved a sense of timelessness, telepathic communication, and nonphysical movement. This book has only a few paragraphs devoted to NDEs, consistent with the intent to discuss briefly how a wide variety of unexplained phenomena may be relate to dark matter.

Kazanis correctly points out that mystics are at least trying to answer some very big and important questions that science cannot. For example, science has very little to offer regarding questions about God, consciousness, and the meaning of life, to name a few. When we know so little about such important questions, it certainly seems reasonable to consider the thousands of years of collective wisdom of other cultures. This book is a good, very brief introduction to such beliefs. The concept of dark matter is intriguing and thus this book is recommended reading for those interested in how science and spirituality might be integrated. It is not the intent of this book to discuss NDEs in any depth, and readers interested in such a focus are advised to consider other books.

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Letter to the Editor

Shared NDEs

To the Editor:

I was pleased to note that the lead article in the Winter 2001 issue of the *Journal of Near-Death Studies* was on a subject I have previously raised among near-death experiencers, namely "shared near-death experiences" (NDEs). The examples in Glennys Howarth and Allan Kellehear's (2001) article are interesting in that they occurred long before Raymond Moody's book *Life After Life* (1975) made the phenomenon well known, and referred to "no corroborative feedback." However, what Howarth and Kellehear meant by "shared NDEs" was "participation in a dying person's NDE," and although that topic is valuable and interesting, it is unrelated to the shared experiences I have been researching.

The type of shared experience I hope to study occurs in a situation in which more than one person comes close to death in the same accident and they are aware of the other person(s) and describe similar events. At any time there are a multitude of mortals making the fantastic journey through the tunnel to a realm of light. Currently, the September 11, 2001 World Trade Towers attack is an extreme example in which a great many people simultaneously experienced the same scenario. If, among them, a few or even many did miraculously survive, would they report similar experiences? In my opinion, the answer would be "no," and thus far I am aware of only a single instance where there was a consciousness of another experiences.

I share Kenneth Ring's belief that up to the frequently reported "barrier" the person can be said to be still capable of recovering, and whether such a person chooses to pass or return raises fascinating aspects of the NDE that we may someday be able to understand. "Death watches" and "bedside vigils" involving healthy individuals are merely partial "participations," but we may yet learn a great deal from someone who truly shares an NDE and returns to tell us about it. Howarth and Kellehear's article might bring to light this sort of "shared" NDE.

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