

SOME NEUROPSYCHOLOGICAL CORRELATES OF THE PHYSIO-KUNDALINI SYNDROME

Bruce Greyson
Charlottesville, Virginia

ABSTRACT: In Eastern traditions, *kundalini* is the biological mechanism of both individual enlightenment and evolution of the species toward higher consciousness. If one purpose of kundalini is biological evolution, then arousal of kundalini should be accompanied by physiological changes. This article explores the relationships between kundalini arousal and self-reported measures of selected neuropsychological variables. From among the members of an organization interested in spiritual and mystical experiences, 321 participants completed self-reported measures of kundalini arousal and of selected neuropsychological variables. A multiple regression analysis suggested that kundalini arousal was significantly related to measures of fantasy proneness, dissociation, absorption, and temporal-limbic hyperconnection, but not to right-brain dominance or to demographic variables. Although self-reported measures of neuropsychological variables significantly predicted kundalini arousal, the author is uncertain whether the kundalini arousal caused these neuropsychological effects or whether persons with this distinct neuropsychological profile were more vulnerable to kundalini arousal.

In Eastern spiritual traditions, *kundalini* is the biological mechanism of both individual enlightenment and evolution of the species toward higher consciousness, a potential force that, once aroused, can produce a variety of mental, emotional, physical, and spiritual effects. The ancient yogic texts described a life energy called *prana* present in all living beings; corollary energies have been described in many other cultures, such as *huo* and *chi* in taoist tradition, the "boiling energy" or *num* of the Kalahari !Kung, *tumo* of Tibetan yogis, *quaumaneq* of Eskimo shamans, *incendium amoris* and *photismos* of Christian mystics, Henri Bergson's *élan vital*, and the more recent terms *bioenergy*, *bioplasma*, and *orgone energy*.

Kundalini has been described as a normally dormant mechanism or organizing principle that can be activated or awakened under certain conditions to strengthen or purify an individual's *prana*, transforming its effects upon the individual. Comparable potential forces or organizing principles also have been described in other traditions, as, for example, *shakti*, the Odic force, the Holy Spirit, the Pearl of Great Price, the Serpent Power, the Rod of Aaron, the Sacred Fire, Osiris, and the Sun Behind the Sun (Kason, Bradford, Pond, & Greenwell, 1993; Murphy, 1992; Sannella, 1987). Krishna held kundalini responsible for life itself (Krishna, 1972) and for the sexual drive, creativity, genius, longevity, and vigor (Krishna, 1974). Although his descriptions of this energy's travels from the base of the spine upward

The author gratefully acknowledges the support of The Nagamasa Azuma Fund and the Bernstein Brothers Foundation, and the statistical advice of Brent Evans and of an anonymous reviewer.
Copyright © 2001 Transpersonal Institute

through channels to a dormant chamber in the brain called the *brahma randhra* do not translate easily into Western anatomy and physiology, Krishna (1972, 1975) predicted that Western science would validate his teachings.

Bentov (1977), a biomedical engineer studying the physiological effects of altered states of consciousness, identified a predictable progression of sensory and motor symptoms that could be triggered under certain circumstances that were said to arouse kundalini. Although he acknowledged that kundalini involves spiritual forces beyond these physiological symptoms, he outlined what he called the "physio-kundalini syndrome" as a biological marker of aroused kundalini. Bentov attributed this physiological syndrome not to energy rising through the body, but to acoustical standing waves in the cerebral ventricles depolarizing the sensory and motor cortices of the brain.

Some kundalini scholars maintain that the physio-kundalini syndrome described by Bentov oversimplifies the concept of kundalini and ignores the critically important spiritual evolutionary features that define the process; others maintain further that the physiological symptoms do not represent kundalini activation at all, but rather effects of unpurified *prana* (Greenwell, 1990; Kieffer, 1994; Scott, 1983). However, theoretical arguments and empirical evidence suggest that the physio-kundalini constellation of symptoms is a reliable biological marker for aroused kundalini (Greyson, 1993a, 1993b).

Western researchers have linked kundalini to near-death experiences (NDEs), the profound spiritual or mystical experiences that some persons report as they approach or start to cross the threshold of death. Ring (1984) speculated that either kundalini is the energy underlying NDEs, or NDEs can stimulate the arousal of kundalini. He subsequently reported that persons who had NDEs were three times more likely to acknowledge physical manifestations of kundalini activation than were persons who expressed interest in NDEs but had never had one themselves (Ring, 1992). Grey (1985) noted similarities between the precipitants and after effects of both NDEs and kundalini arousals and concluded that both were manifestations of the same process. Kieffer (1994) argued that as one approaches death, kundalini potentiates the body's *prana* and directs it to the dying brain in a life-saving effort, the overwhelming rush of purified energy producing visions and other NDE phenomena. Kason (1994) identified kundalini as the mechanism underlying NDEs. Wile (1994) described a speculative neuroanatomical mechanism by which kundalini may effect NDEs, and Jourdan (1994) outlined a neurochemical model of kundalini and its relationship to NDEs.

From descriptions of kundalini arousal in ancient and modern literature, I developed a 19-item dichotomous questionnaire, the Physio-Kundalini Syndrome Index, described elsewhere (Greyson, 1993a, 1993b) as a tool to study kundalini and its effects. Motor symptoms in the Physio-Kundalini Syndrome Index include the body assuming and maintaining strange positions for no apparent reason, the body becoming frozen or locked into strange positions and immovable, the breath spontaneously stopping or changing dramatically for no apparent reason, and spontaneous bodily movements. Somatosensory symptoms included a spontaneous ecstatic tickle or orgasmic feeling, physical sensations starting in the feet or pelvis and

moving up the back to the top of the head and then down the front to the abdomen, extreme sensations of heat or cold moving through the body for no apparent reason, localized bodily pain that starts and stops abruptly for no apparent reason, and a vibration or itching under the skin for no apparent reason. Audiovisual symptoms included internal noises, internal voices, and internal lights or colors. Mental symptoms included observing oneself and one's thoughts as if one were a bystander, sudden intense positive or negative emotions for no apparent reason, thoughts spontaneously and dramatically speeding or slowing, and experiencing oneself as larger than the physical body.

A sample of 153 persons who had had NDEs acknowledged a mean of 7.6 of the 19 items on this kundalini scale, whereas comparison groups acknowledged significantly fewer: a mean of 4.6 items among 55 persons who had come close to death but had not had an NDE and among 113 persons who had never come close to death (Greyson, 1993a), and a mean of 4.9 items among 138 hospitalized psychiatric patients (Greyson, 1993b). Results of a post-hoc test indicated that people who reported NDEs did not also endorse more kundalini items simply because of a positive response bias: A sample of 11 persons who reported NDEs but whose scores on the NDE Scale (Greyson, 1983) did not confirm their experiences ("false-positive" NDE reporters) acknowledged a mean of only 4.5 kundalini items, whereas a sample of 18 persons who denied having had an NDE but whose scores on the NDE Scale confirmed that they did in fact have one ("false-negative" NDE deniers) acknowledged a mean of 7.7 kundalini items (Greyson, 1993a).

If the purpose of kundalini, as Krishna and others have argued, is the biological and spiritual evolution of the species, then arousal of kundalini should be accompanied by physiological changes as well as spiritual enlightenment. This article explores the relationships between kundalini arousal as measured by the Physio-Kundalini Syndrome Index and self-reported measures of selected neuropsychological variables. Five neuropsychological variables were selected for study on the basis of anecdotal reports and theoretical speculations suggesting that they may be associated with kundalini arousal.

The first neuropsychological trait selected for study was cerebral dominance. The idea that the two halves of the brain operate in different ways and that certain people may be more prone to function in a "left-brain" mode or in a "right-brain" mode has waxed and waned in popularity during the past century. Although most neuroscientists now acknowledge that the two halves of the brain usually work together in concert and that brain tissue is fairly flexible in its function, so that when one area is damaged other areas can take over its functions, it is still generally accepted that there are ways of thinking that are more or less specialized to one or the other cerebral hemisphere. Generally speaking, right-brain information-processing tactics are usually described as being intuitive, open-ended, spatial, dealing with global ideas and relationships, focusing on summaries, and nonconformist; whereas left-brain information processing is usually described as being logical, structured, dealing with facts and sequencing, focusing on detailed outlines, and conformist. In most people, these are not competing strategies, but complementary ones, and for most tasks, most persons use both sides of the brain. Nevertheless, it is possible to characterize individuals'

preferred thinking and learning styles as being predominantly right-brain, left-brain, or mixed. It was hypothesized that kundalini arousal would foster the use of an intuitive, unstructured, nonconformist right-brain thinking style, rather than a logical, structured, conformist left-brain thinking style.

The second neuropsychological trait selected for study was a construct that its discoverers, neurologists Bear and Fedio (1977), called "temporal-limbic hyperconnection." In trying to ascertain whether people who suffer from temporal lobe epilepsy have distinctive personality traits *between* their seizures, they identified 18 characteristics that appeared to differentiate epileptics from nonepileptics. Bear and Fedio emphasized that many of these traits are not in themselves pathologic, but that the constellation of these personality traits is characteristic of persons with temporal lobe seizures. These postulated interictal traits included emotional states such as sadness, emotionality, aggression, guilt, anger, and elation; thought patterns such as humorlessness, attention to detail, orderliness, and "viscosity" (repetitiveness and persistence); behavior patterns such as dependence, "hypergraphia" (tendency to write things down), philosophic interests, and altered sexuality; and beliefs such as a sense of personal destiny, religious convictions, paranoia, and hypermoralism.

Bear and Fedio (1977) found that epileptic patients reported significantly more of these traits than did patients with other neurological disorders or healthy comparison subjects. They postulated that temporal lobe seizures stimulate new connections between the cerebral cortex and the limbic lobe, the seat of emotions, so that previously neutral events or ideas start to elicit strong emotional responses. They hypothesized that this enhanced emotional coloring of events fosters a mystical worldview and a sense of having an important personal destiny. Thus they called this syndrome temporal-limbic hyperconnection.

Many clinicians and researchers have speculated on the role of the temporal lobes, particularly the right temporal lobe, in paranormal and mystical experiences, based largely on observations of patients with temporal lobe seizures or on electrical stimulation of the temporal lobes (Dewhurst & Beard, 1970; Hurst & Neppe, 1981; Morneau, MacDonald, & Holland, 1996; Neppe, 1980, 1983, 1984, 1990; Ogata & Miyakawa, 1998; Persinger, 1983, 1984a, 1984b, 1993a, 1993b; Persinger & Fisher, 1990; Persinger & Vailliant, 1985; Tucker, Novelly, & Walker, 1987). It was hypothesized that because kundalini arousal is said to enhance mystical experiences and spirituality, it would increase temporal-limbic hyperconnection traits, particularly those of religiosity, philosophic interest, sense of personal destiny, and perhaps hypermoralism, hypergraphia, and elation.

The third neuropsychological variable selected for study was a controversial construct that has been called "fantasy-proneness." In an intensive-interview study of excellent hypnotic subjects, Wilson and Barber (1981, 1983a) discovered and named this trait, characterized by a strong investment in fantasy life, vivid hallucinatory ability, intense sensory experience, and excellent eidetic memory. They hypothesized that fantasizers' intense involvement in imagination represents the adaptive extreme end of a continuum and that fantasy-proneness may develop either as a means of coping with childhood trauma or neglect or through early encouragement of fantasy by significant adults.

In a series of studies investigating fantasy-proneness, Lynn and Rhue (1986, 1988) corroborated that fantasizers outperformed less-fantasy-prone participants on measures of hypnotizability, vividness of mental imagery, response to waking suggestion, and creativity. They also confirmed Wilson and Barber's observations as to the adaptive nature of fantasy-proneness: Fantasizers in their studies had adequate reality testing and a rich affective and cognitive life, were in touch with social norms, were cognitively and affectively versatile and well-adjusted, and had many close friends and positive self-concepts. Wilson and Barber (1983a) suggested that fantasizers may be more likely than the rest of the population to report paranormal phenomena such as NDEs and out-of-body experiences, religious visions, apparitions, and psychic abilities; correlational studies have substantiated that fantasy-proneness is significantly associated with reports of NDEs and other paranormal or mystical phenomena (Council & Greyson, 1985; Council, Greyson, & Huff, 1986). It was therefore hypothesized that kundalini arousal would also be associated with fantasy-proneness.

The fourth neuropsychological trait selected for study was a related construct called "absorption" by its identifiers, Tellegan and Atkinson (1974). Absorption is the tendency to focus attention on imaginative or selected sensory experiences to the exclusion of other events in the external environment. Although this concentrated attention is central to hypnosis, absorption is generally not considered to be synonymous with hypnotizability but is rather one of several traits that contribute to hypnotic susceptibility. Because significant associations have been documented between absorption and reports of NDEs and other paranormal or mystical phenomena (Council & Greyson, 1985; Council, Greyson, & Huff, 1986), it was hypothesized that kundalini arousal would also be associated with absorption.

The final neuropsychological variable selected for study was a tendency toward dissociation, an unconscious defense mechanism in which emotions are separated from ideas or situations, so that experiencing the emotional impact of a traumatic event can be delayed until a safer time. Although *dissociative disorder*, which is characterized by persistent, recurrent, or chronic dissociation, is recognized as a psychiatric diagnosis, dissociation by itself is a common defense mechanism without necessarily pathologic connotations.

Ring (1992) suggested that dissociation might account for what he called "sensitivity to alternate realities." He suggested that people who have psychic or mystical experiences may have dissociative *tendencies* even though they do not manifest dissociative *disorders*. He proposed a developmental theory of sensitivity to extraordinary experiences, in which childhood trauma stimulates the development of a dissociative response style as a psychological defense. Dissociating allows a child to "tune out" threatening aspects of the environment by splitting himself or herself off from the sources of those threats. It also allows the child to "tune into" alternate realities where, by virtue of the dissociated state, he or she can feel safe regardless of what is happening to the body.

Ring argued, however, that attunement to alternate realities is not a result of dissociation alone, which only *allows* it, but of a combination of dissociation and absorption. According to this model, in order to perceive alternate realities, an individual must both transcend the sensory world through dissociation and attend to internal states

through absorption. Individuals able to do this, Ring argued, would be well accustomed to such unusual states of consciousness by virtue of this kind of psychological conditioning; because of their history of familiarity with these "alternate realities," it is easier for them to "flip" into alternate modes of consciousness and to see, hear, and feel experiences that others might ignore. It was hypothesized that sensitivity to sensations of kundalini arousal would be associated with dissociative tendencies.

METHODS

Participants were recruited from among the members of the International Association for Near-Death Studies, an organization of some 2000 people founded to promote research into near-death phenomena. Its members are interested in spiritual and mystical experiences, but they are not particularly familiar with the concept of kundalini. Members were invited to complete a questionnaire by mail to explore "certain physical symptoms people sometimes have"; 321 persons volunteered and completed the Physio-Kundalini Syndrome Index. Those volunteer participants were then mailed standardized self-reporting questionnaires designed to measure the neuropsychological variables of interest. Because not all participants completed and returned all the questionnaires, the numbers included in these analyses varied from instrument to instrument, as noted below.

Cerebral dominance was measured by the Human Information Processing Survey (Torrance & Reynolds, 1980; Torrance, Reynolds, Riegel, & Ball, 1977), developed by developmental psychologists to explore differing learning styles among students and later expanded to assess right- and left-brain learning and thinking modes. This instrument presents 40 dichotomous choices, from which the respondent can choose either one or the other, or both. Examples include being better at remembering faces, names, or either and responding better to verbal instruction, instruction by example, or either. Temporal-limbic hyperconnection was measured by Bear and Fedio's (1977) Personal Inventory, a 100-item true-false questionnaire that includes 5 statements for each of their 18 traits and 10 items from the Lie scale of the Minnesota Multiphasic Personality Inventory.

Fantasy-proneness was measured by the Inventory of Childhood Memories and Imaginings, a 52-item true-false questionnaire developed by Wilson and Barber (1983b) that is based on their interview schedule. Absorption was measured by Tellegan and Atkinson's (1974) Absorption Scale, a 36-item true-false questionnaire. Dissociative tendencies were measured with Bernstein and Putnam's (1986) Dissociative Experiences Scale, an instrument that asks how frequently respondents experience 28 types of dissociation, ranging from blatantly pathological items such as failing to recognizing oneself in a mirror to common and benign items such as being able to ignore pain.

Because these five self-reported measures of neuropsychological variables overlap to some degree both in theoretical construct and in specific scale items, a multiple regression analysis was carried out, with scores on the Physio-Kundalini Syndrome Index as the dependent variable, and self-reported measures of neuropsychological constructs and significant demographic variables as covariates.

RESULTS

Demographic Variables and the Physio-Kundalini Syndrome Index

Of the 321 participants in this study, 181 (56%) were women and 140 (44%) were men. The mean age of the sample was 49.4 years ($SD = 13.3$), with a range of 20 to 86 years. Of the 321 participants who answered a question about religious preference, 140 (44%) described themselves as Protestant, 54 (17%) as Roman Catholic, 28 (9%) as Jewish, 33 (10%) as having some other religious preference, and 66 (21%) indicated no preference. Of the 319 participants who answered a question about education, 49 (15%) had earned a doctoral degree, 96 (30%) had some postgraduate study short of a doctoral degree, 135 (42%) had attended undergraduate college, and 39 (12%) had not attended college.

The mean score on the Physio-Kundalini Syndrome Index was 6.04 ($SD = 4.39$), with a range of 0 to 19. Scores on the Physio-Kundalini Syndrome Index were negatively correlated with participants' age ($r = -.20$, $n = 321$, $p < .001$); that is, younger participants tended to acknowledge more physio-kundalini symptoms. The mean score on the Physio-Kundalini Syndrome Index for women was 6.85 ($SD = 4.47$), whereas the mean score for men was 5.00 ($SD = 4.06$). That gender difference was statistically significant ($t = 3.827$, $df = 319$, $p < .001$). Mean scores on the Physio-Kundalini Syndrome Index were 5.36 ($SD = 3.88$) for Protestants, 6.70 ($SD = 4.88$) for Catholics, 6.68 ($SD = 5.33$) for Jews, 6.52 ($SD = 4.45$) for subjects with some other religious preference, and 6.48 ($SD = 4.49$) for subjects with no preference. Differences between religions were not statistically significant ($F = 1.57$; $df = 4, 314$; $p = .182$).

Mean scores on the Physio-Kundalini Syndrome Index were 4.08 ($SD = 3.54$) for participants with a doctoral degree, 5.40 ($SD = 4.13$) for those with some postgraduate study short of a doctoral degree, 7.03 ($SD = 4.61$) for those who had attended undergraduate college, and 6.67 ($SD = 4.34$) for those who had not attended college. Differences between educational levels were statistically significant ($F = 6.82$; $df = 3, 315$; $p < .001$). A post-hoc Scheffé test suggested that scores were significantly different between subjects who had some postgraduate study with or without a doctoral degree on the one hand and subjects who had attended only undergraduate college or no college on the other hand. Therefore, for subsequent statistical analysis, educational level was divided into those 174 participants (55%) who had had some postgraduate study and those 145 participants (45%) who had not. The mean scores on the Physio-Kundalini Syndrome Index were 4.95 ($SD = 3.97$) for the first group and 6.95 ($SD = 4.54$) for the second group, a difference that was statistically significant ($t = -4.14$, $df = 317$, $p < .001$). That is, participants without postgraduate study tended to report more physio-kundalini symptoms.

Neuropsychological Variables

The Human Information Processing Inventory, measuring cerebral dominance, is constructed so that positive scores indicate more right-brain dominance and negative scores indicate more left-brain dominance. The mean score of the 294 participants who completed this instrument was 6.43 ($SD = 30.77$), with a possible range

from 40 to -40. The zero-order correlation between scores on the Human Information Processing Inventory and scores on the Physio-Kundalini Syndrome Index was significant ($r = .33, n = 294, p < .001$).

The mean score of the 288 participants who completed the Personal Inventory measuring temporal-limbic hyperconnection was 27.63 ($SD = 12.77$) out of a possible score of 100. The zero-order correlation between scores on the Personal Inventory and scores on the Physio-Kundalini Syndrome Index was also significant ($r = .42, n = 287, p < .001$).

The mean score of the 175 participants who completed the Inventory of Childhood Memories and Imaginings, measuring fantasy-proneness, was 23.58 ($SD = 7.49$) out of a possible score of 52. The zero-order correlation between scores on the Inventory of Childhood Memories and Imaginings and scores on the Physio-Kundalini Syndrome Index was also significant ($r = .64, n = 311, p < .001$).

The mean score of the 172 participants who completed the Absorption Scale was 23.39 ($SD = 6.57$) out of a possible score of 36. The zero-order correlation between scores on the Absorption Scale and those on the Physio-Kundalini Syndrome Index was also significant ($r = .60, n = 306, p < .001$).

The Dissociative Experiences Scale is constructed so that scores reflect the percentage of time that respondents acknowledge experiencing various types of dissociation. The mean score of the 280 participants who completed the Dissociative Experiences Scale was 12.88 ($SD = 11.51$). The zero-order correlation between scores on the Dissociative Experiences Scale and scores on the Physio-Kundalini Syndrome Index was also significant ($r = .57, n = 280, p < .001$).

The multivariate regression coefficient for the association of Physio-Kundalini Syndrome Index scores with these significant demographic and neuropsychological variables was statistically significant ($R = .72; F = 55.15; df = 5, 253; p < .001$). Standardized regression coefficients (betas) between scores on the Physio-Kundalini Syndrome Index and each of these covariates, holding the remaining covariates constant, are presented in Table 1 in order of magnitude, along with the corresponding t values and significance levels. Table 1 also displays the unstandardized coefficient (B) for each variable, along with its 95% confidence interval. As indicated by these data, scores of self-reported measures of fantasy-proneness, dissociation, absorption, and temporal-limbic hyperconnection were significantly predictive of scores on the Physio-Kundalini Syndrome Index, whereas cerebral dominance and demographic variables were not.

DISCUSSION

The self-reported measures that were most strongly predictive of aroused kundalini were the Inventory of Childhood Memories and Imaginings (measuring fantasy-proneness), the Dissociative Experiences Scale, and the Absorption Scale. That finding supports the study hypotheses that persons with aroused kundalini would be good hypnotic subjects, have vivid mental imagery, be creative, enjoy a rich fantasy life, and exercise unusual access to internal states.

TABLE 1
MULTIPLE REGRESSION ANALYSIS OF PHYSIO-KUNDALINI SYNDROME INDEX (PKSI) SCORES

Variable	Standardized coefficient (beta)	<i>t</i>	<i>p</i>	Unstandardized coefficient (B)	95% confidence interval
ICMI	.311	4.75	<.001	.158	.092 to .223
DES	.244	4.50	<.001	.079	.045 to .114
Absorption	.185	2.82	.005	.101	.030 to .171
Personal inventory	.121	2.35	.020	.040	.006 to .073
Education	-.081	-1.70	.091	-.704	-1.522 to .144
HIP	.044	0.87	.384	.006	-.008 to .020
Gender	.013	0.26	.792	.110	-.710 to .930
Age	-.007	-0.16	.875	.002	-.032 to .027

ICMI indicates Inventory of Childhood Memories and Imaginings; DES, Dissociative Experiences Scale; HIP, Human Information Processing Inventory.

The self-reported measure of temporal-limbic hyperconnection, the Personal Inventory, was also predictive of kundalini arousal, as hypothesized. That association may suggest either that the physio-kundalini syndrome is a result of altered temporal lobe physiology or that kundalini arousal alters temporal lobe function; it may also indicate that temporal-limbic hyperconnection is a biological marker that is associated with kundalini but not necessarily causally connected to it.

The self-reported measure of cerebral dominance, the Human Information Processing Survey, was not significantly predictive of kundalini arousal when other covariates were held constant. Therefore, the study hypothesis that kundalini arousal would foster an intuitive, unstructured, nonconformist right-brain thinking style was not confirmed. It should be noted, however, that the Human Information Processing Survey measures respondents' *preferences* for using right- or left-brain information processing strategies, not necessarily their skill at using them.

Those demographic variables that bore significant zero-order correlations with scores on the Physio-Kundalini Syndrome Index—younger age, female sex, and postgraduate education—were no longer significant when corrected for the neuropsychological constructs of interest. The population sampled for this study included members of an organization founded to promote research into mystical experiences; this organization includes academic researchers, clinicians, and experiencers themselves. Those researchers and clinicians in the sample tended to be older, predominantly male, and more highly educated than the experiencers. Those correlations may explain why age, gender, and education appeared to be associated with kundalini arousal until the relevant neuropsychological constructs were held constant.

In summary, it appears that kundalini arousal is accompanied by a distinctive neuropsychological profile, as persons who report many physio-kundalini symptoms also tend to score highly on self-reported measures of fantasy-proneness, dissociation, absorption, and temporal-limbic hyperconnection. These correlational data do not allow us to differentiate between cause and effect. Although these self-reported measures of neuropsychological variables reliably predicted scores on the Physio-Kundalini Syndrome Index, we cannot say whether the kundalini arousal causes or facilitates these neuropsychological effects, or whether persons with this distinct neuropsychological profile are more vulnerable to kundalini arousal. That question can best be answered by longitudinal studies of persons before and after their kundalini arousals. It must also be borne in mind that the measures used in this study were self-reports of neuropsychological constructs and not objective measures of neuropsychological functioning.

The finding of a distinct neuropsychological profile as a biological marker of kundalini arousal has therapeutic and theoretical implications. Psychotherapists treating clients with problems associated with kundalini arousals should be aware of these neuropsychological differences, irrespective of cause and effect. Kundalini researchers may find these data consistent with Krishna's claim that kundalini is the organizing force behind biological and spiritual evolution: Kundalini arousal appears to be accompanied by specific neurobiological distinctions, as must any engine of biological evolution. This study demonstrates the credibility and value of empirical methods in the study of transpersonal psychological phenomena. Further research in these directions might include participants from a more diverse population and employ direct measurements of neuropsychological function rather than self-reported measures completed by mail survey.

REFERENCES

- BEAR, D. M., & FEDIO, P. (1977). Quantitative analysis of interictal behavior in temporal lobe epilepsy. *Archives of Neurology*, 34, 454-467.
- BENTOV, I. (1977). *Stalking the wild pendulum: On the mechanics of consciousness*. New York: Dutton.
- BERNSTEIN, E. M., & PUTNAM, F. W. (1986). Development, reliability, and validity of a dissociation scale. *Journal of Nervous and Mental Disease*, 174, 727-735.
- COUNCIL, J. R., & GREYSON, B. (1985). *Near-death experiences and the "fantasy-prone" personality*. Paper presented at the American Psychological Association 93rd annual convention, Los Angeles.
- COUNCIL, J. R., GREYSON, B., & HUFF, K. D. (1986). *Fantasy-proneness, hypnotizability, and reports of paranormal experiences*. Paper presented at the American Psychological Association 94th annual convention, Washington, DC.
- DEWHURST, K., & BEARD, A. W. (1970). Sudden religious conversions in temporal lobe epilepsy. *British Journal of Psychiatry*, 117, 497-507.
- GREENWELL, B. (1990). *Energies of transformation: A guide to the kundalini process*. Cupertino, CA: Shakti River Press.
- GREY, M. (1985). *Return from death: An exploration of the near-death experience*. London: Arkana.
- GREYSON, B. (1983). The Near-Death Experience Scale: Construction, reliability, and validity. *Journal of Nervous and Mental Disease*, 171, 369-375.

- GREYSON, B. (1993a). Near-death experiences and the physio-kundalini syndrome. *Journal of Religion and Health*, 32, 277-290.
- GREYSON, B. (1993b). The physio-kundalini syndrome and mental illness. *Journal of Transpersonal Psychology*, 25, 43-58.
- HURST, L. A., & NEPPE, V. M. (1981). A familial study of subjective paranormal experience in temporal lobe dysfunction subjects. *Parapsychological Journal of South Africa*, 2(2), 56-64.
- JOURDAN, J.-P. (1994). Near-death and transcendental experiences: Neurophysiological correlates of mystical traditions. *Journal of Near-Death Studies*, 12, 177-200.
- KASON, Y. (1994). Near-death experiences and kundalini awakening: Exploring the link. *Journal of Near-Death Studies*, 12, 143-157.
- KASON, Y., BRADFORD, M., POND, P., & GREENWELL, B. (1993). Spiritual emergence syndrome and kundalini awakening: How are they related? In *Academy of Religion and Psychical Research 1992 Annual Conference Proceedings* (pp. 86-118). Bloomfield, CT: Academy of Religion and Psychical Research.
- KIEFFER, G. (1994). Kundalini and the near-death experience. *Journal of Near-Death Studies*, 12, 159-176.
- KRISHNA, G. (1972). *The biological basis of religion and genius*. New York: Harper and Row.
- KRISHNA, G. (1974). *What is and is not higher consciousness*. New York: Julian Press.
- KRISHNA, G. (1975). *The awakening of kundalini*. New York: Dutton.
- LYNN, S. J., & RHUE, J. W. (1986). The fantasy-prone person: Hypnosis, imagination, and creativity. *Journal of Personality and Social Psychology*, 51, 404-408.
- LYNN, S. J., & RHUE, J. W. (1988). Fantasy-proneness: Hypnosis, developmental antecedents, and psychopathology. *American Psychologist*, 43, 35-44.
- MORNEAU, D. M., MACDONALD, D. A., & HOLLAND, C. J. (1996). A confirmatory study of the relation between self-reported complex partial epileptic signs, peak experiences, and paranormal beliefs. *British Journal of Clinical Psychology*, 35(Pt 4), 627-630.
- MURPHY, M. (1992). *The future of the body: Explorations into the further evolution of human nature*. Los Angeles: Tarcher.
- NEPPE, V. M. (1980). Subjective paranormal experience and temporal lobe symptomatology. *Parapsychological Journal of South Africa*, 1(2), 78-98.
- NEPPE, V. M. (1983). Temporal lobe symptomatology in subjective paranormal experiences. *Journal of the American Society for Psychical Research*, 77, 1-29.
- NEPPE, V. M. (1984). The temporal lobe and anomalous experience. *Parapsychological Journal of South Africa*, 5, 36-47.
- NEPPE, V. M. (1990). Anomalistic experience and the cerebral cortex. In S. Krippner (Ed.), *Advances in parapsychological research* (Vol. 6, pp. 161-183). Jefferson, NC: McFarland.
- OGATA, A., & MIYAKAWA, T. (1998). Religious experiences in epileptic patients with a focus on ictus-related episodes. *Psychiatry & Clinical Neurosciences*, 52, 321-325.
- PERSINGER, M. A. (1983). Religious and mystical experiences as artifacts of temporal lobe functions: A general hypothesis. *Perceptual & Motor Skills*, 57, 1255-1262.
- PERSINGER, M. A. (1984a). Persons who report religious experiences may also display enhanced temporal-lobe signs. *Perceptual & Motor Skills*, 58, 963-975.
- PERSINGER, M. A. (1984b). Propensity to report paranormal experiences is correlated with temporal lobe signs. *Perceptual & Motor Skills*, 59, 583-586.
- PERSINGER, M. A. (1993a). Paranormal and religious beliefs may be mediated differentially by subcortical and cortical phenomenological processes of the temporal (limbic) lobes. *Perceptual & Motor Skills*, 76, 247-251.
- PERSINGER, M. A. (1993b). Vectorial cerebral hemisphericity as differential sources for the sensed presence, mystical experiences and religious conversions. *Perceptual & Motor Skills*, 76, 915-930.
- PERSINGER, M. A., & FISHER, S. D. (1990). Elevated, specific temporal lobe signs in a population engaged in psychic studies. *Perceptual & Motor Skills*, 71, 817-818.

- PERSINGER, M. A., & Vailliant, P. M. (1985). Temporal lobe signs and reports of subjective paranormal experiences in a normal population: A replication. *Perceptual & Motor Skills*, 60, 903-909.
- RING, K. (1984). *Heading toward omega: In search of the meaning of the near-death experience*. New York: Morrow.
- RING, K. (1992). *The Omega Project: Near-death experiences, UFO encounters, and mind at large*. New York: Morrow.
- SANNELLA, L. (1987). *The kundalini experience: Psychosis or transcendence?* Lower Lake, CA: Integral Publishing.
- SCOTT, M. (1983). *Kundalini in the physical world*. London: Routledge and Kegan Paul.
- TELLEGAN, A., & ATKINSON, G. (1974). Openness to absorbing and self-altering experiences ("absorption"), a trait related to hypnotic susceptibility. *Journal of Abnormal Psychology*, 83, 268-277.
- TORRANCE, E. P., & REYNOLDS, C. R. (1980). *Preliminary norms: Technical manual for Your Style of Learning and Thinking—Form C*. Athens, GA: Georgia Studies of Creative Behavior, University of Georgia.
- TORRANCE, E. P., REYNOLDS, C. R., RIEGEL, T., & BALL, O. E. (1977). Your Style of Learning and Thinking: Preliminary norms, abbreviated technical notes, scoring keys, and selected references. *Gifted Child Quarterly*, 21, 563-573.
- TUCKER, D. M., NOVELLY, R. A., & WALKER, P. J. (1987). Hyperreligiosity in temporal lobe epilepsy: Redefining the relationship. *Journal of Nervous & Mental Disease*, 175, 181-184.
- WILE, L. C. (1994). Near-death experiences: A speculative neural model. *Journal of Near-Death Studies*, 12, 133-142.
- WILSON, S. C., & BARBER, T. X. (1981). Vivid fantasy and hallucinatory abilities in the life histories of excellent hypnotic subjects ("Somnambules"): Preliminary report with female subjects. In E. Klinger (Ed.), *Imagery: Vol. 2. Concepts, results, and applications* (pp. 133-149). New York: Plenum.
- WILSON, S. C., & BARBER, T. X. (1983a). The fantasy-prone personality: Implications for understanding imagery, hypnosis, and parapsychological phenomena. In A. A. Sheikh (Ed.), *Imagery: Current theory, research, and application* (pp. 340-390). New York: Wiley.
- WILSON, S. C., & BARBER, T. X. (1983b). *Inventory of Childhood Memories and Imaginings*. Framingham, MA: Cushing Hospital.

The Author

Bruce Greyson, M.D., is the Bonner-Lowry Professor of Personality Studies in the Department of Psychiatric Medicine at the University of Virginia. He is editor of the *Journal of Near-Death Studies* and a cofounder, past president, and research director of the International Association for Near-Death Studies. His research interests include the aftereffects of mystical experience and the differentiation between mystical experience and psychopathology. This is his second article on kundalini to appear in *The Journal of Transpersonal Psychology*.