

## ARTICLE

# Defining Yoga-Nidra: Traditional Accounts, Physiological Research, and Future Directions

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## Abstract

The term *yoga-nidra* has been used in many empirical studies to refer to relaxation and guided imagery. These techniques do not represent the intention or physiological correlates of *yoga-nidra* discussed in the traditional yoga literature. We propose an operational definition of *yoga-nidra* that is supported by several physiologically testable hypotheses regarding its outcomes and effects. Traditional descriptions of *yoga-nidra* and contemporary accounts of its practice are reviewed, and studies examining the physiological correlates of *yoga-nidra* are examined. Proposed hypotheses for future research using this operational definition are provided.

**Key Words:** *yoga-nidra*, mindfulness, neurophysiology, *yoga* literature

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*Yoga-nidra* is a popular subject for seminars about *yoga* practice and *yoga* therapy. Although many teachers use the term *yoga-nidra* as a synonym for relaxation (Feuerstein, 1999), some practices have little relationship to the traditional definitions in the literature. In the majority of studies of *yoga-nidra*, subjective questionnaires and rating scales were used to examine the effects of relaxation protocols; however, *yoga-nidra*'s physiological and neurological processes were not systematically evaluated. Consequently, the operational definition of *yoga-nidra* has become diluted and confused, making systematic hypothesis testing and cross-study comparison and replication difficult.

We propose an operational definition of *yoga-nidra* that is based on the traditional *yoga* literature and accounts for empirically measurable, physiological markers that distinguish it from other states of relaxation. Physiological studies, particularly those measuring brain function using electroencephalography (EEG) and positron emission tomography (PET) may support Swami Rama of the Himalayas's assertion that "all of the body is in the mind but all of the mind is not in the body" (Rama, 2002, p.58).

## A Proposed Definition

In 2011, Swami Veda Bharati sponsored an international conference on *yoga-nidra* to review traditional descriptions and methods of practice, evaluate current research, and promote a dialogue. The goal was to initiate a discussion between those representing the oral tradition of *yoga* and research scientists. Bharati, a former professor of South Asian studies at the University of

Minnesota, is among the most senior monks in India's Swami order. He has inherited the historical and oral-initiatory tradition of the great philosopher, Sankaracarya, through initiation from his guru, Swami Rama of the Himalayas. Bharati proposed a definition of four levels of *yoga-nidra* practice that would provide measurable physiological hypotheses for empirical investigation. Specifically, *yoga-nidra* (*yoga* sleep) represents a state in which an individual demonstrates all the symptoms of deep, non-REM sleep, including delta brain waves, while simultaneously remaining fully conscious.

## Neurologic Activity

Delta waves (frequency of  $\leq 4$  Hz) are most consistent with deep non-REM sleep. Theta waves (4–8 Hz) are associated with concentration and meditation, dreams, hypnosis, and hypnagogic imagery. Alpha waves (8–13 Hz) indicate deep physical relaxation, and beta waves ( $> 13$ –30 Hz) suggest alert functioning of the waking state. Gamma waves (30–80 Hz) indicate processing involving multiple sensory modalities and execution of specific cognitive or motor functions. For a detailed review of meditation studies that used EEG, refer to Cahn & Polich, 2006.

The term *yoga-nidra* is often used to refer to processes and practices that are preparatory to *yoga-nidra* proper. We suggest a definition that includes four distinct levels of practice. Level 1 represents a state of deep relaxation. During this phase the brain first produces alpha waves, which may verge on theta waves during deeper practice. These deeper exercises may be used for self-healing, such as reducing blood pressure and dealing with migraine headaches, among others. These protocols are similar to those used in clinical hypnosis (Hammond, 1990).

Level 2 represents a state that is characterized by creativity, invention, achieving decisions and solutions to problems, and composing lectures and research papers, poetry, minutely detailed action plans, and the like. This stage is evidenced by theta waves that verge on delta waves during deeper practice.

During Level 3, the practices of Level 1 result in the transition to *yoga-nidra*, or the state of *abhava-pratyaya*; that is, cognition of negation in a cave of the heart center (Yoga Sutras I.10; see Bharati, 1986; Zambito, 1992). During this state, the brain may initially produce theta waves, followed by delta waves. The participant experiences deep non-REM sleep but remains aware of his or her surroundings. Attainment of this level may require instruction by an advanced teacher. Swami Rama of the Himalayas recommended that one not remain in Level 3 in excess of 10 minutes at a single time.

Progression to Level 4 occurs after the first three levels are mastered. During Level 4 the mind simultaneously remains in

two states consisting of sleep and simultaneous conscious awareness (*a-japa japa*, or the effortless repetition of a mantra in spontaneous meditation) and meditation during which the person is aware of *kundalini*. Kundalini is the subjective experience of the very subtle power of consciousness in meditation. A practitioner may alternate between theta and delta waves during this process. Unlike Level 3, which is time limited, this process may last as long as 3.5 hours.

When Levels 3 and 4 are mastered, one may gradually transition into *turiya*, during which yoga-nidra and *turiya* become indistinguishable. *Turiya* is a state during which the highest form of meditation in *samadhi* (called *asamprajñata* [a-cognitive] in yoga and *nirvikalpa* [free of thought] in Vedanta) becomes one's normal state of awareness and is maintained at all times (see definitions from *Yoga-vasistha*, translated in Venkatesananda, 1993). It is hypothesized that at this point, EEG readings may register no discernible electrical activity. This hypothesis has yet to be demonstrated under controlled conditions.

## Traditional Yoga Literature

Descriptions of yoga-nidra in the traditional yoga text tend to be oblique and often refer to the state of yoga-nidra rather than descriptions of the practice. When discussing the traditional yoga text we are not rigidly referring to texts of formal yoga philosophy. Because yoga is primarily a discipline of meditation, we have taken into consideration information about meditation practices from multiple oral and written perspectives, including the yoga Upanishads and Vedantic, Ayurvedic, and Buddhist texts. Though the topic of yoga-nidra is vast, there is a paucity of descriptions related to relaxation exercises and subtle-body practices. For example, the hatha yoga texts contain few explicit descriptions of yoga-nidra, which might lead one to conclude that few exist (see *Vasistha-samhita* III.57-75; *Yoga Yajnavalkya* VII-1-37, translated in Bharati, 2001; 771–773).

## The Oral Tradition of Yoga

There are two potential explanations for the scarcity of textual accounts of yoga-nidra. First, many practices were traditionally taught in response to the needs of the individual and were almost solely communicated by word of mouth (Bharati, 2001). Second, the injunction, “Do not teach! Do not teach! Do not teach!” was very common in texts about yoga practice (*prayoga-sastra*). As such, written descriptions are often partial and devoid of essential details. Further, the practices of yoga-nidra were often reserved for those deemed to be qualified, which was determined in the context of a one-to-one relationship between teacher and student.

One of the *pramanas* (means of correct knowledge) in the yoga system is *agama*, “that which has come,” usually translated as scripture (Monier-Williams, 1899, 1970; Zambito, 2010). The yoga tradition includes the action and speech of a master as *agama*, not what is solely written in the books (Bharati, 1986). It is important to consider the oral teachings as well as the written works, many of which were deliberately left incomplete or

did not explain the practice of yoga-nidra in its entirety. Therefore, we do not rely exclusively on written material when we refer to the textual tradition of yoga.

## Vedic and Epic Literature

The term *yoga-nidra* can refer to practice as well as to an object of devotion. In the Vedic literature (roughly 5000 BCE to 1000 CE) and Epic literature (approximately 700 BCE to 1000 CE), *yoga-nidra* refers to the mythological dissolution of the cosmos, or Vishnu's cosmic *yoga-nidra*. It also represents Vishnu's power of *tamas*, or the universal principles of inertia and entropy, and is identified with the Divine Mother as Kali, the *shakti* of cosmic *tamas* (see Jagadishwarananda, 2003, for further description). *Yoga-nidra* may also refer to a deity who was involved in the birth of Krishna (Campbell, 1974).

## Jainia and Buddhist Literature

The Mahayana Buddhist traditions, and the Vajrayana in particular, refer to a practice of clear, light sleep similar to classical yoga's account of *yoga-nidra*. This light sleep is described in the fourteenth century text, *Book of Three Inspirations*, by Tsongkhapa the Great, guru of the first Dalai Lama (Mullin, 2005). This practice involves concentrating on the heart center, the *cakra*, associated with the state of deep sleep. The individual progresses through four stages of emptiness to an “experience of a light like that of a dawn with a clear sky” (Mullin, 2005). Its description is identical to that of the practices included in the Yoga-Vedanta and Tantric traditions (Aiyar, 2000; Dyczkowski, 1998; Rama, 1982; Rama, 1988).

These experiences are described in Mahayana tradition as states of *samadhi*. It is likely that the clear, light state is very similar to the state of *turiya* described by Vedantic writers from Gaudapada onward. As with *turiya*, the clear, light state is an experience beyond which there are “no further signs” (i.e., the highest attainment, liberation), and it eventually pervades all states of consciousness, waking, dreaming, and sleeping (Mullin, 2005, p. 207). Through the experience of *turiya*, there appears to be a practical link between the clear light meditation practice and *yoga-nidra*.

The Theravada Buddhist yoga literature contains no references to *yoga-nidra*, because it is described in the *hatha-yoga* literature. The Tibetan Buddhist tradition has a discipline of dream yoga, which does not apply to the state of deep sleep; however, it is related to the practice of clear, light sleep and involves the dissolution of all thought and an experience of nothing but pure awareness (Rinpoche, 1998). Although the Jaina yoga literature includes some references to *yoga-nidra*, it does not appear to include descriptions of *yoga-nidra* practice.

## Ayurvedic Literature

In Ayurvedic literature, the *Charaka-samhita*, a revelation that is partially ascribed to Patañjali, contains a discussion of the theory of sleep in the *Sutra-sthana*, which culminates in the verse, “The same sleep, if properly enjoyed, brings about happi-

ness and longevity in human beings as the real knowledge brings about *siddhi* in a yogin” (Chandra & Dash, 2008, Verse 21.38). Although this intimates that sleep is an entry point to elevated, superconscious states, no detailed description of the practice is included.

Patañjali's *Yoga Sūtras* (approximately 200 BCE) does not explicitly describe the technique of yoga-nidra, but the nature of sleep as a mental operation is explored (I.10), as are the dream and sleep states as a means to enter samadhi. Sūtra I.10, *abhava-pratyaya - alambana-vrttir-nidra*, defines the mental process (*vrtti*) of sleep as concentration on nescience (*abhava*) and its cause (Bharati, 1986). This has important implications for the practice of yoga-nidra. When used in conjunction with a mind that has no focus (*alambana*) or has nonbeing as a focus, the mind becomes very malleable, and the power of the mind field can be shaped by one's intention (*samkalpa*). This is valuable in processes of learning and self-healing. Even more important is the observation of the dream (*svapna*) and deep sleep (*nidra*) states as a means to enter into samadhi. Sūtra I.38, *svapna-nidra-jñana-alambanam va*, states that one may enter samadhi “with support of knowledge of dream and [deep] sleep” (Bharati, 1986, 361). The practical details of this process are not described, however.

In *Shiva-sūtra* I.7 of the Shaiva tradition of Kashmir (approximately 950 CE), Vasugupta asserts that the yogi experiences the fourth state of consciousness (*turiya*) in the midst of the other three states: waking, dream, and sleep. This gives rise to a classification of states of consciousness wherein each of these three states is inherent within the other (*Shiva-sūtra* I.10). The result is a schema of nine states of consciousness (10 or more if you count *turiya*): waking in waking, waking in dream, waking in deep sleep, dream in waking, dream in dreaming, deep sleep in dreaming, and so forth (Dyczkowski, 1998; Jhoo, 2007; Singh, 1999). Several of these, particularly waking in deep sleep (*jagrat-susupti*), dreaming in deep sleep (*svapna-susupti*), deep sleep in dreaming (*susupti-svapna*), and deep sleep in deep sleep (*susupti-susupti*), describe aspects of the levels of practice of yoga-nidra mentioned by Bharati earlier in this article. Verse 75 of the *Vijñāna-bhairava-tantra* describes the nature of the concentration on sleep through which this is accomplished:

When sleep has not yet fully appeared, that is when one is about to fall asleep and all the external objects (though present) have faded out of sight, then the state (between sleep and waking) is one on which one should concentrate. In that state the Supreme Goddess will reveal herself (Singh, 1999, p. 70–71).

Though most written references describe the state of yoga-nidra as the goal, three texts describe the process of achieving yoga-nidra in some detail. The *Hathayogapradipika* (IV.43–50) describes the process of *khecari-mudra*, which culminates in the attainment of yoga-nidra (Digambarji & Kokaje, 1998). The *Shandilya-upanishad* (I.35) describes a similar process with the same sequence of steps (Aiyar, 2000). Finally, Shankaracarya also describes the process of going into yoga-nidra in his *Yoga-taravali* (Deshikachar & Deshikachar, 2003).

In *Hathayogapradipika* and *Shandilya-upanishad* (IV. 43–44), the process of entry into yoga-nidra is described in similar terms. When the *sushumna-nadi* or *shunya-svara*, the central of

the three primary energy channels of the energy body (*prana-maya-kosa*), “seizes the *prana*, *khecari* is established” (Digambarji & Kokaje, 1998, p. 147). From establishment of *khecari*, the state of *unmani*, the “upward mind,” ensues (Digambarji & Kokaje, 1998, p. 148.) “One should practice *khecari* until *yoga-nidra* is attained. Once *yoga-nidra* is attained, there is no such thing as *kala* (time)” (Digambarji & Kokaje, 1998, p. 149). The text proceeds to describe the state as one in which there is no thought, and life activities (*vayu*, movement of *prana*) are reduced to a minimum.

In Verses 17–26 of the *Yoga-taravali*, Shankaracarya describes entry into the state of yoga-nidra. Verses 17–19 describe movement into the state of *unmani*, a state in which the mind and senses are under volitional control and inhalation and exhalation cease (*kevala-kumbhaka*; Deshikachar & Deshikachar, 2003). Verses 21 and 22 relate how yogis enter *amanasaka-mudra*, a state in which there is no activity of *manas*, then describe how the breath transcends the mind (has entered the *sushumna-nadi*) and how they “are linked to the little space in their hearts” (Deshikachar & Deshikachar, 2003, pp. 56–57). In this state the mind (*manas*) is described as “void of activity” (*vritta-shunya*). This state, *sahaja*, is “spontaneous” or “natural,” and there is no activity of the senses (Deshikachar & Deshikachar, 2003, pp. 58–59). The state of yoga-nidra then occurs. Specifically, “when both intentions and imagination are cut off, when uprooted from the web of *karma*, through unbroken practice, the yogini achieves *yoga-nidra*” (Deshikachar & Deshikachar, 2003, pp. 62–63). The practitioner is encouraged to remain in *turiya*, in the *nirvikalpa* state. It is evident from Shankaracarya's explanation that activity of the sensory and disputative mind (*manas*) ceases entirely in the state of yoga-nidra. In the highest state of *turiya*, neither the sensory nor other aspects of mind evidence activity, though the person may appear to be awake.

## Contemporary Yoga Literature

The contemporary yoga literature includes a number of descriptions of methods of yoga-nidra. Miller's (2005) general description states that “during yoga-nidra, we enter into a state that approximates sleep during which dream-like movements spontaneously appear. But unlike sleep, during which the mind identifies with these movements, during *yoga-nidra* we bear witness to these mental dream-like fragments” (Miller, 2005, p. 34.) He goes on to describe a series of processes of dealing with thoughts and images, memories and visualizations, which he pairs with levels of embodiment according to the Vedanta conceptualization of five bodily sheaths or *koshas*. Finally, he reaches a point at which he prescribes making “the great turn” during which “in Being, the ego-I, thought could not be sustained. It dissolves into its source. . . . Observe how the mind stops and thinking dissolves. . . . This is what happens in deep sleep” (Miller, 2005, p. 55). In this last step, Miller may come closer than anyone to achieving the traditional description of one's awareness in yoga-nidra.

Satyananda, of the Bihar School of Yoga, describes several preliminary practices related to yoga-nidra. They include (a)

making mental resolution or setting an intention (*samkalpa*), (b) initiating rotations of consciousness through the body, (c) practicing breath awareness (nostrils, throat, chest, counting the breath), (d) relaxing the mind and emotions, (e) visualizing various images, and (f) reaffirming mental resolutions or intentions (*samkalpa*; Saraswati, Swami Satyananda, 1998). Although this is the most detailed description of the preliminary practices of yoga-nidra, it does not include resting the mind in the heart center or instruction about how to enter a state of deep sleep during which the mind, as *manas*, does not function. These methods are also not consistent with Shankara's definition.

Satyananda's successor, Swami Niranjanananda Saraswati, also briefly discusses yoga-nidra in his book, *Yoga Darshana* (Saraswati, Swami Niranjanananda, 1993). In addition to describing the process of yoga-nidra in similar terms to Satyananda, he denotes three preliminary levels of yoga-nidra. No mention is made of the "mindless" state of yoga-nidra itself, however.

Panda (2003) describes yoga-nidra vis-a-vis the eight limbs of yoga. This description includes an array of *asana* and *pranayama* techniques, as well as *mudra* and *bandha* practices. Panda explains the Vedantic theory of the evolution of the mind, the body sheath or *kosha* system, the *cakra* system, Kundalini, and a great deal of ancillary *yoga-vedanta* theory. In his description of the preliminary practices of yoga-nidra, he delineates several forms of external and internal rotations of consciousness, as well as a complex tantric system of *nyasa* (Panda, 2003). He includes a discussion of Freudian psychoanalysis and contrasts it with Indian theories of mind, then briefly examines common threads between the two theories, characterizing hypnosis as an externally suggested trance and yoga-nidra as an "autosuggestion." We contend that hypnosis is a process of autosuggestion, whether or not it is accompanied by external facilitation, and consider hypnosis to be a special case of yoga-nidra. Last, Panda describes yoga-nidra as a state between waking and dreaming, which is incorrect because it misidentifies the brain waves emitted during yoga-nidra as primarily theta rather than delta.

Swami Rama writes of five methods of yoga-nidra and describes two of them. The first is a full procedure that includes preliminary relaxation exercises and a short method that follows mastery of preliminary relaxation techniques (Rama, 1988). The full procedure begins with a mental statement of intention to remain aware (*samkalpa*), followed by progressive relaxation of major muscle groups. This is followed by a 61-point relaxation that focuses on *marma* points, with the goal of relaxing the subtle body, and "point-to-point breathing," or *shithali-karana*, translated as "making or doing relaxation" (Rama, 1988, p. 186–191). *Shithali-karana* entails cultivating awareness of the flow of the breath from the crown of the head through successive points in the subtle body, exhaling and inhaling, through the eyebrow, throat, and heart *cakra* five times each. Awareness then moves to the heart center, with nothing but awareness of the breath. An individual may use the shorter method of breathing through the three upper *cakras* five times each to quickly enter yoga-nidra in the heart center after mastering the three preliminary relaxation practices.

The approaches that exclusively use relaxation exercises and visualizations do not lead to the absence of mental activity described by Shankaracarya as essential to yoga-nidra. Rather, they are relaxation techniques that are preliminary steps in the process of yoga-nidra (for a detailed description of the practice, see Rama, 1988).

Our review of the historical and contemporary yoga text suggests that yoga-nidra is a state during which activity of the mind is suspended. Neither thoughts nor images are present, and the practitioner experiences conscious, deep, dreamless sleep, possessing awareness of the surroundings but neither thinking about them nor interacting with them. This review suggests that methods of relaxation that exclusively use imagery and/or relaxation are only preparatory steps in the process of yoga-nidra. These activities produce predominantly alpha and theta brain wave activity rather than the delta activity characteristic of deep REM sleep.

## Research Literature

The research literature about yoga-nidra is scarce and limited by the lack of an empirical definition of the state of yoga-nidra. A number of investigations have examined various physiological criteria related to yoga-nidra, but their lack of empirical consistency and rigor make it difficult to draw any definitive conclusions.

## Early Physiological Studies

Early empirical studies of yoga-nidra were conducted in the 1970s and reported in several non-peer reviewed publications (Greene & Greene, 1977; Moffat, 1974). In one investigation, Swami Rama of the Himalayas participated in an EEG study of yoga-nidra during which he was observed to enter conscious deep sleep for about 10 minutes, at which time delta waves were recorded. He was able to recount verbatim all the conversations that occurred in the lab during that time, demonstrating his awareness of his surroundings.

In his comments about this experiment, Swami Satyananda stated that "the capacity to remain consciously aware while producing delta waves is one of the indications of the super conscious state, *turiya*" (Saraswati, Swami Satyananda, 1998, pp. 176–177). Although it is true that someone in *turiya* would be conscious of his/her surroundings, this kind of awareness is also characteristic of the state of yoga-nidra prior to entry into *turiya*, according to Swami Rama and Swami Veda Bharati. Bharati contends that the state of *turiya* is accompanied by a flat EEG rather than by delta waves, indicating a moment-to-moment state of *asamprajñata* or *nirvikalpa-samadhi*, when measurable cognitive activity ceases altogether, despite apparent wakefulness. To date, no carefully controlled demonstration of such a state has been accomplished (Bharati, 2006).

In 2004 Dr. Dean Radin of the Institute of Noetic Sciences used more tightly controlled experimental conditions in an effort to replicate the Swami Rama study. A number of physiological parameters were measured while Swami Veda Bharati entered a state of delta wave sleep while maintaining conscious

awareness of his surroundings, similar to Swami Rama's experience (Bharati, 2006). After examining the EEG data collected while talking with Swami Veda Bharati prior to the experiment, Radin suggested that "Swami Veda's ordinary state of awareness is analogous to that of a normal person in a deep meditative or sleep state" (Bharati, 2006, p. 69). The EEG trace showed predominant production of delta waves even during casual conversation with his eyes open. Neurologically, this is highly unusual.

## Recent Physiological Studies

Several empirical studies of the iRest method of relaxation developed by Richard Miller have been conducted (Birdsall, Pritchard, Elison-Bowers, & Spann, 2011; Engel et al., 2007; Pritchard, Elison-Bowers, & Birdsall, 2010; Stankovic, 2011; unpublished research at [www.irest.us/programs/irest-research-and-programs](http://www.irest.us/programs/irest-research-and-programs)). These investigations used questionnaires and rating scales to measure participants' experience. They provided evidence of the subjective effectiveness of relaxation but did not measure the physiological correlates associated with the state of yoga-nidra. A discussion of their findings is beyond the scope of this article.

In 1999, PET and EEG were used to assess changes in cerebral blood flow patterns in a sample of 9 yoga teachers, each with more than 5 years of experience practicing relaxation meditation (yoga-nidra). Researchers found consistent patterns of brain activity during meditation and relaxation. Specifically, EEG outcomes revealed alpha and theta waves during what was described as the practice of yoga-nidra (Lou et al., 1999). These patterns of brain activity are consistent with those of states of relaxation and meditation but do not meet the criteria for voluntary production of predominantly delta waves while retaining conscious awareness. These findings represent evidence of neurologic states attained during preliminary practices rather than the state of yoga-nidra.

In another study, Kjaer and colleagues used PET scans to examine dopamine production in the ventral striatum during a yoga-nidra relaxation meditation for 8 highly experienced meditation teachers (Kjaer et al., 2002). They reported that "subjectively, yoga nidra [was] characterized by reports of vivid imagery and decreased attention towards action" (Kjaer et al., 2002, p. 256). EEG data provided evidence of increased theta wave activity, which is consistent with an experience of imagery (Kjaer et al., 2002). The traditional texts and the personal experience of Swami Veda Bharati maintain that neither imagery nor other thought process are present during the state of yoga-nidra, suggesting that participants were engaging in practices that are preparatory to yoga-nidra.

Kumar and Joshi (2009) studied 40 students who were trained in the yoga-nidra method of Swami Satyananda Saraswati (Saraswati, Swami Satyananda, 1998) and a specific breathing exercise (*pranakarsa-pranayama*) developed by Shriram Sharma Acharya. Students' brain waves were measured using EEG, and galvanic skin response was also assessed. Participants' beta wave activity was gradually replaced by alpha waves during the practice. Alpha waves indicate a state of relaxation preliminary to yoga-nidra, but not the predominant delta

wave pattern observed during the state of in yoga-nidra.

Another study examined EEG data for 20 individuals who used the Bihar School of Yoga protocol for yoga-nidra. As in the Kumar and Joshi study (2009), participants' beta wave activity was gradually replaced by alpha waves. After more than 30 sessions of practice, alpha waves were found to be replaced by some theta waves (Mandlik, Jain, & Jain, 2009). Because no delta wave activity was detected, participants were likely in a state of relaxation generation and imagery generation but not a state of yoga-nidra. The production of theta waves suggests that participants experienced the second level of practice preliminary to yoga-nidra.

These studies demonstrate that what is often referred to as *yoga-nidra* in contemporary research is often a state of deep relaxation and imagery generation that is a precursor to yoga-nidra. During this state, alpha and theta brainwaves, as opposed to the delta wave activity found during the state of yoga-nidra, are reported. The state of yoga-nidra is devoid of imagery, thought, and mantra repetition and consists only of the awareness of being. This is characterized by awareness of the breath during which one observes the mind and body in sleep. To date, extant research and findings are inconsistent with those of early studies. It appears that yoga-nidra as it is described by Shankaracarya and its physiological correlates have yet to be studied.

## Implications for Empirical Investigation

Clearly, it is important to empirically test Shankaracarya's traditional model of yoga-nidra, and as such, we suggest the following hypotheses for empirical investigation:

1. The state of yoga-nidra represents a conscious entry into a state of non-REM sleep. Individuals entering this state will be observed to voluntarily generate predominantly delta waves, as measured by EEG. Persons will also demonstrate awareness of their surroundings, as measured by the verbatim recall of a list of words.
2. Replication of existing yoga-nidra studies will reliably demonstrate the production of alpha wave activity, a precursor to entry into yoga-nidra proper.
3. Levels 2, 3, and 4 of Bharati's model (clear predominance of delta waves) will be empirically distinguished using EEG data.
4. Consistent with Shankaracarya's criterion, we predict that the state of turiya will be indicated by an absence of EEG-observed brain activity, which would indicate cessation of mental activity (*citta-vriti-nirodha*). This has yet to be demonstrated in carefully controlled conditions.

We suspect that the state of consciousness present in Level 2 of the Bharati model bears a strong resemblance to those observed during clinical hypnosis. This has implications for a wide range of learning and self-healing strategies for both mental and physical health. This line of inquiry will require further refinement, particularly in terms of measurement of the EEG correlates of hypnotic states. These hypotheses challenge the contention that consciousness requires brain activity. While it

may appear ambitious, inquiry of this nature would test the premise that yoga practices transcend the physical senses.

The studies involving Swami Rama of the Himalayas and Swami Veda Bharati cited earlier provide preliminary support for our hypotheses. A more carefully controlled pilot study is under development at the Meditation Research Institute of Swami Rama Sadhaka Grama in Rishikesh, India, in collaboration with Dr. Shirley Telles. We hope to report study results separately in the future.

## Postscript

Swami Rama once intentionally produced two cysts on his arm while a group of German doctors watched. He identified one cyst as malignant cancer and the other as benign. He asked that biopsies be taken. He then made the two cysts disappear. The biopsy results confirmed his prediction that one cyst was malignant and the other benign (Greene & Greene, 1977). The physicians did not publish their observations in fear of the reaction of their colleagues. Swamiji gave up such demonstrations because it was clear that people would not believe what their senses were telling them. Let us be rigorous in our empirical study of yoga but courageous in accepting the challenges of what our rigor may reveal.

## References

- Aiyar, K. N. S. (2000). *Thirty minor upanishads*. New Delhi, India: Parimal Publications.
- Bharati, Swami Veda (aka Pandit Usharbudh Arya D.Litt.). (1986). *The Yoga Sutras of Patanjali with the exposition of Vyasa: A translation and commentary: Vol. I. Samadhi-pada*. Honesdale, PA: Himalayan International Institute.
- Bharati, Swami Veda. (2001). *The Yoga Sutras of Patanjali with the exposition of Vyasa: A translation and commentary: Vol. II. Sadhana-pada*. Delhi, India: Motilal Banarsidass.
- Bharati, Swami Veda. (2006). *Yogi in the lab: Future directions of scientific research in meditation*. Rishikesh, India: AHMSIN Publishers.
- Birdsall, B., Pritchard, M., Elison-Bowers, P., & Spann, J. (2011). *Does integrative restoration (iRest) meditation decrease perceived stress levels and negative moods in school counselors?* Retrieved from [http://counselingoutfitters.com/vistas/vistas11/Article\\_84.pdf](http://counselingoutfitters.com/vistas/vistas11/Article_84.pdf).
- Cahn, B. R., & Polich, J. (2006). Meditation states and traits: EEG, ERP and neuroimaging studies. *Psychological Bulletin*, 132(2), 180-211.
- Campbell, J. (1974). *The mythic image*. Princeton, NJ: Princeton University Press.
- Deshikachar, T. V. K., & Deshikachar, K. (2003). *Adi Sankara's Yoga Taravali: English translation and commentary*. Chennai, India: Krishnamacharya Yoga Mandiram.
- Digambarji, Swami, & Kokaje, R. S. (1998). *Hathapradipika of Svatmarama* (2nd ed.). Pune, India: Kaivalyadhama S.M.Y.M. Samiti.
- Dyczkowski, M. (Ed. & Trans.). (1998). *The aphorisms of Siva: The Siva sutra with Bhaskara's commentary, the Varttika*. New Delhi, India: Indica Books.
- Engel, C. D., Choate, C. G., Cockfield, D., Armstrong, D. W., Jonas, W., Walter, J. A. G., . . . Miller, R. (2007). *Yoga nidra as an adjunctive therapy for post-traumatic stress disorder: A feasibility study*. Walter Reed Army Medical Center Deployment Health Clinical Center. Samuelli Institute.
- Feuerstein, G. (1999). *Yoga dictionary*. Boston, MA: Shambala.
- Feuerstein, G. (2003). *The deeper dimension of yoga*. Boston, MA: Shambala.
- Greene, E., & Greene, A. (1977). *Beyond biofeedback*. San Francisco, CA: Delacorte Press.
- Hammond, D. C. (Ed.) (1990). *Hypnotic suggestions and metaphors*. New York, NY: Norton.
- Jagadishwarananda, Swami (Trans.). (1953, reprinted 2003). *Devi mahatmyam*. Mylapore, India: Sri Ramakrishna Math.
- Kjaer, T. W., Bertelson, C., Piccini, P., Brooks, D., Alving, J. & Lou, H. (2002). Increased dopamine tone during meditation-induced change of consciousness. *Cognitive Brain Research*, 13(2), 255-259.
- Kumar, K. & Joshi, B. (2009). Study on the effect of *pranakarshan pranayama and yoga nidra* on alpha EEG and GSR. *Indian Journal of Traditional Knowledge*, 8(3), 453-454.
- Lou, H., Kjaer, T. W., Friberg, L., Wildschiodtz, G., Holm, S. & Nowak, M. (1999). A 150-Hz PET study of meditation and the resting state of normal consciousness. *Human Brain Mapping*, 7(2), 98-105.
- Mandlik, V., Jain, P., & Jain, K. (2009). *Effect of yoga nidra on EEG*. Nasik, Maharashtra, India: Yoga Vidya Gurukul University. Retrieved from <http://www.yogapoint.com/info/research5.htm>.
- Miller, R. (2005). *Yoga nidra: The meditative heart of yoga*. Boulder, CO: Sounds True.
- Moffat, S. (1973). The psychic boom. In *Encyclopedia Britannica yearbook of science and the future*. London, UK: Encyclopedia Britannica.
- Monier-Williams, M. (1899, 1970). *A Sanskrit-English dictionary*. Oxford, UK: Clarendon Press.
- Mullin, G. H. (2005). *The six yogas of Naropa*. Ithaca, NY: Snow Lion Publications.
- Panda, N. C. (2003). *Yoga-nidra: Yogic trance, theory, practice and applications*. Delhi, India: DK Printworld.
- Pritchard, M., Elison-Bowers, P., & Birdsall, B. (2010). Impact of integrative restoration (iRest) meditation on perceived stress levels in multiple sclerosis and cancer outpatients. *Stress and Health*, 26, 233-237.
- Rama, Swami. (1982). *Mandukya upanishad: Enlightenment without god*. Honesdale, PA: Himalayan International Institute.
- Rama, Swami. (1986). *Path of fire and light: Vol I. Advanced practices in yoga*. Honesdale, PA: Himalayan International Institute.
- Rama, Swami. (1988). *Path of fire and light: Vol. II. Advanced practices in yoga*. Honesdale, PA: Himalayan International Institute.
- Rama, Swami. (2002). *Conscious living*. Dehradun, UK, India: Himalayan Institute Hospital Trust.
- Rinpoche, T. W. (1998). *The Tibetan yoga of dream and sleep*. Ithaca, NY: Snow Lion Publications.
- Saraswati, Swami Niranjanananda. (1993). *Yoga darshana: Vision of the yoga upanishads*. Munger, Bihar: Yoga Publications Trust.
- Saraswati, Swami Satyananda. (1998). *Yoga nidra*. Munger, Bihar, India: Bihar School of Yoga.
- Singh, J. (Trans.) (1999). *Vijnana-bhairava or divine consciousness*. Delhi, India: Motilal Banarsidass.
- Stankovic, L. (2011). Transforming trauma: A qualitative feasibility study of integrative restoration (iRest) yoga nidra on combat-related post-traumatic stress disorder. *International Journal of Yoga Therapy*, 21, 23-37.
- Venkatesananda, Swami. (1993). *Vasistha's yoga*. Albany, NY: State University of New York Press.
- Zambito, S. (1992). *The unadorned thread of yoga: The Yoga Sutra in English, a compilation of the Yoga Sutras of Patanjali*. Poulsbo, WA: Yoga Sutras Institute Press.
- Zambito, S. (2010). *The Yoga-Sutra Sanskrit-English dictionary*. Poulsbo, WA: Yoga Sutras Institute Press.