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Andrew B. Newberg
Thomas Jefferson University, Philadelphia, PA, USA

Mark R. Waldman
Loyola Marymount University, Los Angeles, CA, USA

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A Neurotheological Approach to Spiritual Awakening

Andrew B. Newberg
Thomas Jefferson University
Philadelphia, PA, USA

Mark R. Waldman
Loyola Marymount University
Los Angeles, CA, USA

A neurotheological approach suggests an analysis of spiritual awakening experiences by combining phenomenological data with neuroscience. This paper presents a synthesis combining information on the thoughts, feelings, and experiences associated with spiritual awakening experiences and neurophysiological data, primarily from neuroimaging studies, to help assess which brain structures might be associated with these experiences. Brain structures involved with emotions correlate with emotional responses while areas of the brain associated with the sense of self appear to correlate with the key feature of these experiences in which an individual loses the sense of self and feels intimately connected with God, universal consciousness, or the universe. This paper also seeks to address the assumption whether awakened states as described in popular spirituality are similar or different compared to spiritual enlightenment as described in Eastern spiritual traditions. Thus, the implications of such a neurotheological analysis are also considered.

Keywords: ***spiritual, awakening, mystical, enlightenment, neurotheology, brain, neuroimaging***

> In mystic states we both become one with the Absolute and we become aware of our oneness. This is the everlasting and triumphant mystical tradition, hardly altered by differences of clime or creed. (James, 1902, p. 307)

In its broadest sense, *spiritual awakening*, or *enlightenment*, is a form of awareness in which the person feels that he or she has found a new way of understanding the world (Newberg & Waldman, 2016). However, there are many ways that different traditions have defined this concept. For Jews, Muslims, and Christians, the mystical experience of enlightenment brings them into a new relationship with God, and in many Asian traditions, enlightenment promises release from human suffering. Interestingly, the Age of Enlightenment argued that true knowledge about the world derived from reason and science. For these individuals, religion and spirituality were a hindrance to enlightenment. Regardless of the specific spiritual perspective an individual may have, enlightenment appears to be a transformative experience in which people come to acquire a new knowledge about the universe around them and their place within it. As considered below, a number of definitions can be offered, but perhaps the easiest way to define the enlightenment experience is in the term itself: to shed light on our human ignorance and bring ourselves out from the dark (Newberg & Waldman, 2016). More generally, these experiences radically transform a person's worldview and values. As described below, these experiences have a number of core elements that can be related to various aspects of brain function. Interestingly, enlightenment also refers to a specific experience in which the transformation occurs, as well as a new permanent state that arises from the given experience (Pyysiäinen, 2003; Wright, 2017). Individuals who experienced this type of enlightenment reported permanent changes to their sense of health, relationships, occupation, spirituality, life, and death (Newberg & Waldman, 2016).

Neuroscience, and more specifically *neurotheology*, now provides tools to explore these deliberate and spontaneous moments of profound insight. Neurotheology is the interdisciplinary field of study correlating brain activity with religious and spiritual phenomena such as beliefs, practices, and experiences (Newberg, 2010). Neurotheology is not a neuroscientific analysis of religious and spiritual experiences per se, nor is it a religious analysis of neuroscience. Neurotheology incorporates perspectives from neuroscience, anthropology, sociology, psychology, religious studies, philosophy, and theology to form a holistic inquiry into spiritual phenomena. Importantly, neurotheology is not reductionistic but seeks a common ground between religion and science (Newberg, 2018). Using a neurotheological approach, one can compare the descriptions of experiences from a large number of individuals, along with ~~our~~ the body of research using neuroimaging techniques, to begin to appreciate the power, complexity, and uniqueness of enlightenment experiences. What, for example, do people feel and think when they experience enlightenment? Does age, gender, or socioeconomic status (SES) influence these "aha" events? Is there a common thread or specific approach one can take to evoke them? These questions, and many others, have been part of a growing number of survey studies, including several from our research group (Yaden et al., 2015, 2016, 2017).

This paper seeks to provide a synthesis of subjective self-report and neurophysiological data with the goal of addressing how various elements of spiritual awakening experiences are associated with specific brain processes. The data we refer to comes primarily from our current survey data of spiritual experiences, in addition to other available data in the literature, as well as neuroimaging data performed by our group and other research groups. This is not meant to be a systematic review of the literature, but rather a synthesis of current data with the goal of developing hypotheses for future research. There is currently no critically-informed consensus on what spiritual enlightenment is, but it is hoped that the data presented below is an initial step in providing information for helping to form such a consensus. This information may also help address other related questions such as whether spiritual awakenings are similar or unique experiences across individuals and traditions, and whether enlightenment can be spiritual, secular, or both.

The variety of cognitive, emotional, and experiential elements of spiritual awakenings all relate to various neurophysiological processes. In this review, the basic brain functions and structures typically associated with them are reviewed. However, the brain functions as a unified whole and many structures function as systems in order to enable one to have various perceptions, thoughts, and feelings (Ledoux, 1998). For example, generally speaking, cognitions involve systems of the brain including the temporal and frontal lobes implicated in memory, abstract concepts, and the sense of causality. Experiences, particularly sensory experiences, may involve the auditory or visual systems that include parts of the thalamus, somatosensory cortex, visual and auditory cortex, and memory regions (Newberg & Waldman, 2006). Emotions are most likely attributable to activity in the insula along with limbic system structures such as the amygdala and hippocampus, and larger cortical networks (Touroutoglou, Hollenbeck, Dickerson, & Feldman Barrett, 2012; Feldman Barrett, 2017). These areas of the brain are associated with the perception of emotional responses as part of a larger network of cortical structures involved with bringing emotions to consciousness (Ledoux, 1998). In addition to changes occurring in the brain itself, many of these spiritual awakening experiences are felt throughout the body (Newberg & Waldman, 2009). The brain also regulates the autonomic nervous system, which alters blood pressure, heart rate, respiratory rate, and a variety of other physiological processes. If a given individual feels their heart racing during a spiritual awakening experience, the autonomic nervous system is involved, which is regulated by the emotional networks in the brain (Newberg & Iversen, 2003).

It is for these reasons that neurotheology may be a useful tool in furthering understanding of spiritual awakening experiences. Creating data that provides a critical evaluation of the elements of these experiences is essential for both psychological as well as religious and spiritual perspectives. In

our prior research (Newberg et al., 2001; Newberg & Iverson, 2003; Newberg, Pourdehnad, Alavi, & d'Aquili, 2003; Newberg, Wintering, Morgan, & Waldman, 2006; Newberg, Wintering, Waldman, et al., 2010; Newberg, Wintering, Khalsa, Roggenkamp, & Waldman, 2010; Newberg et al., 2015; Newberg & Waldman, 2016), we performed over 300 brain scans of people engaged in a variety of religious and spiritual practices, including meditation, prayer, speaking in tongues, and trance states. The ability to observe changes in the brain associated with these different practices, and their concomitant experiences, provides neurotheology an important foundation from which to explore these experiences. However, the neurophysiological data is only as useful as the phenomenological information that corresponds to it. Observing an increase of activity in the limbic system may have little use unless one understands the emotional responses that the person experiences. Much of this issue is addressed not only through cognitive neuroscientific studies, but also the field of neurophenomenology, which specifically explores how phenomenal experience relates to brain functions (Gordon, 2013; Laughlin, McManus, & d'Aquili, 1990). Thus, it is essential to further understand both the physiological processes as well as the phenomenological elements of spiritual awakening experiences in order to develop a more effective taxonomy.

The Spiritual Awakening Survey

In the current paper, we describe the results we obtained through the use of an online survey of people's most intense spiritual experiences (Yaden et al., 2015, 2016, 2017). This research arose because of a recognized absence of phenomenological data regarding such experiences. The survey was an online website that obtained substantial amounts of data from each individual participant. Subjects were asked about their demographics, SES, religious background, current religious tradition, medical conditions and medications. In addition, the website contained several, standardized questionnaires designed to obtain information about the person's sense of spirituality, religion, perspectives on death, and intensity of spiritual experiences (see Yaden et al., 2015; Yaden et al., 2016; Yaden et al., 2017). The final component of the survey provided subjects a textbox in which they could write or paste a full description of their most intense spiritual experience or experiences. In addition to the full narrative, individuals were asked specific questions to ensure that all aspects of the experience were covered. These additional questions included information regarding emotions, experiences, abilities, and the overall sense of realness of their experience. The purpose for these individual questions was based on the notion that some narratives may focus on specific elements of an experience because they were the most intense, while ignoring other elements that may have existed but were not the most prominent. An individual who had an intense sense of oneness with God may focus the entire narrative on the experience of the connection with God. The person may have also had an intense experience of love, but may not have related this emotional experience due to the intensity of the other element. The hope was to create as thorough evaluation of these spiritual awakening experiences as possible.

Approximately 2000 individuals responded to the website and provided information across all the questions. In the end, there were approximately 700 fully complete data sets from which the information was analyzed (Yaden et al., 2015; Yaden et al., 2017). We used several different approaches, depending on the data analyzed and the specific questions to be addressed. For example, in our study of the realness of religious and spiritual experiences, we used the Linguistic Inquiry and Word Count (LIWC) program to tokenize (i.e., split text into separate words) and count how often words from 64 different categories (e.g., social processes, function words, work, pronouns) occurred in each participant's description of his or her spiritual awakening experience. We then considered the relative frequency of each word in each LIWC dictionary and correlated them with the items regarding the epistemic quality of the experience. On the other hand, an analysis of the impact of psychedelic-induced spiritual experiences compared to non-psychedelic-induced experiences analyzed the same database using ANCOVA analysis to compare these experiences across multiple domains for these two groups, controlling for gender, SES, education, and religion.

This data has begun to be published in Yaden et al. (2015, 2016, 2017), and a summary and additional analysis of the overall evaluation of the various narratives and other descriptions and data is provided. It is important again to note that the subjects were not necessarily proficient meditators, and were not highly religious or spiritual individuals, per se. The demographics demonstrated that subjects cut across all traditions, religious groups, genders, and countries—-approximately 10% of the respondents came from outside of the United States.

The initial analyses of the data, particularly the narratives, are described in more detail in our published results in Yaden et al. (2015, 2016, 2017). A content analysis was performed on the narratives in these studies to elucidate which terms and phrases were used most often in order to describe what are here considered spiritual awakening experiences. From this, different types of experiences were compared: experiences that arose from different conditions such as meditation versus drug-induced experiences, experiences related to medical conditions such as near-death experiences, and other analyses related to demographic and spiritual measures.

The results from Yaden et al. (2015, 2016, 2017) suggested two fundamental concepts with regard to spiritual awakening. The first is that virtually every experience is described using unique features. No one word (e.g., spiritual, God, power, etc.) was used in more than 25% of the narratives (Newberg & Waldman, 2016), and people used a variety of terms to describe similar types of concepts. For example, some individuals referred to the experience as it related to God, a force, an energy, a spirit, consciousness, or love. The use of these unique terms raises interesting neurotheological questions. Are these experiences fundamentally the same, correlating with similar neurophysiological changes, which are subsequently described in a different manner based on an individual's beliefs and cognitive processes? Or are these truly distinct experiences that correlate with activity in different parts of the brain? At this point, these questions remain unanswered. Thus, we were left with a tremendous sense of the uniqueness of each person's spiritual awakening experience.

In Newberg and Waldman (2016), an example of the specific differences in descriptions of spiritual awakening experiences was the interesting differences between genders. For men, the most commonly used words (in declining order) were mind, religion, world, meditation, understand, universe, nature, drug, reality, consciousness, thought, force, and existence. The most commonly used words for women were God, know, love, people, church, energy, presence, need, hear, die, pray, child, learn, and home. After these terms, the words people used to describe their experiences reflected the qualitative elements of the experiences: unity, clarity, intensity, and surrender.

In spite of these unique descriptions, when using content analysis, various words and concepts can be related to similar ideas. With this in mind, in Newberg and Waldman (2016), we came to the conclusion that there were four core components of the spiritual awakening experience that seemed to pervade all experiences irrespective of the specific unique descriptors—a sense of unity, a sense of intensity, a sense of clarity, and a sense of surrender. The following section considers these unique elements in more detail to help construct a clearer understanding of the nature of spiritual awakening experiences. These elements are not given in any particular order.

One element described by a number of scholars is a sense of unity or oneness (Newberg & Waldman, 2016). In one study, most reports of spiritual awakening experiences were associated with a loss of the sense of self and a sense of that self becoming connected to something greater (Yaden et al., 2016). This is sometimes referred to as a sense of oneness, unity, or self-transcendence. Interestingly, the sense of oneness can be with a variety of objects. For those who are religious, the sense of oneness is frequently with a religious figure such as Jesus or God. For those individuals in a nontheistic tradition, the experience of unity is frequently with the universe, a sense of universal consciousness, or even a sense of nothingness. However, in all of these experiences, the self clearly begins to dissolve and the person perceives the self to become part of or absorbed into a greater oneness.

Here are two examples from the survey

(Newberg & Waldman, 2016) of a description of the intense sense of unity. The first is from a 65-year-old American Jewish woman who said,

> It felt like an energetic merging and being at one with the most powerful Creative Force/Being in and beyond all universes. In that moment, I was simultaneously the same individual consciousness of myself, but I was also a part of "God." (n.p.)

Another individual, who was a 43-year-old Hindu woman from India, stated,

> Once when I was practicing a pranic healing [sending energy to parts of the body through one's hands] tears were streaming down my cheeks. Then I experienced a feeling of "ONENESS" with all beings. My body felt very light and there was no separation between me and the external reality. There was no sense of "self." It was very unique. (n.p.)

These are the types of descriptions that are common amongst the experiences people describe as their most intense spiritual awakening experience.

From the neurotheological perspective, the area of the brain that seems to be particularly related to feelings of unity and oneness is the *parietal lobe* (Newberg & Iversen, 2003). The parietal lobes are located in the *posterior superior* portion of the brain. The parietal lobes are association areas through which sensory input travels, establishing a sense of a spatial self (Blanke, Slater, & Serino, 2015). More recent research has shown that the lower portion, particularly the *posterior temporo-parietal* region, may be associated with a sense of self-consciousness and of *peri-personal* space (Serino et al., 2013). Thus, the parietal lobes are associated with the ability to navigate through the world and avoid bumping into objects. Individuals with a damaged parietal lobe will often have substantial impairments in visual spatial processing and can sometimes experience an unusual phenomenon called *neglect* (Li & Malhotra, 2015). Patients with neglect will not perceive certain parts of their body to actually be part of their body. They frequently will try to throw their own leg out of the bed, because they perceive it to be someone else's leg.

During intense spiritual states in which a person experiences a profound sense of unity, there is decreased activity in the parietal lobe, which we have postulated is associated with the loss of the sense of self (Newberg et al., 2001; Newberg et al., 2003). If parietal lobe activity establishes the sense of self, then a decrease of activity would be associated with a loss of the sense of self. Thus, during intense spiritual states and those of spiritual enlightenment, one would expect markedly decreased activity in the parietal lobe to be associated with the profound sense of unity that the person experiences.

According to Yaden et al. (2017), the level of intensity of spiritual awakening experiences may be another core quality of such experiences. Participants described these as being the most intense experiences that they have ever had. One 38-year-old Christian male described a particular meditation practice:

> This one style of meditation was a fixation on God and the beauty in all things. I would imagine God's love and the connectedness we shared. This was the most intense type of meditation I had ever experienced. I had never felt so much love, warmth, and comfort. (n.p.)

Thus, specific features of these experiences such as visions or emotions were the most beautiful or most powerful that participants had ever experienced. The intensity of spiritual awakening experiences is part of what enables the individual to identify them as being so transformative (Newberg & Waldman, 2016). The emotional centers of the brain, such as the limbic system, particularly the amygdala, have been found to correspond differentially with the intensity of various emotions (Bonnet et al., 2015). In addition, the insula, along with the prefrontal cortex, appears to be associated with ~~in~~ assessing the intensity of various emotional responses (Bechara, Damasio, & Damasio, 2000). Activity in these brain regions is correlated with emotional experience, as well as recognizing events and stimuli that are of motivational importance. It is likely that the intensity of the spiritual awakening experience is associated with such changes of activity in these areas of the brain because of the importance of this event. Further, in Yaden

et al. (2017), the additional unique elements of these experiences ~~are~~ were also described as the most intense that a person had ever experienced. The person felt the most intense love or the most beautiful music ever experienced.

Yaden et al. (2017) suggested that another core quality of spiritual awakening experiences is a sense of clarity. For the individual, this experience may demonstrate the true nature of the world and his or her relationship to it. The person "gets it" for the very first time. The experience helps the individual understand some fundamental aspect of life, typically related to how the universe works and how the individual is supposed to relate to the universe. In our survey (Newberg & Waldman, 2016), the experience ~~is~~ was frequently described as providing a deep sense of meaning and purpose for the remainder of the person's life, and the sense of meaning and purpose were reported as increased in over 80% of subjects. The sense of clarity ~~is~~ was also part of what ~~is~~ was experienced as *eureka* moments or *aha* moments that typically occur in the context of various problems that people face throughout life. These minor experiences provided a new way of thinking about a particular issue or problem, but they ~~are~~ were differentiated from the profound mystical experiences which changed the person's entire life. A 37-year-old female scientist had this to say about her experience:

> Everything in life seemed to click. I had this clarity and it was as if I was looking at life from the inside out. I just felt this sense of clarity. I work in science, and I grew up in a conservative religion, but I have always rejected and tried to avoid the idea of "blind faith." Despite my trepidation, this experience seemed to satisfy my proof-oriented science mentality with the concept of intuition. It was almost as if my intuition from somewhere "deeper" had offered some sort of direct experience that offered up proof. (n.p.)

It should also be noted that for some, this clarity led to a deep sense of religiousness or spirituality while for others, it took them away from religion. A 38-year-old male therapist explained how his experience showed him there was no religion:

> The words I can find to describe it was that everything was perfect just the way it was: the yard, the tree, the fence, myself . . . everything felt connected. I thought to myself, "Oh, this is what the Buddhists and Hindus were talking about!" Then it occurred to me that when I die, that's it. No afterlife, no God, just this life. (n.p.)

At this time, it is not completely clear which brain region is associated with the sense of clarity arising. However, our brain imaging research in Newberg, Wintering, Waldman, et al., (2010) has suggested one interesting possibility. The thalamus is a key structure, centrally located in the brain, associated with the processing of sensory information from sense organs to the higher areas of the cortex. It has been argued that the thalamus may be the seat of consciousness because it is implicated in the integration of many types of neuronal processes (Newman, 1995; Min, 2010). Our brain imaging research in Newberg, Wintering, Waldman, et al., (2010) has demonstrated some significant changes in the thalamus, both during intense spiritual practices and as a longer-term consequence of such practices: those individuals who had been performing intense spiritual practices for over 15 years had an unusual asymmetry in the thalamus, while the evaluation of the longitudinal effects of meditation practices showed that the symmetry of the thalamus changed over time. Since the thalamus is active during initial sensory processing, and is part of a larger network associated with the evaluation of the environment (Wong et al., 2014), shifts in thalamic activity and the network that also includes the basal ganglia, hippocampus, amygdala, insula, and regions of the frontal and temporal lobes may enable an individual to develop new and complex understandings of external reality. We might speculate that changes in thalamic activity account for the substantial transformative shift that is part of these awakening experiences.

The sense of realness is not so much a primary component of these experiences, but the result of all of the core components (Yaden et al., 2017). The sense of clarity, intensity, and unity are part of what enables an individual to recognize the experience as something more relevant than what

the person feels during everyday experience. The sense of realness is what identifies this experience as something that is fundamentally real, and even more real so than everyday experience. In previous work, we have considered the possibility that the brain functions on the basis of epistemic states in which varying levels of reality are perceived (d'Aquili & Newberg, 1999). The most common example relates dreams to our everyday reality experience. During a dream, no matter how real it feels, when the person awakens, the dream is immediately relegated to an inferior state of reality. When one awakens, the everyday reality is given priority over the dream reality. In a similar manner, patients with schizophrenia have hallucinations that will be perceived as real while having them but will often be recognized as "part of the illness," and hence not real, when these patients are adequately treated. In comparison to dream states or hallucinations, it has been suggested that when individuals have a spiritual enlightenment experience, even after they no longer are having that experience, they do not relegate that experience as inferior, but rather continue to regard it as being more real than our everyday reality experience (Yaden et al., 2017). Thus, the sense of realness is a sine qua non of the spiritual awakening experience.

The fourth element that seems to be experienced during spiritual awakenings is a sense of surrender. As the individual begins to enter into the spiritual awakening experience, whether purposeful or inadvertently, there is ultimately a sense in which the person feels taken over by the process. For the individual, he or she is no longer making the experience happen, it is happening to them. This sense of surrender has been a fundamental aspect of many meditation and prayer-based practices (Newberg & Waldman, 2016). Some more specifically attempt to find an experience of surrender such as during Islamic practices (Newberg et al., 2015). However, other meditation practices that involve intense focus can lead to an experience in which the person surrenders to the overall enlightenment process. In terms of neurotheology, the brain area that may be related to the sense of surrender is most likely the frontal lobes, and more specifically the prefrontal cortex (Newberg, Wintering, Morgan, & Waldman, 2006; Newberg et al., 2015). Brain scan studies have shown a very specific change occurring in the frontal lobes during experiences of profound surrender (Newberg et al., 2006; Newberg et al., 2015). This has been observed in a variety of practices, such as Islamic prayer, as well as speaking in tongues (Newberg & Waldman, 2016). In these states, the individual feels a sense of surrender to God, and allows the experience to happen, as opposed to purposely making it happen. During these intense feelings of surrender, activity in the prefrontal cortex has been found to decrease (Newberg et al., 2006, 2015). This is in contrast to some of the early phases of meditation in which purposeful concentration and willful focus on the object is associated with an increase of activity in the prefrontal cortex (Newberg et al., 2001, 2003). However, at some point, when the individual experiences a profound sense of surrender, activity in the frontal lobe decreases (Newberg et al., 2006, 2015).

Our model suggests that meditation result in a spiritual awakening experience. The meditation process is correlated with an overall increase of activity in the frontal lobes, but the spiritual awakening is associated with a drop of activity in the frontal lobes (Newberg & Iversen, 2003; Newberg & Waldman, 2016). It is likely that it is not the actual activity level so much as the change in activity level—in other words, as brain activity changes, the individual experiences different aspects of these experiences. For example, it is not that the frontal lobes turn off, but how much and how quickly they turn off that correlates with the type of experience. Thus, the initial heightened activity in the frontal lobes during prayer or meditation is subsequently associated with a decrease which takes the overall frontal lobe activity below the baseline activity. This marked drop in activity is perhaps the essential neurophysiological element in the sense of surrender. It is also interesting to note that the prefrontal cortex is understood to organize thoughts and abstract ideas (Goldberg, 2001). This executive function of the frontal lobes may be essentially "taken off line" during the spiritual awakening process as the frontal lobe activity decreases. This would potentially allow an entirely different set of beliefs and ideas to

enter into the cognitive processes of the brain which are typically modulated by the frontal lobes. A new set of beliefs can then be established as the new belief system once the frontal lobes' functions have been restored. Thus, the decreased activity in the frontal lobes may allow for a restructuring of beliefs that becomes the new "enlightened" state of the individual once the frontal lobes' functions resume for restructuring and maintaining beliefs.

We propose that the final characteristic of enlightenment experiences is their transformative aspect, which not only occurs in the moment, but seems to have a permanent effect on the individual. Data from our survey (Newberg & Waldman, 2016) suggested that many aspects of a person's life are completely changed as the result of this experience. And, more importantly, the changes are almost uniformly for the better. In fact, only 3–5% of people described worsenings in the various aspects of their life, such as relationships, jobs, or sense of religion and spirituality. The vast majority of the individuals surveyed found substantial enhancements in their overall perspective of relationships, vocations, health and well-being, meaning and purpose in life, and sense of religious or spiritual beliefs. The permanence of these experiences is also important from a neurotheological perspective because it suggests that the brain itself has changed in a permanent way. It is possible that the thalamus may shift, or the frontal lobes may shift, both during these experiences, as well as in the long term. Studies have documented that extremely proficient meditators have fundamentally different brains than non-meditators (Lazar et al., 2005; Newberg, Wintering, Waldman, et al., 2010).

At this point, there has not been a definitive study to evaluate people before and after a spiritual awakening. However, a recent study by our group (Newberg et al., 2017) with individuals who went through an intensive retreat based on the spiritual exercises of St. Ignatius suggested that there are profound differences in the brain from pre- to post-test both in terms of general activity levels, as well as at the level of various neurotransmitters such as serotonin and dopamine. Specifically, as a result of undergoing a one-week spiritual retreat, participants showed reductions in their dopamine transporter in the basal ganglia and in the serotonin transporter in the midbrain regions. These results suggest that release of dopamine or serotonin could subsequently have a greater impact on these brain areas, theoretically augmenting any spiritual experience associated with the release of these neurotransmitters. Although there is little research on neurotransmitter activity during spiritual practices or experiences, one positron emission tomography (PET) study showed a release of dopamine during intense yoga meditation (Kjaer et al., 2002). More such studies are required to better understand how various neurotransmitters are associated with spiritual awakening experiences.

In addition, two studies suggested that dopamine and serotonin activity may be closely associated with a sense of religiosity, willingness to believe or not believe in God, or even mindset such as optimism versus depression (McNamara, Durso, & Brown, 2006; Newberg & Iversen, 2003). That spiritual awakening experiences may alter many of these physiological processes is a testament to the power of these experiences and how they transform a person's psyche. This is fundamentally important data for transpersonal psychology in elucidating how the various neurophysiological and psychological aspects of an individual can be radically changed ~~by~~ after spiritual awakening experience. Future work will clarify which neurophysiological changes are associated with the transformative and permanent aspects of spiritual awakenings. Observing more individuals before and after such experiences should help to clarify if the brain regions and findings described above are more definitively correlated with enlightenment. The neurotheological approach can facilitate better understanding of the spiritual, therapeutic, and biological impact of spiritual awakening experiences.

Conclusion

Overall, the data from the survey (Newberg & Waldman, 2016), as well as our prior brain scan studies (Newberg et al., 2001; Newberg & Iverson, 2003; Newberg et al., 2003; Newberg et al., 2006; Newberg, Wintering, Khalsa, et al., 2010; Newberg, Wintering, Waldman, et al., 2010; Newberg et al., 2015; Newberg & Waldman, 2016),

helps us document in more detail the nature of spiritual awakenings. The data also provides some fascinating comparisons between the experiences of a variety of individuals and those described by Eastern traditions such as Buddhism and Hinduism as well as those described by various modern scholars. It seems that there are a number of common elements of virtually all spiritual awakening experiences.

In summary, in our research of spiritual awakening experiences, there is a sense of oneness in which the individual awakens to a new relationship with God or the universe and no longer experiences the personal ego but a higher state in which all things are one. Emotions are affected in these states, although many individuals described intense feelings of love or joy while others experienced an absence of emotions. In Buddhist enlightenment, for example, the goal is to awaken to a state in which there is no suffering. Many participants in the survey reported improvements in their overall sense of well-being, suggesting that their experiences have led to a reduction in suffering, but perhaps as Buddhism argues, there is still a further state to be obtained in which suffering is eliminated. There is the sense of transformation by which these experiences permanently change the individual. Such transformations are described by these individuals, but also by Buddha or Arjuna. And these states are associated with the cognitive concept of wisdom—an understanding and insight into the fundamental nature of the universe. Although many people in the survey described these various elements, at the present time, there is no way to compare these experiences directly to each other or to the well-known enlightenment experiences described in sacred texts. Certainly, the experiences of Buddha or Arjuna seem to be of a magnitude or type which is fundamentally distinct, but whether neurotheology will provide its own insights into the natures of these experiences remains to be seen.

Although neurotheology is only scratching the surface, this data is an important step in creating a catalog and taxonomy of these spiritual awakening experiences. By combining understanding of neuroscience, psychology, spirituality, and the phenomenology of these experiences, there is a far greater opportunity to fully understand the nature of these experiences and their impact on an individual's life.

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About the Authors

Andrew B. Newberg, M.D., is Director of Research at the Marcus Institute of Integrative Health at Thomas Jefferson University and Hospital in Philadelphia. He is also a Professor in the Departments of Integrative Medicine and Nutritional Sciences with a secondary appointment in the Department of Radiology at Thomas Jefferson University. He is the author of the new book entitled, "Neurotheology: How Science Can Enlighten Us About Spirituality." He is the co-author of, "How Enlightenment Changes Your Brain: The New Science of Transformation." He is the co-author of the best selling books, "How God Changes Your Brain" and, "Why God Won't Go Away." Additional information regarding books and research can be found at www.andrewnewberg.com.

Mark Waldman, is Executive MBA Faculty at Loyola Marymount University and is on the faculty of Holmes Institute. He has co-authored four books with Dr. Newberg and is the author of ten other books including the recently published "NeuroWisdom: The New Brain Science of Money, Happiness, and Success." Additional information can be found at www.MarkRobertWaldman.com

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