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A Spiritually Trained Brain : The Therapeutic Effects of Spiritual Practice for Individuals with Temporal Lobe Epilepsy

Amanda Michelle Gvozden
Dickinson College

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A Spiritually Trained Brain

The Therapeutic Effects of Spiritual Practice for Individuals
with Temporal Lobe Epilepsy

By Amanda M. Gvozden

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Professor Daniel Cozort, Supervisor
Professor Teresa Barber, Supervisor
Professor Theodore Pulcini, Reader
Professor Nitsa Kann, Reader
Professor Mara Donaldson, Reader
Professor Andrea Lieber, Reader
Professor Jeffrey-Joeseph Englehardt, Reader

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Introduction

For scholars of Christianity (Woods, 1913; Landsborough; 1987), 2 Corinthians 12:7 includes a short phrase which has provoked much discussion and inquiry. Paul states in this letter that “Therefore, in order to keep me from becoming conceited, I was given a thorn in my flesh, a messenger of Satan, to torment me.” Paul seems to be asserting that he has been burdened by some sort of physical affliction he refers to as a “thorn.” Therefore, the question that follows is: “what is this ‘thorn’?”

There has been considerable speculation surrounding this question but one of the most probable answers is that Paul suffered from a condition known as Temporal Lobe Epilepsy or TLE. Temporal lobe epilepsy is electrical misfirings between neurons in the temporal lobe of the brain. These misfirings cause a variety of effects including altered visual, tactile, and auditory sensations. The visions that Paul had throughout his life, beginning with the vision of Christ on the Road to Damascus (Acts 9:1-8), support this diagnosis. The head trauma Paul suffered after falling from his horse is speculated to have been the inception of his epileptic visions. Following this event, visions continued, most notably including Paul’s visions referenced earlier within the same letter. In 2 Corinthians 12:2 Paul discusses being “caught up to the third heavens.” It is this vision, followed by the aforementioned “thorn in the flesh,” which leads to speculation that Paul may indeed have suffered with TLE (Landsborough, 1987, 661)

That is not to say that these visions were merely a neurological error, however. It may be the case that these visions were still received and divine in nature. In fact, many neuro-theologians, individuals who study the neurological patterns of religious experience, contend

that the temporal lobe, an area of the brain associated with memory, emotional responses, language, auditory perception and visual perception, functions as an antenna for experiencing God. Because individuals with TLE have heightened temporal lobe sensitivity, their connection to the divine may be stronger than a neuro-typical individual. There is much discussion on both sides of the argument regarding not only Paul's experience but those of other individuals with TLE. In fact, there are many people today who have TLE and experience mystical visions.

This paper is for the many modern individuals with TLE. I wish to provide insight into a particularly complex condition and to provide a method of making the "thorny" aspects of TLE a bit less of a burden.

In chapter one, we will begin our investigation of TLE, mystical experience, and spiritual practice by investigating the negative comorbid psychological symptoms of TLE. TLE is a notoriously complex disorder. One of the greatest challenges for individuals suffering with TLE is the prevalence of emotional and psychological comorbid symptoms. The co-occurrence of depression, anxiety, stress, anger, and decreased social skills associated with TLE lead to an overall decreased quality of life among most individuals with TLE.

As such, it is imperative to find an effective solution at managing not only the epileptic events that exacerbate these comorbid symptoms, but also the symptoms themselves. This is a surprisingly difficult task. While a great deal is known about the activity in the brain during a temporal lobe seizure, much less is known about what area of the brain is directly responsible for triggering said event. This makes it difficult to target brain areas when devising

pharmaceutical or surgical interventions. Therefore, any such treatments administered are done primarily experimentally.

Unsurprisingly, these treatments often do not work or work well for most patients making them more exacerbated by their condition. Invasive surgeries and strong medications are prescribed as a method of aggressively combatting the temporal lobe seizures. However, this has disturbing effects for many individuals, especially individuals who have an additional comorbid symptom of TLE: mystical experiences. For individuals who have mystical experiences during their temporal lobe seizures, these medications and procedures threaten to prevent these experiences. This is troubling because many individuals having these experiences view them as part of themselves and are threatened by their removal. As such, it is imperative to find a more effective way of treating TLE and its comorbid symptoms. Specifically, what is needed is a treatment that works with, rather than against, TLE and its associated mystical experiences.

Such a solution may be found in a surprising place. The work of Andrew Newberg and Michael Persinger, among others, has demonstrated that the neural activity during temporal lobe seizures closely mirrors the neural activity of practicing mystics during mystical experiences. As such, we will next turn our attention to the relationship between TLE and epilepsy in chapter two. Many of the same areas are activated during a TL seizure and a mystical experience, with key differences in the frontal lobe and the amygdala. Practicing mystics demonstrate increased activity in the frontal lobe (an area of the brain responsible for emotional control and reasoning) and decreased activity in the amygdala (associated with fear and anger responses) whereas individuals with TLE show decreased frontal lobe activity and

increased amygdala activity. These differences are extremely important regarding the type of experience an individual will have. By comparing the neurological activity of TLE and mystical experience and illustrating their neurological patterns, we will develop a definition of mystical experience that centers on the neurological patterns of the experience.

Keeping our neurological definition of mystical experience in mind, we will investigate the history of the study of mysticism in chapter three. We will investigate the social hallmarks of mystical experience and mysticism which will influence our investigation of TLE and mystical experience.

We will then investigate the descriptions given by individuals who have mystical experiences with TLE and those who are long term spiritual practitioners in chapter four. Individuals with TLE, overall, report more negative emotions associated with their experience, including depression, confusion, and anxiety. This is particularly concerning because we understand that these emotions are already serious issues for individuals with TLE. Spiritually practicing mystics, on the other hand, report sensations of bliss, peacefulness, and oneness consistently. This difference, again, can be attributed to the preparation and conditioning that spiritually practicing mystics have undergone as compared to unprepared individuals with TLE. It seems, therefore, important to turn our attention toward the impact of spiritual practice.

Using this information, we will then assert that the cause of these differences is neural-conditioning in. Spiritually active mystics have been preparing their brains, through spiritual practice, for highly intense mystical experience. They have strengthened key areas of the brain so that when the mystical experience takes place, these areas kick into action and result in the

best possible mystical experience, that is, one that is sublime and blissful rather than horrific and dreadful. Studies demonstrate that spiritual practice increases grey matter formation in these key areas and increases the capacity for neuroplasticity allowing individuals who engage in spiritual practice to affect change on their own brains. Individuals with TLE who lack such training have an entirely different experience.

This will lead us to an investigation of the evolutionary, emotional, and social benefits of spiritual practice in chapter five. Overall, investigations of individuals engaging in long term spiritual practice suggest that such practice provides many evolutionary, biological, and social benefits. In terms of evolution, researchers including James McClenon suggest that spiritual practice and mystical experience increase fertility and survival rate, particularly during childbirth. They also suggest that the capacity to have a mystical experience is a heritable trait. This would indicate that the human population, over time, may be becoming more prone to mystical experience. Biological benefits of spiritual practice include decreased chance of stroke and heart disease. This is likely due to the decrease in stress also associated with spiritual practice. Other biological advantages include increased cognitive abilities and the reduced propensity for Alzheimer's disease. Social advantages incurred by spiritual practice include decreased stress, decreased anxiety, decreased depression, decreased propensity for anger, increased emotional control, and increased empathy. These benefits correspond directly with the negative comorbid symptoms of TLE.

In chapter six, we will finally look at how spiritual practice can benefit individuals with TLE and prepare them in order to have a more beneficial mystical experience. This is because another issue faced by many individuals with TLE who have mystical experiences is the

uncontrolled nature of the experience. Because these individuals have not prepared for their experience, they have not formed a conscious context in which to experience it. The context has been determined by experiences in their environment rather than experiences they have directed themselves leading to often disturbing and confusing mystical experiences. We will see this illustrated best in a case where an atheist individual with TLE has a mystical experience contrary to his beliefs. This experience disturbs and confuses him because it has, in essence, been conditioned from outside of himself. Through spiritual practice, individuals with TLE can shape the context within which they will have a mystical experience. This will help to better align the experience to their own beliefs and result in an experience that is less confusing or disturbing.

Therefore, we will conclude by asserting that spiritual practice may be the best method of treating the negative effects of TLE by working with the condition and its associated mystical experiences rather than against them. Spiritual practice has no negative side effects, unlike medication or surgery. Also, spiritual practice does not threaten the prevention of mystical experience, but rather will help to prepare the brain for such experiences and lead to a more positive outcome. Even for individuals with TLE who do not have mystical experiences, spiritual practice will provide benefits that help to reduce or eliminate the negative comorbid symptoms of their condition. Moreover, bearing in mind current attitudes in the United States surrounding therapeutic spiritual practice, this would not be a difficult treatment to employ. A growing percentage of the population reports having had a mystical or religious experience and many already utilize spiritual practice as a method of therapy. Therefore, it is clear that spiritual practice might be the best therapy for improving the quality of life for individuals with TLE.

Chapter 1: Negative Psychological Effects of Temporal Lobe Epilepsy

Epilepsy has obvious detrimental effects on the quality of life of an individual. Poorly managed epilepsy can interrupt one's daily life with seizures, make certain otherwise routine tasks dangerous such as cooking or mowing the lawn, and even prevent epileptic individuals from participating in certain major life activities such as driving. However, even well managed epilepsy and controlled seizures do not mean that an individual with epilepsy is not suffering. In addition to these immediate symptoms, the high rates of comorbidity with other psychological conditions make epilepsy even more challenging to deal with.

TLE Depression and Anxiety

Depression and anxiety are well documented problems associated with epilepsy. Causes of depression and anxiety in individuals with epilepsy are both neurobiological and psychological. From a neurological standpoint, the temporal lobe, the area that is damaged in cases of temporal lobe epilepsy (TLE), is also highly involved in regulating moods (Piazzini, 2001, 29). The damage that contributes to the resulting seizures also contributes to depression and anxiety. In addition to these physical causes, social stigma, anxiety surrounding the seizures, poor self-esteem, loss of control, and fear surrounding the seizures are psychological factors that can contribute to heightened depression and anxiety in individuals with epilepsy (Piazzini, 2001, 29).

A three-part study conducted at the Epilepsy Center at San Paulo Hospital illustrates the prevalence of these issues among individuals with epilepsy in comparison to a neuro-typical population as well as sub-groups within the epileptic population. The study asked three questions: is there a significant difference in mood disorders between individuals with epilepsy and those without epilepsy? Do patients with partial epilepsy (epilepsy that affects primarily one section of the brain—for the purpose of this study, individuals with temporal lobe epilepsy and frontal lobe epilepsy) have different levels of depression and anxiety than those with generalized epilepsy (epilepsy in which the entire brain is involved in a seizure event)? And are there specific neural-areas associated with these mood disorders?

To answer these questions the researchers studied a group of one hundred fifty individuals with partial epilepsy, seventy with idiopathic generalized epilepsy and one hundred control participants without any form of epilepsy. All participants were administered two self-rating mood questionnaires for the evaluation of depression and anxiety (Piazzini, 2001, 29). The first questionnaire was the Zung Self-Rating Depression Scale. In this test participants were asked to assess the frequency of occurrence of twenty life events on a four-point scale ranging from “very seldom” to “very frequent.” A score of forty or more represented depressive symptoms (Piazzini, 2001, 30). The higher the score, the higher the level of depression. The second questionnaire administered was the State Trait Anxiety Inventory S-Anxiety Scale (Stai-S). This questionnaire consisted of twenty life situations related to mood on which subjects were required to rate their present feelings on a four point scale ranging from “not at all” to “very much.” A score of forty or more indicates an anxious condition (Piazzini, 2001, 30). Again, the higher the score the more severe the anxiety.

Based on the self-reported data, the researchers found that there was a significant statistical difference in prevalence and intensity of anxiety and depression between individuals with epilepsy and without epilepsy. On the Zung Depression Scale individuals with epilepsy scored on average a fifty-five indicating high levels of depression while the control non-epilepsy group reported scores averaging thirty-two, or non-depressed. On the Stai-S scale, patients with epilepsy reported average scores of fifty-four indicating high levels of anxiety compared to the control non-epilepsy average score of thirty, non-anxiety (Piazzini, 2001, 30). The answer, then, to the group's first question "is there a difference in prevalence and intensity of depression and anxiety between individuals with epilepsy and individuals without epilepsy?" was a clear yes; individuals with epilepsy are more depressed and anxious than non-epileptic individuals (Piazzini, 2001, 30).

When comparing the individuals with generalized epilepsy with those with partial epilepsy, there again were significant differences in prevalence and intensity of depression and anxiety. On average, individuals with generalized epilepsy reported depression scores of forty-four compared to an average report of fifty-eight from individuals with partial epilepsy. Likewise, on the Stai-S scale, individuals with generalized epilepsy reported average scores of forty while individuals with partial epilepsy had average anxiety scores of fifty-six. This illustrates that individuals with partial epilepsy are more depressed and anxious than individuals with generalized epilepsy. Within this group, individuals with temporal lobe epilepsy had the highest scores for both depression and anxiety, having higher scores than individuals with frontal lobe epilepsy (FLE) (Piazzini, 2001, 30). Individuals had average Zung scores of sixty-one where as individuals with frontal lobe epilepsy had average Zung scores of fifty-three

indicating higher depression among individuals with temporal lobe epilepsy. Likewise, individuals with TLE had average scores of sixty-one on the Stai-S test compared to Stai-S scores of fifty-three for individuals with FLE demonstrating higher levels of anxiety among individuals with TLE as compared to individuals with FLE (Piazzini, 2001, 30). Ultimately, from this information, we can conclude that individuals with TLE had higher rates of depression and anxiety than any of the other groups evaluated in this study.

TLE and Anger

In addition to high levels of depression and anxiety, individuals with TLE also often struggle to control their anger. Researchers concluded that individuals with TLE often suffer with a comorbid condition known as Intermittent Explosive Disorder or IED. IED is characterized by recurrent outbursts of anger or more precisely, “several discrete episodes of failure to resist aggressive impulses that result in serious assaultive acts or destruction of property” (Elst, 237). The behavior is out of proportion to the stress and is not due to any other psychological disorder or substance abuse.

To test this hypothesis, fifty individuals—twenty-five individuals with TLE IED and twenty-five individuals with TLE but not IED—were studied using electrophysiological, neuropsychological, and psychometric investigations. After reviewing the results, researchers concluded that the increased and uncontrollable aggression in individuals with TLE is linked to the damage in the hypothalamus, amygdala, and associated limbic structures characteristic of TLE (Elst, 240). The hypothalamus, amygdala, and associated limbic structures are involved in

the mediation of aggression in humans. The amygdala and limbic system are thought to play a crucial role in the mediation of fear and defensive aggression. Therefore, pathology within these circuits affecting the amygdala may lead to heightened aggression. In fact, several studies show that electrical stimulation of the amygdala can lead to experiences of fear, anxiety and anger, while lesioning of the amygdala severely impairs fear conditioning. For this reason, the damage to the amygdala as a result of TLE perpetuates increased fear and defensive aggression leading to IED in many individuals with TLE (Elst, 243).

TLE and Emotional Recognition

Besides having poor control over their own emotions as a result of TLE, individuals with TLE often experience difficulty interpreting the emotions of others. Anterior temporal lobe regions, particularly the amygdala participate in the recognition of facial emotional expression. Lesion studies showed the amygdala and associated structures in the temporal lobe play a crucial role in the recognition of emotions and visual stimuli (Meletti, 2003, 426). In TLE the amygdala and hippocampus, two areas key to emotional recognition, are often damaged together (collective term is mesial temporal sclerosis [MTS]) (Meletti, 2003, 426).

To test how significantly MTS affected the ability of individuals with TLE to correctly identify the emotions of others a group of neurologist working at the Epilepsy Monitoring Unity of Bellaria Hospital in Bologna, Italy investigated the ability of ninety-six individuals with TLE and fifty-five individuals without TLE to correctly identify the emotions presented on a variety of emotion expressive pictures. First, the subjects were given a facial recognition test. This

means that the participants were given a picture of a face and then asked to pick out the matching face from a group of other images. Both the TLE participants and the non-TLE participants were able to match the faces with a greater than ninety-five percent accuracy rate (Meletti, 2003, 427). Next, the participants were given an emotional recognition test. For this test, participants were shown a variety of faces, each making a different emotional expression (happiness, fear, disgust, sadness, and anger) (Meletti, 2003, 427). Individuals with TLE displayed an impaired ability to recognize emotions, especially fear, sadness, disgust, and anger, with the greatest difference between individuals with TLE and without TLE in recognizing disgust (Meletti, 2003, 430).

In addition to these frequently occurring emotional challenges for individuals with Temporal Lobe Epilepsy, researchers Bear and Fedio report a much longer list including irritability, hyper or hypo sexuality, emotional instability, mania, depression, guilt, humorlessness, anger and hostility, and paranoia. These and the above mentioned characteristics make social life very difficult for individuals with TLE (1977, 457). Outbursts of anger make it difficult to communicate effectively with others and also push individuals away. Inability to recognize the emotions of others makes it difficult to empathize and communicate with others or respond predictively and appropriately to others, which are crucial features of human communication. These emotional difficulties then perpetuate the additional challenges faced by individuals with TLE: depression and anxiety. TLE makes depression and anxiety a likely result of the disorder itself, but compounded with the inability to make social connections as a result of the other symptoms, this reinforces depression and anxiety causing a vicious cycle that

is difficult to escape. As a result, researchers began to investigate the impact that these symptoms had on the overall quality of life of individuals with TLE.

TLE and Quality of Life

When researchers approached the question of effects of these comorbid psychiatric symptoms of TLE on the quality of life of individuals with TLE, they had three primary questions: what is the nature and extent of difference in self-reported psychiatric symptoms between patients with TLE and matched healthy controls; what is the relationship between chronicity (duration) of TLE and comorbid psychiatric symptoms; and what is the impact of comorbid psychiatric symptoms on self-reported health-related quality of life?

To answer these questions the researchers administered two self-reporting scales to a participant group of ninety-six individuals (fifty-four individuals with TLE, and thirty-eight individuals without) (Hermann, 2000, 185). The first scale that participants were asked to fill out was the Symptom Checklist 90 Revised scales (SCL-90-R) to assess the severity of psychiatric symptoms among individuals with TLE and individuals without TLE. Compared with healthy controls, patients with temporal lobe epilepsy exhibited significantly higher (worse) scores across all but one of the twelve SCL-90-R scales meaning that overall, individuals with TLE exhibited not only more psychiatric symptoms than their control group counterparts, but also more severe psychiatric symptoms as well. Moreover, among participants with TLE, higher chronicity was associated with significantly higher (worse) scores across all SCL-90-R scales (Hermann, 2000, 187). The second scale that the participants were asked to fill out was the

Quality of Life in Epilepsy-89 scale (QOLIE-89). After comparing the results of the control group and the individuals with TLE, the researchers found that individuals with TLE exhibited increased emotional-behavioral distress was associated with lower (worse) scores across all seventeen QOLIE-89 scales, indicating that individuals with TLE reported experiencing overall lower quality of life than their control, non-TLE, counterparts (Hermann, 2000, 188).

Addressing Comorbid Psychological Effects of TLE

The obvious solution would seem to be to address the seizures themselves. Stopping the seizures could stop the neurological damage as well as the psychological damage done by associated stigma. However, this is not easily done. While the area involved in a temporal lobe seizure is identifiable through fMRI scans, it is difficult to pinpoint the exact cause of the seizures. Therefore, medication taken to prevent the seizures is often ineffective.

One option to eliminate seizures is Radio Frequency Nerve Lesioning (RFNL) (Persinger, 1983, 1259). This procedure cuts the connection between certain nerves making it impossible for them to send signals between each other. By disrupting the communication between nerves in the temporal lobe, particularly surrounding the hippocampus and amygdala, temporal lobe seizures may be eliminated. However, not even this approach is always effective. Moreover, preventing the mystical events associated with temporal lobe seizures is seriously emotionally troubling for individuals with TLE. The experiences have become a part of them and taking this part away is a threat that can itself cause stress, anxiety, and depression (Persinger, 1983, 1261). Therefore, the most reasonable solution would be to find a therapy for the negative

comorbid symptoms of temporal lobe epilepsy that work with, rather than against, the seizures and mystical experiences characteristic of the condition.

Chapter 2: Temporal Lobe Epilepsy and Mystical Experience

Epilepsy has long been associated with mystical experience. The Ancient Greeks viewed epilepsy as a visitation from the gods and thus a sacred disease; medieval Christians believed that epilepsy was a result of demonic possession; and the Aztecs and Incas also strongly associated epilepsy with magic curse and religion (Khwaja, 167).

Today, epilepsy is associated with mystical experience only in the specific context of temporal lobe epilepsy (TLE) rather than other forms of epilepsy. Temporal lobe epilepsy is the result of abnormal electrical signals in the temporal lobe and may be caused by head trauma, heat stroke during infancy, tumors, and heredity (Joseph, 127). We will now look at the specific neural activity during a temporal lobe seizure associated with religious experience and see how this compares to the neural activity of neurotypic individuals (people with normal brain activity) and individuals who have frequent mystical experiences.

Brain Patterns of a Temporal Lobe Seizure

Although temporal lobe seizures share some of the same features as other types of focal or generalized seizures, they tend to be characterized by complex sensory, motor, and autonomic disturbances, superimposed on a background of altered consciousness which are not characteristic of other forms of epilepsy (Helminiak, 1984, 34). During temporal lobe seizures there is abnormal activity in the temporal lobe and immediate surrounding areas. Specifically,

there is a disturbance in the limbic system, which is closely connected with the emotional life of the individual (Hyde, 325). TLE brings about a loss of awareness of time and space, a hyper-awareness of emotions, depersonalization, dissociation, and a hyper-awareness of sensations (Khwaja, 167).

This atypical functioning of the system leads to abnormal perceptions and altered states of consciousness (Slater and Beard, 147). This happens because of stimulation of cortical structures within this area of the brain, primarily the hippocampal and amygdaloid complexes, which are associated with sense of self in relation to time and space (Persinger, 1983, 1255). The right hippocampus and the left amygdala, structures within the limbic system, are the precise structures within the brain that are most active during a temporal lobe seizure (Murphy, 2010, 496). The right hippocampus is associated with cognitive functions that process non-verbal information. It is also involved in spatial perception, music, appreciation, memory, and the storage of these memories (Stark, 2007). The left amygdala is highly involved in fear when intensely stimulated and with sexual and aggressive behaviors during more intermediate states (Stark, 2007).

These structures are the most implicated in the mystical experiences during TL seizures (Murphy, 2010, 500). Experiences involving the left amygdala are more oriented towards prayer and faith in God while experiences involving the right hippocampus are more oriented towards meditation and insight. Both areas may be active during a seizure resulting in a mixed experience. In fact, a sudden stimulation of the amygdala alters the sense of self in space and time and could in turn alter the functioning of the hippocampus and change memory perception (Persinger, 1983, 1256).

Brain Patterns of Contemporary Mystics

Several studies have been conducted in recent years to track the neural-activity of practicing mystics during spiritual practice and mystical experience. It should be noted that these studies have, for the most part, focused on meditation as the primary method of entering a mystical experience. While there are certainly other methods of entering mystical experiences, these have, thus far, been less studied. However, these studies do consistently demonstrate that brain activity during mystical experiences shows similar patterns to TL seizures.

To analyze the neural patterns of individuals during mystical experience, Dr. Andrew Newberg at the Hospital of the University of Pennsylvania observed the neural patterns of meditating Tibetan Buddhist monks. During their meditation the monks were asked to pull on a string as they entered the climax of their meditative state (McCrae, 350). When the monks pulled the string, the doctors began recording their neural activity using radioactive isotope injected into their bloodstream and a SPECT camera to follow the participants' blood flow in their brains. Increased blood flow to a region of the brain indicated that that region was more active. The findings showed high activity within the monks' temporal lobes and extremely low levels of activity in the parietal lobes, which control sense of orientation in time and space. The scans also showed increased activity in the monks' frontal lobes, an area of the brain associated with emotional control and concentration. Following the scans, the individuals were asked to report their sensations. The monks described feelings of dissolution of boundaries between

themselves and the external world. They also reported a sense of numinous oneness with the universe (McCrae, 354).

Another study by Newberg analyzed the neural activity of Franciscan Nuns in prayer (BBC). Again, Newberg used SPECT imaging to record the blood flow to different areas of the brain while the nuns prayed. The nuns, like the monks, were asked to tug on a string once they felt they had reached a peak experience or moment of transcendence. These findings closely mirrored those of the Tibetan Monks in meditation. These images also demonstrated increased temporal lobe activity and decreased parietal lobe activity. Additionally, the nuns displayed increased activity in their frontal lobes as well. The nuns reported similar sensations to those described by the monks as well: a sense of dissolving boundaries and oneness. The only difference between the two groups was activation in the language area versus the visual cortex. The monks, who were performing meditation that required complex visualization showed increased activity in their occipital lobes whereas the nuns who were concentrating on verbal prayer showed slightly increased activity in their language areas. These differences are insignificant in terms of outcomes and can be attributed to differences in spiritual practice methods.

Dr. Michael Persinger also recorded the neural activity of an individual during a mystical experience. During a routine EEG study monitoring the effects of transcendental meditation, an experienced meditation instructor displayed an electrical anomaly in the right temporal lobe. She reported “being filled with the spirit” and feeling the presence of God. The episode lasted for about 20 seconds (Comings, 484).

Several studies have been conducted to analyze the long term neurobiological changes in an individual who has engaged in long term spiritual practice. In a recent study, MRI scans were used to analyze the brain structure of twenty long term Vipassana meditators. The mean length of practice of the meditators was 8.6 years, with each meditator practicing approximately two hours daily. The MRI images revealed that meditators had increased grey matter concentration in regions activated during meditation. The brain is composed of two types of matter: grey matter and white matter. Grey matter is the tissue within the brain that is actually responsible for carrying out the functions of the brain. Increased grey matter in an area indicates that this area of the brain is functioning at a high capacity. In the same way that large muscles indicate not only that that muscle is used frequently but also that it is well prepared to perform its appropriate function, so too does increased grey matter in an area of the brain. The right anterior insular area, an area of the brain involved in introspective awareness, showed the greatest increased density among the group of mediators who focused on bodily awareness during the meditation sessions. Additionally, the left inferior temporal gyrus, an area involved in processing and interpreting visual stimuli and emotional regulation and response control, and the hippocampus, an area involved in memory and fear, both showed increased grey matter.

A second study of long term meditators also suggests that long term spiritual practice leads to increased grey matter in several key areas. Using high resolution MRI scans, researchers examined the brain structure of forty-four long term meditators. The images showed increased grey matter in a variety of areas. The right orbito-frontal cortex, the right thalamus, and left inferior temporal gyrus both showed increased grey matter. But the most

pronounced increase in grey matter was observed in the right hippocampus. All of these areas have been implicated in emotional regulation and response control. In fact, the study demonstrates that the increased grey matter caused by frequent, long term meditation enabled the meditators to more effectively cultivate positive emotions, retain emotional stability, and engage in mindful behavior.

Finally, a large scale study summarizing the results of 147 independent investigations involving a total of 98,875 subjects reports similar notable neurobiological changes in the brain structures of long term meditators. The study included the results of investigations using three primary techniques: Positron Emission Tomography (PET), Magnetic Resonance Imaging (MRI), and Single Photon Emission Computerized Tomography (SPECT) on a variety of spiritual practices: yoga, tantric yoga, yoga nidra, kundalini yoga, and Tibetan meditation. All of the investigations shared several distinct features: increased prefrontal activation, increased frontal lobe activation, and decreased parietal lobe activity (Muramoto, 2003). This is particularly important because the frontal lobe is the area of the brain responsible for mediating the preparedness for mystical experience and the cognitive processes involved in appreciation of them (Azaro et al., 2003).

Comparing Mystics with Non-mystics

It is clear that there is a similarity between the neural activity of mystical experience among individuals with TLE and individuals without. But why? It is hypothesized that the connection has to do with temporal lobe sensitivity. Psychometric data suggests that temporal lobe

sensitivity exists in a continuum within the human species (Murphy, 2012, 496). There seem to be several groups of people who display heightened temporal lobe sensitivity within the temporal lobe, particularly the right hemisphere: individuals diagnosed with partial complex epileptic seizures with a focus in the temporal lobes (which we refer to as Temporal Lobe Epilepsy) and non-epileptics who have frequent mystical experiences (elevated temporal lobe signs have been reported by people who engage in spiritual practices and who have a history of mystic experiences). Most people fall somewhere in the middle of the scale. Individuals with TLE have a predisposition for mystical experience because of the already elevated levels of activity in their temporal lobes. Individuals who engage in spiritual practice train their brain and heighten the basal activity within their temporal lobes through practice.

However, while there are similarities between the experiences of individuals with TLE and long term spiritual practitioners, there are distinct differences as well, most notably that the descriptions of the experiences differ in reported content and attitude which we will discuss in greater detail later. This leads to an overall negative association between mystical experiences for individuals with TLE and a positive experience for spiritual practitioners. I suggest that using the above information we can help to alleviate some of these negative effects with individuals with TLE by adding spiritual practice to their routines thus strengthening the regions that are involved in the mystical experience that will prepare the brain for these experiences and that will help to make the mystical experiences positive.

Before we continue, it should be noted that this approach to mysticism and mystical experience is rather narrow. We will be focusing primarily on mystical experience defined by a set of neurological patterns as described above. However, this does not take into account the

substantial history and depth of the study of mystical experience and mysticism that is outside of this view point. Therefore, to understand better how our neurobiological categorization of mystical experience and mysticism is situated within a larger conversation, we should now look at the study of mysticism more broadly.

Chapter 3: The Emergence of a Neurological Investigation of Mystical Experience

Social scientists such as Robert Bellah (2011), Michael Winkelman (2010), and John Baker (2010) argue that the origins of religion can be found among a group of people that we would today refer to as mystics: those who have a direct experience of the divine. Rhythmic chanting, drumming, and dancing enhanced social bonding and induced an altered state of mind in which humans first encountered the divine.

Today mysticism lies, for the most part, on the perimeters of the religions that it helped originate and is treated as a different category of experience entirely. As a result, it has become increasingly more difficult to understand mysticism or the mystical experience. Moreover, culture and context significantly affect the report being given or even the content of the experience itself. Additionally, mystical experiences are such that words fail to adequately describe them at all. Therefore, it is difficult to pin down one comprehensive definition for mysticism. To address this difficulty, a new method of investigating mysticism and mystical experience is emerging. Neurologists and “neurotheologians” (those who attempt to explain religious experience and behavior in neuroscientific terms) are looking at brain structures and activity during mystical experiences to define mysticism and mystical experience in broad, encompassing, neurobiological terms.

While we are defining mysticism in neurobiological terms, we must also investigate the experiences by which mysticism is defined. It is easy to conflate mystical experience with religious experience. However, it is important to distinguish them in order to understand what

religious and mystical experiences do and do not entail and to identify the unique features of mystical experiences.

Religious Experience and Mystical Experience

What makes the distinction difficult is that mystical experiences are a type of religious experience. In fact, sociologist Ernst Troeltsch refers to mystical experience as the third type of religious experience after the church and the sect (Troeltsch, 1960). Each is a different type of experience within the broader category religious experience. In other words, mystical experiences are religious experiences, but not all religious experiences are mystical experiences. To understand why this is the case, it is important to have clear examples and defining characteristics of both religious and mystical experiences.

Let us begin by addressing religious experience. This category is easier to define and understand because many people have either had some sort of religious experience in their lifetime or know someone who has, as compared to the very few who have had a mystical experience. As the name implies, religious experience occurs within the context of one or more religions. Robert S. Ellwood, Jr., provides several examples of religious experiences that are not mystical experiences that can help to clarify this distinction. First of all, religious experiences that are non-mystical in nature can be thought of broadly as a directed, non-spontaneous interaction with religious principles, concepts, or entities. Thus, it involves the canons, beliefs, practices, rituals, or any number of other facets of a given religion to which one feels a certain enthusiasm or attraction. The enthusiasm one might feel while studying a religion would be a basic sort of religious experience (Ellwood, 1980). This experience may be profoundly

transformative, but it involves interacting with religious concepts, not with the truths behind those concepts that occurs in mystical experiences. If one takes this interest further, and subscribes to the ethical principles of a religious tradition, one has a religious but not mystical experience because the adoption of these principles has come not from a direct experience with the truths behind the religion but exclusively with the religion itself (Ellwood, 1980). Even religious activity that involves the interaction with or manipulation of spiritual powers or deities is categorized as religious rather than mystical (Ellwood, 1980). Even though the interaction is directly with the divine, it is controlled and directed rather than being the spontaneous direct perception of oneness associated with mystical experience.

While these experiences are religious but not mystical in nature, the boundary between the two is porous so that some of the experiences described above could morph into mystical experiences. For instance, many mystical experiences develop from the last described variety of religious experience: direct controlled interaction with, or manipulation of, the divine, such as occurs in prayer or worship. In these cases, the religious experience transforms into a mystical experience that elicits different sensations and is identified by different characteristics.

Broadly speaking, mystical experiences involve an uncontrolled, direct encounter with the divine. The experience arises spontaneously. Even when it is preceded by religious practice, the human participant does not initiate the experience itself; it simply happens. This characteristic psychologist William James refers to as “passivity” (1902). James outlines three other characteristics that define mystical experience. First, James asserts that the experience is “noetic” in nature (1902). By this he means that there is a sensation of knowing and feeling associated with the experience, as though the experience itself imparts an additional, otherwise

inaccessible knowledge to the individual. Religious experience also can involve gaining knowledge, such as in the first example regarding an intellectual or academic enthusiasm for religion, but through study, acquiring knowledge by an individual's own volition and effort. In a mystical experience, the knowledge is imparted to the individual through the experience of union with a divine other (1902).

Another characteristic of mystical experience, according to James, is transiency, the ephemeral nature of the experience itself (1902). While one may be engaged in a religious experience, such as study or prayer, for hours or longer, mystical experiences characteristically last mere seconds and at most last a few minutes. The final characteristic James uses to define mystical experience is "ineffability" (1902). The experience is so intense and overwhelming that talking about the experience becomes nearly impossible. To fill this void, the individual uses experiences and language from their own lived experience to describe what would otherwise be impossible to articulate (Gombrich, 1960). This does not mean that the experience itself lacks substance or is empty, but rather that it is so grand that words do not accurately reflect the nature of the experience. This characteristic will prove to be important when investigating the constructivist perspective on mystical experience and the motivation for investigating mystical experience neurobiologically, but suffice it to say that the characteristic of ineffability largely speaks to the intense nature of the mystical experience.

Context and Constructivism

The nature of the mystical experience means that individuals oftentimes have difficulty describing the experience. Words simply do not suffice. It is because of this that many mystics borrow terminology from the culture they are most familiar with or the religion they practice to describe or characterize their experience (Katz, 1992). This is referred to as “constructivism,” the process by which individuals who have had mystical experiences contextualize these experiences within their given religious or cultural situation (Moore, 1978).

In this way, while religiosity may lead to the experience itself, it also may help to describe the experience afterwards. Words used to describe the experience are often either religious or religious-substitute words relating to ultimate truths and existential questions. The experience “calls forth” the most ultimate and transcendent words that the individual has at their disposal in his or her cultural and religious context (Forman, 1999). Hick shares this attitude, saying that any interaction with the infinite divine is filtered through finite human understanding and understood through human concepts (Hick, 1980). Sociologist Marghanita Laski recorded the descriptions of sixty-three mystics following mystical experiences; these descriptions reinforce the contextual nature of mystical experience (Laski, 1962). The participants used words and concepts from their own cultural or religious context to help describe their nearly indescribable experience. We will see this pattern of ineffability and contextualization in mystical experiences we examine later.

Philosopher Steven Katz takes this one step further saying that not only does context affect the description of the experience, it influences the experience itself (Katz, 1992). The

cultural and religious context of an individual largely dictates the images and sensations they will have in the mystical experience, according to Katz. This will be particularly important to remember when investigating human neural-plasticity. This suggests that through conditioning such as prayerful and meditative practice, mystical experiences and their after effects can be guided and molded.

Types of Mystical Experience

Moreover, not only are their different ways of describing or having a mystical experience based on cultural or religious context, there are also a variety of types of mystical experiences.

According to Geoffrey Parrinder, there are at least three basic types of mystical experience with possible divisions within each type. The first type, and the type most people think of when they hear “mystical experience” is “theistic” mystical experience. Theistic mysticism seeks union, but not identity, with God (Parrinder, 1976). In other words, one wishes to be united with God but does not wish to become God. Generally this type of mysticism is associated with monotheistic traditions and emphasizes love as the medium through which unity with God is achieved.

Panentheism is a concept also associated with theistic mysticism. It is the philosophical position that God is present in every part of the universe. However, God maintains a higher status than the parts. In essence, God is in all of the parts of the universe but also even more than the universe itself. Although God is immanent in the universe, God is also transcendent and all-powerful (Oliver, 2009). This concept often is associated with devotional mysticism (Ellwood, 1980).

A second type of mysticism is “monistic” mysticism. A monistic mystic seeks identity with a universal principle (Parrinder, 1976). One experiences the true and ultimate identity of all beings. Through unity with this universal principle one discovers that they share this identity with all other beings and that it is the root nature of everything. In other words, the divine, nature, and humanity are all composed of the same substance. Generally, monistic mysticism is associated with Eastern traditions. Associated with monistic mysticism is the philosophical concept of pantheism, that God or the divine resides in every part of the universe and that the entire universe is the complete identity of God or the divine. It is impossible to differentiate between God and the rest of the universe (Oliver, 2009). This concept is associated with a variety of modes of mysticism including some types of wisdom mysticism (Ellwood, 1980).

The third type of mysticism Parrinder identifies is non-religious mysticism. This type of mysticism seeks union with something or everything, somewhat like monism, but without calling it sacred (Parrinder, 1976). Examples of this may be a sense of oneness with nature or a moral principle or a political cause.

Variety of Mysticism

Historically, mysticism has varied considerably. However, it is important that each incarnation did not develop in a vacuum. The modes of mysticism developed in conversation with one another. In this way, to understand modern mysticism it is essential to understand the themes and practices of its predecessors and see how they shaped the way we understand mysticism today. First, we return to the description of mysticism we began with, that of ritualized

chanting, dancing, and altered states of consciousness. This may very well be the first mystical and religious experience of the human species: entering a mystical state through a ritualized practice that changed the individual's perception of reality. This was usually a group activity such as rhythmic chanting and dancing around fire in which several members of the group would enter an altered state of mind during the ritual resulting in the formation of inter-group trust and group bonding (Winkelman, 2010).

Shamanism another type of mysticism. A shaman is a religious specialist within a given community who may have extra-human powers such as the ability to have visions, communicate with spirits or the dead, or powers to heal the sick or injured. Generally, mystical experiences within shamanism are associated with initiation rites; however, there are a variety of other contexts during which a shamanistic mystic would have a mystical experience also such as during vision quests or healing rituals (Bellah, 2011). During these experiences, the shaman seeks to gain awareness of the spirits to gain wisdom or guidance from them or to get control over them. These experiences are associated with individual power but also the power of nature and the spirits and the wisdom and guidance that can be gained from them. The shaman has special access to this wisdom and then becomes more powerful as an individual (Bellah, 2011).

Another type was ancient wisdom mysticism which can be seen in Jewish Kabbalah, much of Hellenistic pre-Christian religion and philosophy such as Gnosticism and Stoicism, and early Greek Christianity, just to name a few. As the name would suggest, this type of mysticism seeks union with the divine through knowledge. There is a certain sacred knowledge that one must access to achieve a mystical experience. During the experience itself, the individual gains

further transcendent knowledge (James, 1902). Individual power is highly important within this context. The individual who is seeking divine knowledge makes the mystical experience possible. Also, the individual gains power or from the knowledge they gain from the experience.

Devotional mysticism emphasizes love as the means to achieve union with the divine. Through intense love, one opens oneself up to achieving union with the divine. The quest is for liberation from all of the constraints and oppression of non-love. Individual power is less emphasized in this type of mysticism (Oliver, 2009). Here, one surrenders to the divine through love. Individuals devote themselves to the contemplation and practice of love. This includes passionate worship, praise, outreach, and service. These acts are undertaken on behalf and in reflection of the divine. It is through this contemplation and these actions that one comes into contact with the divine.

Modern mysticism takes on a more individualized approach. But there is also much individual variation in the way modern mysticism is practiced and conceived. The major shift occurring in modern mysticism is a breakdown of barriers between practices and beliefs that were associated with separate types of mysticism. This correlates with the rising shift from individuals identifying strongly with one religious tradition to a more individual centered, eclectic self-developed identity (from religiosity to spirituality (Funk, 2012)). Now, there is more of a symbiosis, which leads to greater individuality. This is because the individual is creating a new spiritual reality for themselves either through individual convictions or through practices and beliefs borrowed from a number of traditions and combined in an eclectic and highly individual fashion (Ellwood, 1980).

Common Patterns of Mysticism and Mystical Experience

Despite the variety in types and expressions of mysticism and varieties of mystical experience, there are prominent patterns that emerge. One pattern that emerges across cultures and religions among practicing mystics, those who practice and seek mystical experiences, is the psychological effect of the experience. The psychologist Abraham Maslow, famous for his work dealing with human needs, also addresses psychological states of peak experience. Maslow describes two states: B states and D states (1970). D states are states of deprivation in which the individual has some need that is unfulfilled. This deprivation motivates the person to seek ways to fulfill his or her need. B states are “being states” in which the individual is fulfilled in the present moment. When a B state is amplified to its highest “pitch,” Maslow refers to it as a “peak experience” (Maslow, 1970). Mystical experiences are an example of this peak state, or are at least in the case of someone seeking mystical experience as a way to fulfill unfulfilled needs in the D state through spiritual practice. As a result, the mystical experience fulfills spiritual needs of the practitioner in his or her D state and leads to self-fulfillment.

Another pattern that emerges across cultures and religions is the basic structure of a mystical experience. Laski, Bharati, and other scholars of religion suggest that there are three stages to any mystical experience. The first stage is the trigger. This can be described using Maslow’s D state. Individuals may be feeling depressed, anxious, frustrated, and otherwise deprived. In order to alleviate this, they may take up some sort of practice to fulfill these needs. The D state is the trigger that begins an individual’s search for fulfillment and thus begins his or her mystical experience. Second is the climax (Bharati, 1976; Laski, 1962). This may be described in terms of Maslow’s peak B state (Maslow, 1970). In this state, the needs of the

individual have been fulfilled to their highest capacity. The individual feels united with an entity, presence, or principle responsible for fulfilling their needs. Finally, there is the third stage: afterglow (Bharati, 1976; Laski, 1962). This is the post-experience phase where an individual reflects on the experience, contextualizes it, and tries to find words to describe it.

These patterns suggest that there may be a way to understand mysticism from a different perspective. Because there seem to be unifying features of mystical experiences, scholars have begun to hypothesize that perhaps mystical experiences are intrinsic to human nature and biology (Winkelman, 2010; Bellah, 2011; Newberg, 2009). This hypothesis has prompted research into the neurology of mystical experience. This sort of research will be illuminating in several ways. First, it will help to understand experiences that are difficult to describe in a more concrete way. Because of the ineffable nature of mystical experience, it is difficult to pin down what all a mystical experience actually entails. By looking at neurological functioning during a mystical experience, we can acquire new terms by which to define mystical experiences.

Second, it is clear that cultural, religious, and historical context play a large part not only in the interpretation of a mystical experience but also, possibly, in the sensations and perceptions during the experience itself. A neurological look at the biological phenomena that occur during a mystical experience will be able to illuminate patterns universal to all humans that cut across cultural and religious context. This is not to say that context no longer matters or that cultural and religious nuances of any given experience are meaningless; far from it. Rather, constructivism combined with the neurological aspect of brain plasticity opens up the possibility that mystical experiences can be shaped. As we will see later, mystical experiences

have, with proper conditioning and preparation, a beneficial effect on cognition and emotional health. Helping individuals train their brains so that their mystical experiences, which may have otherwise been overwhelming and disturbing, are beneficial, has great therapeutic implications.

Third, a neurological approach to understanding mystical experience will illuminate commonalities among these varied and complex experiences and promote cross cultural and cross religious understanding. This investigation will shape our understanding of human similarity and difference. Finding universal neurological patterns during mystical experience across cultures, religions, and types of mysticism will add another dimension of similarity and encourage empathy and understanding.

Chapter 4:

The Nature of Mystical Experience and Patterns among Their Reports

We will begin our neurological investigation of mystical experiences by investigating more thoroughly their structure. Let us discuss the processes of the mystical experience, relying on sociologists Laski and Bharati, who find three stages (Bharati, 1976; Laski, 1962).

The First Stage: Trigger

The first stage of mystical experience is the trigger stage. We will talk about the trigger in two different ways. One is as “background influence.” Background influence refers to the circumstances in the life of an individual such that they sought a mystical experience. In other words, this is a particular attitude toward the world and reality. Whatever the larger framework is that makes up the “background influence,” it is highly influential in the inception and perception of the mystical experience. The trigger may also be a physical cue eliciting an altered state of consciousness, such as a sudden vista of natural beauty or a Zen master’s slap (Elwood, 1980). The physical trigger is grounded in context. A Zen master’s slap would be taken very differently by a Christian mystic lacking knowledge of the slap’s intention than it would by a Zen student. A vista of natural beauty may have no effect on a gnostic mystic who views nature as inherently profane and seeks an entirely transcendent divinity. The trigger leads to actively seeking a mystical experience, which itself is not considered a separate stage of the experience, but is crucial to its inception.

We will discuss two primary methods of achieving the second stage of the mystical experience, the actual feeling of divine union that is referred to as the “climax” (Bharati, 1976; Laski, 1962). One method of entering this altered state of consciousness is passive meditation, or *via negativa* (D’ Aquili, 1999). We will walk through the processes in terms of the neurobiological events at each stage and their effects on the individual’s perception.

Passive Meditation or *Via Negativa*

The path of *via negativa* begins in the right attention association area with the individual’s will or intent to clear the mind of thoughts and words. This results in partial deafferentation (the interruption or destruction of the afferent connections of nerve cells) of the orientation association area blocking input from the verbal-conceptual association area as well as from specific sensory modalities (D’ Aquili, 1993). The individual attempts to not pay attention to direct sensory inputs. Further disattention generates further deafferentation.

Although at this point there is only partial deafferentation, the inhibitory effects slowly build as the meditation is sustained. The partial deafferentation of the right orientation association area results in stimulation of the right hippocampus (Joseph, 1990). The right hippocampus subsequently stimulates the quiescent centers of the right amygdala (D’ Aquili, 1993). After the right amygdala reaches a certain threshold it will stimulate the quiescent part of the hypothalamus resulting in the stimulation of the peripheral quiescent system. This results in the sensation of relaxation and eventually of more and more profound quiescence.

Active Meditation or *Via Positiva*

The other mode of entering an altered state of consciousness to achieve a mystical experience is active meditation, or *via positiva* (D'Aquili, 1999). Instead of clearing their minds, individuals focus on some stimulus. This may be a word, an image, a phrase, an external object, or anything else with significance to the individual. The emotional overtones of the object of focus serves to stimulate the limbic system. Impulses pass from the right attention association area of the individual to the right orientation association area. In this case the impulses are facilitatory and stimulating rather than inhibitory or deafferenting as in *via negativa*. This stimulation takes a different path depending on whether the image is being imagined or physically seen (Joseph, 1990) but in both scenarios the right orientation association area is ultimately stimulated (D'Aquili, 1999). The continued stimulation of the right orientation association area begins to stimulate the right hippocampus. This, in turn, stimulates the right amygdala. After the stimulation of the right amygdala reaches a certain threshold, this stimulates the hypothalamus generating a pleasant sensation. Impulses then pass back to the right amygdala and hippocampus, gathering intensity (D'Aquili, 1999).

The Second Stage: "Climax"

In both scenarios, *via negative* and *via positiva*, the gathering intensity has the potential to lead to maximal stimulation within the hypothalamus, creating "spillover" (D'Aquili, 1999) into what

Laski and Bharati call the second state of the mystical experience or “the climax” (Bharati, 1976; Laski, 1962). The climax is the “first moment of the mystical experience proper” (James, 1902).

There are several different types of climax. One type of climax is the hyper-quiescent state (D’Aquili, 1999). In this state of climax quiescent activity is exceptionally high meaning feelings of intense relaxation. This type of activity is paradigmatic of a sleep state but also occurs during the hyper aware phases of meditation. A second type of climax is hyper-arousal state (D’Aquili, 1999). Arousal activity is exceptionally high resulting in sensations of extreme excitation and arousal. This state may occur under circumstances where motor activity is continuous and rhythmic such as rapid ritual behavior or rhythmic dancing. A third type of climax is the hyper-quiescent state with eruption of the arousal system (D’Aquili, 1999). This state is associated with “oceanic bliss” and a tremendous release of energy. This may occur during the practice of “slow” ritual behavior. Yet another type of climax is the hyper-arousal state with eruption of the quiescent system (D’Aquili, 1999). This state arises in the midst of a state of hyper-arousal as a discharge of the quiescent system and is associated with the sensation of rapturous or ecstatic rush or a sense of flow.

Finally, the state of climax on which we will be focusing and largely identifying as true mystical experience is the hyper-quiescent and hyper-arousal state. In this state there is simultaneous maximal discharge of both the arousal and quiescent systems. This happens when spillover from extreme stimulation of the hypothalamus creates a simultaneously quiescent and aroused state leading to the experience of absolute unity (D’Aquili, 1999, p. 109). In this state, the concept of self-versus-other breaks down and the individuals experience unity with that outside themselves. We will be focusing on mystical experiences that take this final form of

hyper quiescent and hyper arousal, for it is within these states that individuals feel a union with the divine.

Lesser Mystical States

If there is not full deafferentation of both orientation association areas, or if there are slight changes in the activity of the limbic system, the experience may not be of complete unity, but still an experience of the divine “other” including hyper-lucid visions, trances, and senses of religious awe. These are considered “lesser mystical states” (D’Aquili, 1999, p. 117).

However, absolute unity and lesser mystical states are difficult to distinguish because they are both subject to inadequate linguistic description due to their novelty and intensity. Nevertheless, sensations differ in the two experiences. Lesser mystical states, while often associated with out of body sensations like those of absolute unity experiences, are also associated with visual, tactile, and auditory hallucinations of God or other religious figures as separate from themselves. The two experiences also lead to different emotional states following the experience. While lesser mystical experiences may elicit feelings of awe, excitement, ecstasy, fear, anxiety, or depression, absolute union experiences characteristically elicit feelings of oneness and unity followed by profound peacefulness. We will see this distinction more clearly when discussion mystical experiences of practitioners and mystical experiences of individuals with TLE.

The Third Stage: Afterglow

The third and final stage of the mystical experience is the “afterglow” (Bharati, 1976; Laski, 1962). This stage is after the intensity of the climax recedes and associated ideas and images appear (Elwood, 1980). In other words, this is the time during which individuals interpret or contextualize their experiences. The reports of mystical experience that we will be looking at are the interpretations of mystics during the afterglow.

The interpretation process also has several phases (Elwood, 1980). The first phase of interpretation during the afterglow is what Elwood calls “associative interpretation.” During this stage, the individual’s preconceptions and images are aligned with the experience. Next, the individual may seek meaningful reinforcement of the experience by discussing it with others who have reported similar experiences or by referring back to the teachings of the tradition with which they identify. The final stage of interpretation may happen much later, long after the experience has ended. This stage I will call “universalization”; this is where individuals apply their experience to the external world and develop a new world view. This may affect the way they view existence, the nature of reality, their relationship with nature, their relationship with humanity, their purpose in life, and their concepts of self. This universalization creates a modified set of beliefs that constitute the individual’s “background influence” in the event of future mystical experiences.

Prevalence of Mystical Experiences

This discussion of the structure and modes of mystical experience raises several other questions. First, why is this important? Mystical experience is not something that we hear about frequently, so why does it matter? One possible response is that just because something is not discussed frequently does not mean that it does not exist and affect many people. In fact, according to several studies, there is a large, perhaps surprisingly so, percentage of the population that claims to have had some sort of religious or mystical experience at least once during their lifetime. In a series of surveys conducted by the PEW Research Center a trend of increasing reports of religious and mystical experience can be observed (Smith, 2009). In response to being asked: “have you ever had a religious or mystical experience—that is, a moment of religious or spiritual awakening?”—nearly half of Americans (49%) say they have. This is more than double the number of Americans who responded positively in 1962, when only 22% of Americans reported having had such an experience. Since 1962, numbers of individuals responding “yes” has steadily increased as is illustrated in Figures 1 and 2.

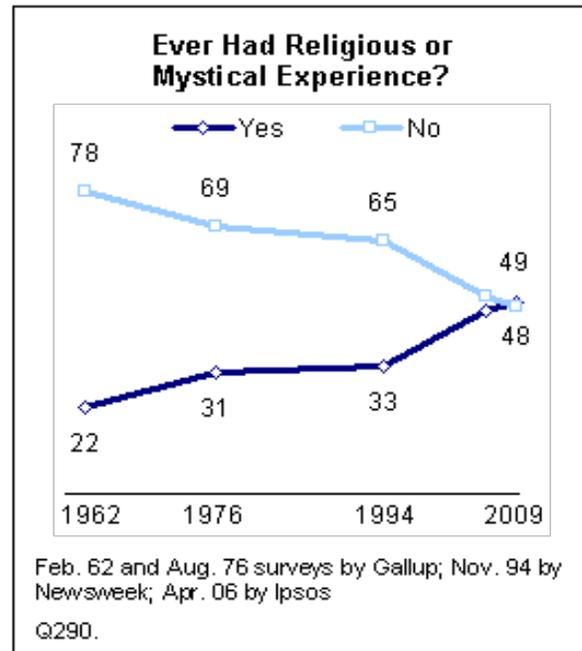
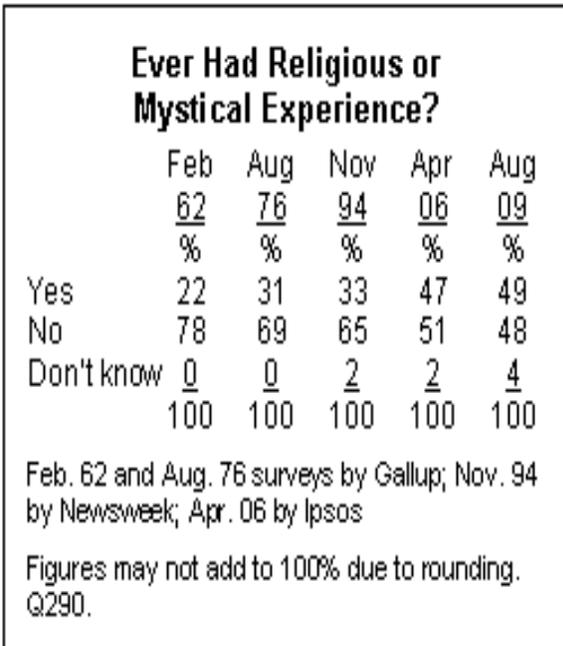


Figure 1: Smith, Gregory; Allison Pond; Neha Sahgal. *Eastern, New Age Beliefs Widespread: Many Americans Mix Multiple Faiths*. Rep. Washington D.C.; Pew Research Center’s Forum on Religion & Public Life, 2009. Pp. 12

Figure 2: Smith, Gregory; Allison Pond; Neha Sahgal. *Eastern, New Age Beliefs Widespread: Many Americans Mix Multiple Faiths*. Rep. Washington D.C.; Pew Research Center’s Forum on Religion & Public Life, 2009. Pp. 2

Who Has Mystical Experiences?

Further questions uncovered information regarding the behaviors of individuals reporting religious or mystical experiences. The study reports that religious or mystical experiences are most common among people who regularly attend religious services. Sixty-one per cent of those who attend some sort of religious service at least once a week reported that they have had a religious or mystical experience, compared with less than half of those who attend services on a monthly or yearly basis (48%) and just one-third of those who seldom or never attended religious services (33%) (Smith, 2009, p. 12-13).

This information demonstrates several things. First, it speaks to the importance of understanding religious and mystical experiences and their effects on individuals. If such a high percentage of the American population reports to have had a religious or mystical experience, these phenomena should be investigated to gain a better understanding of the human condition. Second, as we will discuss, mystical experiences have a particular effect on an individual's mental health. If such a large, and ever growing, segment of the population is having religious and mystical experiences, it will be important to analyze the effects and ramifications of those experiences to better understand human psychology.

These findings also point to the variety of religious experiences. While these figures are impressive and, for some, unexpected, it is important to contextualize this information. The poll phrases the question very broadly, asking about both religious and mystical experiences in the same sentence. As discussed before, although mystical experience is a type of religious experience, there are many other types of religious experience, all of which would have elicited

an answer of “yes” had the participant been referring to those types of experiences. As a result, we must acknowledge that not all of the respondents are describing what we are investigating: that is an experience of union with the divine.

Descriptions of Mystical Experience

Within the group, types of experience varied considerably. Descriptions of religious and mystical experiences that participants reported included were awareness of divine forgiveness and salvation, a spiritual awakening to nature, healing, visions, voices, dreams, or “turning to God in a crisis”; some could not describe their experience at all (American Institute of Public Opinion, 2013, p. 53-55).

Taking into account the variety of religious and mystical experiences, we will narrow our focus to mystical experiences of absolute unity. We will now look at the content of those experiences and analyze what this tells us about the patterns and effects of such mystical experiences. In 2007, Andrew Newberg conducted a survey of descriptions of mystical experience collecting the reports of nearly 1000 individuals, 300 of whom described specific absolute unity mystical experiences in detail (Newberg, 2009, p. 70). When Newberg analyzed the content of all of the experiences, he found no significant common terminology. In fact, even the word “experience” was apparently absent from the majority of reports, being used in only twenty-three percent of reports. The word “God” was used with the second most frequency at eighteen percent. “Feeling” was third at seventeen percent, followed by “spirituality,” “life,” and “belief.” Only ten percent used the word “love,” and six percent used the word “peace.”

Less than five percent referred to “faith,” “consciousness,” or “truth.” And even fewer referenced religious figures of any sort including “Jesus” (2009, p. 72).

This lack of consistency definitely illustrates the uniqueness in the way individuals describe their mystical experiences. This is presumably the case in large part due to the varied backgrounds of the individuals surveyed and the varied contexts in which their experiences occurred. However, it may be premature to conclude that because the experiences were not described with any common terms that they have no common features. It is useful to reexamine the reports for other patterns that may be present. Hidden between the lines there may be common themes that suggest a more subtle more meaningful type of unity. Upon further examination, it was concluded that although the descriptions of the participants’ mystical experiences did not share common terminology, they did share common concepts, attitudes, and feelings. Nearly half described their experiences as peaceful, using words such as “calmness,” “serenity,” and “contentment” (2009, p. 75). These themes seem to reflect the fifth state of mystical experience discussed earlier: the hyper-quiescent and hyper-arousal state of absolute unity.

“Personalities” of God

Individuals who have had mystical experiences also seem to have a thematically unique way of perceiving God. According to a study conducted at Baylor University, Americans tend to embrace one of four different personalities of God: authoritarian, critical, benevolent, or distant (Bader, 2006). As we will see, the mystics tend not to see God in these ways.

Those who see God as having an authoritarian personality believe that God actively interacts with humanity to punish the wicked and reward the good during their lifetimes. These are individuals that would likely attribute illness, natural disasters, and other devastating events to God's displeasure with the suffering individual or nation's behavior. The crucial point about an authoritarian perspective of God is that God intervenes in human life on the basis of right or wrong action.

Those who see God as having a "critical" personality believe that although God may be displeased with human behavior, He does not intervene in the world. That is, God may have an unfavorable view of humanity, but His judgment occurs in the afterlife. A belief in eternal salvation or damnation as a result of actions an individual did during their lifetime is associated with a critical personality of God.

Another view of God is that of a kind, gentle, and forgiving God. This Benevolent God is very active in the lives of humans by listening to them, understanding them, and answering their prayers. This God cares deeply for humanity and all of God's works are good, full of love, and done in the best interests of humanity, though they may sometimes cause suffering and pain.

People who believe in a distant God believe that God is uninvolved entirely with human affairs. God in this sense is a cosmic force that set the universe into motion and then receded. God does not judge humanity or hold opinions about personal behavior.

However, these perceptions of God do not seem to line up with any of the descriptions of mystical encounters. Therefore, Newberg proposes a fifth personality of God: the mystical

personality of God (Newberg, 2009, p.112). This conception of God is not anthropomorphic.

The questions on the Baylor survey did not allow for an option that was non-anthropomorphic yet immanent (Newberg, 2009, p.112). Therefore, the results did not reflect the existence of a fifth conception.

In this view of God, God is described as an emotional presence using words like “peace,” “energy,” “tranquility,” or “bliss.” Or, God is the universe, the pantheistic concept discussed in section one. For others, God is the truest nature of self (Newberg, 2009, p.112).

Descriptions of Mystical Experiences of Practicing Mystics

Another characteristic of the descriptions of the mystical experiences of spiritually practicing individuals is the positive nature of their descriptions. As mentioned above, the feelings of mystical experiences for mystical practitioners often bring sensations of intense joy and profound peacefulness. The period following these experiences is also characteristically positive. Below are the descriptions of mystical experiences from a variety of long term spiritual practitioners that illustrate these features.

St. Bernard of Clairvaux

St. Bernard of Clairvaux uses the metaphor of marriage to describe the event of his mystical experience and his interpretation. He says that God demands to be honored and feared, but that love is better than both, especially the love like that of a bride for her groom, for she has

nothing but love for him and love alone. When the soul conforms to God's Word, according to Bernard, it becomes His bride. The relationship is 'an embrace – an embrace surely, where to will and not to will the same things makes one spirit out of two . . . His bridegroom is not only loving but love itself." However, despite his use of physical and personifying metaphor, Bernard emphasizes that his experience of God's loving presence was not by means of the senses:

The Bridegroom-Word, although He has several times entered into me, has never made His coming apparent to sight, hearing, or touch . . . Not by His movement was He recognized by me. I could not tell by any of my senses that He had penetrated to the depths of my being. It was, as I said, only by the movement of my heart that I was able to recognize His presence . . . (O'Brien, 103, 1963).

St. John of the Cross

As a student of St. Teresa of Avila, St. John of the cross was intimately familiar with Christian mysticism and mystical experience. One such experience of his own is recorded in a poem wherein he describes a night time encounter with God, whose gentle hands wound his neck and stupefy him with love. He says: "I remained, lost in oblivion; my face I reclined on the Beloved. All ceased and I abandoned myself, leaving my cares forgotten among the lilies" (Nims, 21, 1979).

Rumi

Rumi is a Sufi poet. Sufism is a mystical form of Islam that emphasizes intense love for and of God. Union with such a God was a shock, a stupor, and a painful ecstasy (*wajd*). This ecstasy was said to be “a flame which is born in the interior of being; it springs out of passionate desire, and when it comes the limbs are shaken by joy . . .” (Anawati, 179, 1961). The goal is, through “annihilation” (*fana*) to enter the “substance” (*baqa*) of the unity of everything. To do this one contemplates the ultimate, God as the essence of the universe. The veils of the world are removed, the truth of ultimate unity is apparent, and the soul is freed. On the subject of the “annihilated” man Rumi wrote: “I have put duality away, I have seen that the two worlds are one; One I seek, One I know, One I see, One I call. He is the first, He is the last, He is the outward, He is the inward” (Hakim, 120, 1959).

Chuang Tzu

As a Taoist philosopher Chuang Tzu speaks of mystical experience not as ecstatic or intense, but as oceanic and supremely peaceful. The true mystical experience, for him, is one of profound stillness found through sustained inaction. After meditating and eliminating all thought and action, Chuang Tzu experiences such stillness with perfect spontaneity which he describes as the “synthesis of inactions.” He expands:

I take inaction to be true happiness, but ordinary people think it is a bitter thing.

I say the highest happiness has no happiness, the highest praise has no praise . . .

Let me try putting it this way. The inaction of Heaven is its purity, the inaction of

earth is its peace. So the two inactions combine and all things are transformed and brought to birth. Wonderfully, mysteriously, there is no place they come out of. Mysteriously, wonderfully, they have no sign. Each thing minds its business and all grow up out of inaction. (Watson, 191, 1968)

It is within this sustained inaction that what Chuang Tzu calls the “true man” is formed and finds the purest peace.

Hakuin Zenji

Hakuin Zenji was a Zen Buddhist mystic responsible for revitalizing Zen Buddhism in Japan in the eighteenth century. His description of his mystical experience begins with a description of his misguided youth, when he thought that Buddhism required nothing other than keeping the mind in absolute calm. While he recalls that calm meditation succeeded at first he writes:

On the very first day that I went into the mountains to study and practice meditation I made up my mind to be strenuous and bold in faith, and to work hard at carrying on the refining discipline of the Way. But after only two or three frosts had passed over me, suddenly one night I received an enlightening experience. The many doubts which I had felt up to this time were brought into harmony with the root principles of the inner spirit and they melted away like ice water. (Shaw, 34, 1971)

There are several things to be aware of when analyzing these descriptions of mystical experience. First, the experiences are from a variety of religious traditions. The individuals giving these descriptions are all practicing religious individuals with much spiritual preparation—meditation, prayer, and a variety of other modes—prior to their experiences. Their background affects the way their experiences are perceived and described. We will later discuss how this background in religious practice is key to a beneficial mystical experience.

While the descriptions differ in context, thus causing different associations, the concepts, emotions, and themes are similar. Overall, the descriptions represent a perception of God that is mystical in nature, intimately connected to humanity, nature, the world, and the universe at large.. They all describe a sense of unity with the divine but also the revealing of a divine secret, that God is unified with everything which is reflective of the mystical “personality” of God and also the hyper-quiescent and hyper-arousal state characteristic of absolute unity experiences. These concepts will be important when evaluating the effects that the mystical experience has on the individual. How do these experiences affect the individual’s mental and physical states? How are they connected to these overwhelming and illuminating sensations during the mystical experience? Although we have discussed how context can affect the interpretation of the mystical experience, we will now shift our focus to analyze how the mystical experience can in turn transform the mind of the experiencer.

Descriptions of Mystical Experiences of Individuals with TLE

The descriptions of the mystical experiences among individuals with TLE closely mirror the descriptions given by practicing mystics with a few important differences. The following are descriptions given by several individuals with TLE from a variety of studies. We will examine the attitudes and feelings articulated by these individuals in comparison to those expressed by practicing mystics. But first, it should be noted that the pool of descriptions of mystical experiences from individuals with TLE is very small. In fact, the number of individuals with TLE who have mystical experiences is quite small itself. While this is a small group of descriptions to evaluate, one important observation is that they demonstrate similar emotional descriptions and emotions following their experiences despite their differing backgrounds and beliefs. Further research should be done to collect the descriptions of mystical experience from individuals with TLE to provide more insight.

In 1998, Miyakawa and Ogata conducted a study on two hundred thirty-four individuals with epilepsy. Of all of the cases studied, three (1.3%) were found to have had sudden mystical experiences. All three individuals had temporal lobe epilepsy. The following three cases are descriptions they gave regarding their experiences.

The first case involves a forty-four year old woman with a background in Shintoism and Buddhism. At age twenty-eight, after years of suffering with partial seizures, she was diagnosed with temporal lobe epilepsy. Her experiences included auditory perceptions of the voices of deities telling her to “kneel and pray before the gods and Buddha” (322). She also had visual sensations including visions of “God and the Buddha appearing before her and seeing the

writings from the Sutras” which she recounts gave her strength and inspiration. Later in life she became a shaman. Upon hearing the name and birth information of her clients, she began a prayer chant in a trance-like voice. She also spent several hours each day praying to gods or Buddha.

The second case is a fifty-five year old woman who converted to Christianity at age twenty-three. She did not become a serious believer until her first mystical experience at the age of thirty-three, when she first began having seizures. Her religious experiences associated with her temporal lobe seizures continued throughout her life, occurring about once every five years. During her experiences she had visions of Jesus and heard his voice.

The final case from the 1998 study involves a forty-four year old spiritual man. He was first diagnosed with temporal lobe epilepsy at age fourteen and from then on experienced seizures once or twice a month. He reports that every manifestation of mystical experience was different: “I saw different divine worlds structured around folk beliefs, a new sect of Christianity, and other kinds of contemporary religions. I heard the voices of the objects of worship of every religion and saw how the heavens and the earth were created according to each religion.”

The following two cases are reports given by individuals interviewed as a part of the BBC documentary, “God on the Brain,” produced in 2003.

Rudi Affolter was both a life-long atheist and a life-long sufferer of TLE. At age 43, he had his first and only religious vision during temporal lobe seizure. In his vision, Affolter experienced dying and going to hell. During the experience he was told he went there because

he was not a Christian. This shocked him because he did not believe in God or the Christian teaching on hell. Despite being extremely alarmed by the experience, Affolter never had another mystical experience during a temporal lobe seizure and did not become spiritual or religious.

Gwen Tighe was both a life-long Roman Catholic and a life-long sufferer of TLE. Throughout her life time, Tighe had many visions. Tighe recounts that her visions often concerned the devil. In one experience while in the hospital, Tighe describes having had an overpowering sensation of fear and seeing a very bright light. Another experience that followed the birth of her son involved sensations of rapture and joy and similar blinding light.

These descriptions seem to suggest several things. First, the nature of the experiences seem to align most closely with what we referenced before as “lesser mystical experiences.” The sensations described are not that of absolute unity, but rather of interacting with a divine other. Additionally, all of the above interviewees expressed feelings of dread, anxiety, depression, or other emotional instability following their experiences. This again diverges from absolute unity experiences which are characteristically followed by feelings of profound peace and serenity. This is crucial to the difference between how these biologically similar experiences have vastly different emotional effects on individuals with TLE versus practicing mystics. Additionally, this is of great concern considering the comorbidity of depression, anxiety, and aggression with temporal lobe epilepsy. If lesser mystical experiences are exacerbating these preexistent comorbid conditions, it becomes evident that finding a way to manage these lesser mystical states is imperative.

Chapter 5: Benefits of Spiritual Practice and Mystical Experience

Evolutionary Benefits

Mystical experiences and spiritual practices have various beneficial effects. In fact, the inception of spiritual practice was likely a stress relieving mechanism for early hominids (Wallace, 1996, 107). Rituals that would induce altered states of consciousness had therapeutic effects of decreased stress and lower anxiety and were therefore practiced and repeated frequently. Such rituals included singing, chanting, drumming, dancing, and other repetitive behaviors. These repeated behaviors would induce an altered state of consciousness in the practitioner. Altered state of consciousness rituals would result in pleasant sensations equivalent to the relaxation response characterized by EEG changes such as reduced heart rate, reduced blood pressure, reduced respiratory rate, and reduced stress (McClenon, 1997, 345).

The frequent practice of these rituals resulted in a qualitative shift from normal patterns of mental functioning and behavioral changes (Tart, 1969, 2). It is thus suggested that rituals inducing altered states of consciousness lead to increased survival advantage among practitioners (McClenon, 1997, 347). First, altered state of consciousness rituals improve fertility and increase survival rates. First, the rituals decrease stress and anxiety and in turn support immune system functioning (Nash, 1992, 152). Also, the rituals decreased pain and complications during pregnancy and birthing thus improving survival rates by reducing infant mortality rates (Mehl, 1994). In fact, genetic investigations of groups performing altered state

of consciousness rituals point to a genetic component of mysticism. It seems that the ability to have mystical experiences is a heritable trait with high frequency, meaning that over time, the population would become more able to have mystical experiences (McClenon, 1997, 345). This bodes well for the efficacy of using spiritual practice as a therapeutic method among individuals with TLE.

On a psychological level, these rituals decrease anxiety about death. Persinger hypothesizes that spiritual practice and mystical experience may be evolutionary adaptations that aid in human survival (1985). Because mystical experience suggests existence beyond the physical, it implies the existence of a separate realm of existence open to enter following physical death. This possibility decreases stress about death and allows for clearer, more rational thinking and planning. The ability to act and think rationally rather than instinctively increases survival rates. It also allows for the development of technology and social structures that increase productivity and efficiency.

Social Benefits

Within the group, those who have mystical experiences often hold a special position because of their unique experiences (Kavanau, 1994). The neurobiological patterns associated with mystics are also associated with unique emotional and cognitive characteristics that make for good leaders such as increased cognitive abilities, increased empathy, enhanced listening skills, and a tendency toward reflection and caution meaning well thought out and planned decisions (Persinger, 1993). Additionally, because of their unique leadership skills, mystics often would

take unique leadership roles and form groups around themselves. In this way, spiritual practice and mystical experience enabled group unity and organization, resulting in more effective group decision making (Murphy, 2010).

Following the teachings of the resident mystic created group unity around a certain set of beliefs and principles as experienced by the mystic through direct other worldly encounters. These beliefs and principles unified groups and decreased intergroup competition by defining a common basis of belief and standards. All of these factors helped to increase survival rates for the human species. However, this hypothesis does not take into account adequately the benefits of spiritual practice and mystical experience that persist into industrialized societies.

Emotional Benefits

The benefits of mystical experience in industrialized societies are well documented and are important aspects to keep in mind as we consider the way spiritual practice and mystical experience can play a role in temporal lobe epilepsy. One of the benefits of spiritual practice is its ability to decrease individuals' propensity for anger. This is important because anger is a particularly difficult emotion to deal with and has particularly detrimental effects on human health and cognition. Anger is one of the most difficult emotions to control because it is so hard wired into us (Newberg, 2009). The amygdala, an area of the brain highly responsible for producing responses of fear and anger, is an ancient part of the brain, a part sometimes called our reptilian brain, and it is difficult for other parts of the brain to overrule it. However, because

anger has over all detrimental effects on our social and cognitive abilities, it is imperative to be able to control it.

To emphasize the importance of gaining control over anger, I will illustrate the detrimental effects of uncontrolled anger. First, anger has real negative physical effects. Anger increases blood pressure and tension, which in turn leads to a variety of health problems. High blood pressure and stress are like cracks in pavement; if the weather is warm, there is no problem, but come the first freeze, the cracks fill with ice and expand, creating issues that are now difficult and expensive to fix. High blood pressure and stress on their own are problems, but ones that can be treated with relative ease. However, if they are not addressed, or more importantly, if their cause anger is not addressed, larger, more serious problems loom on the horizon. These problems include decreased immunity, which in turn leads to more illness and therefore more stress, heart attack, heart disease, etc.

Additionally, anger breaks down neuro-connections (Newberg, 2009). This makes it more difficult to think and express oneself, making communication more difficult. Anger also inhibits anterior cingulate cortex functioning, preventing empathy and compassion. If anger is sustained for too long, these temporary inhibitions become permanent and prevent reasoning and empathy long term, or at least until those skills are relearned.

Anger also leads to other emotional challenges that cause social problems. Primarily, anger generates anxiety (Newberg, 2007). Anxiety leads to broad distrust of others that in turn reinforces anger and anxiety making it a difficult cycle to escape once initiated. Anger also shuts down frontal lobe functioning, making it impossible to listen to and empathize with the

individual the anger is directed toward. This seems to validate the anger and make it even more difficult to escape from. If you disagree with the position of the individual you are angry with and cannot listen to or empathize with their position after becoming angry, you reinforce your original idea that their position is invalid while also reinforcing the validity of your anger toward them. These effects of anger together lead to isolation and depression.

Even worse, anger is contagious in a manner of speaking. Our brains are designed to react to anger with anger. Mirror neurons, the same neurons that encourage us to feel happy for others achievements or sad when we see others suffering, have a darker and more dangerous side. Because of these structures, we are likely to respond to the emotions of others by reflecting those emotions. In the scenarios above, this is innocuous or even fulfilling in some cases. However, the mirroring capacity of our brain does not differentiate between beneficial emotions and detrimental ones. Therefore, we just as easily identify anger in others and then reflect it back toward them. In this way, anger is both contagious and dangerous. If we are angry towards others, they in turn become angry toward us, causing the cycle to repeat and escalate.

Benefits of Spiritual Practice in Controlling Anger

However, as mentioned earlier, spiritual practice enables individuals to better deal with anger once it arises or even staves off anger arising during stressful situations. One way that spiritual practice does this is by changing the chemical composition of our brains. First, spiritual practice is associated with increased dopamine (Kjaer, 2002). Brain scans show a sixty five percent

increase in dopamine in individuals practicing meditation (Kjaer, 2002). Dopamine heightens positive thinking, optimism, increases your sense of well being, and allows you to feel safe in the world. This sense of well being and safety decreases the propensity for anger. The fight or flight reaction is not constantly cued up, because the individual does not feel constantly threatened. Spiritual practice is also associated with increased gamma-aminobutyric acid (GABA) (Streeter, 2007), which is effective in staving off anger. Increases of GABA by as much as twenty seven percent have been recorded in the brains of meditators. GABA is also associated with lower levels of depression and anxiety, emotions that can both lead to anger and are effects of prolonged anger. Spiritual practice has also been shown to decrease the presence of epinephrine and norepinephrine (Infante, 2001). These hormones are associated with stress, and when decreased, increases the individual's sense of relaxation making it easier to avoid becoming angry or at least deal to better with anger should it arise.

The neurological training that happens during spiritual practice is also an important factor in combatting anger (Newberg, 2009). The intention of these practices plays a large role in their beneficial effects. By focusing on compassion and empathy, the individual is activating and training certain areas of the brain. This causes the individual to think in a different way about the situation that would have caused an anger or stress reaction. Brain scan studies show that the anterior cingulate cortex, which is associated with empathy and compassion, is activated during meditation and prayerful practices (Newberg, 2009). Continuing and repeating the practice for years strengthens this area. This results in overall increased empathy and compassion, but also a different perspective on situations that may otherwise have caused stress or anger. Even for beginning practitioners, this would help to break the cycle of

reinforced anger that resulted from inability to listen to or empathize with the challenging position as described above. Frontal lobe activity also increased, allowing individuals to think more rationally and not to be overtaken by fear and anxiety (Newberg, 2009). In addition to decreasing one's propensity for anger and staving off the negative effects associated with anger and stress, increased dopamine, increased GABA, decreased epinephrine and norepinephrine, and a strengthened anterior cingulate cortex have overall beneficial results for the spiritually practicing individual including overall decreases in stress, increased sense of well being and realization, and improved cognitive functioning (Newberg, 2009).

Spiritual Practice and Anxiety and Depression

Spiritual practice also has a significant effect on decreasing anxiety among practitioners. Spiritual practice produces an anxiolytic effect by decreasing locus coeruleus firing (a nucleus of the pons, part of the brainstem, involved in physiological response to stress and panic), decreasing noradrenaline, increased GABA, increased serotonin, decreased levels of cortisol (a stress hormone), and increased levels of endorphins (Newberg and Iversen, 2003).

Finally, spiritual practice has been shown to decrease depression among practitioners. Increases in serotonin, dopamine, melatonin, and endorphins have been recorded during meditation sessions. Additionally, if individuals meditate frequently over long periods of time, these increases in depression staving hormones become permanent resulting (Newberg and Iversen, 2003).

Spiritual Practice and Physical Health

Spiritual practice also has physical effects that improve individuals' health and longevity (Musick, 2004). A national long term longitudinal study found that those who attend some sort of religious service at least monthly have a thirty to thirty five percent decreased rates of death from circulatory, digestive, and respiratory disorders. For example, increased attendance was inversely correlated with likelihood to smoke, which by itself staved off many major health issues (Musick, 2004). For older individuals this benefit is even greater (Musick, 2004).

As the highest, most intense incarnation of spiritual practice, mystical experiences preceded my spiritual practice are overall very positive and beneficial experiences. Mystical experiences often fulfill the needs of the individual's D state. The needs that the individual sought to address through spiritual practice are most fulfilled through intense and profound mystical experiences. In addition to the benefits of the spiritual practice itself, the self-fulfilling effects of the mystical experience allow the individual to enter an altered state of mind, gain a new perspective, and solve problems. Spiritual practice exercises and strengthens the parts of the brain that are key to a mystical experience as well as connected areas that will help to navigate the entirely novel and intense experience and contribute to beneficial after effects. Additionally, the background of spiritual practice will give the individual preparation and context for the intense and profound mystical experience, enabling them to have the most meaningful after-glow period of the mystical experience. This also will enable the individual to most effectively communicate their experience. Mystical experiences can be difficult to articulate already due to their ineffable nature. With previous experience and a defined context

within which to interpret the experience, articulating the experience can be easier and help the individual to better understand the experience themselves.

Effectiveness of Spiritual Practice

This is great news for life long religious and spiritual practitioners, but what does it mean for people who have not been brought up in a religious tradition or had spiritual training their entire lives? The good news is that the brain is remarkably plastic. New neural connections can be made at astonishing rates and one can quickly begin to experience both the psychological and physical benefits of spiritual practice.

A study conducted by Andrew Newberg at the University of Pennsylvania shows that it can take less than two months to affect change in the neural functioning of the brain through meditation (Newberg, 2009). In under two months of practicing meditation, the subject exhibited increased activity in the frontal cortex and anterior cingulate cortex (reasoning and compassion) and in the cerebellum (regulation of autonomic processes). Changes also occurred in the basal ganglia, which is responsible for controlling voluntary movements, behavioral control, cognitive flexibility and memory formation. Decreased or abnormal activity in this area is associated with disorders such as Alzheimer's, Parkinson's, Tourette's, and Huntington's disease, suggesting that besides decreasing stress, anger, and related diseases, meditation and spiritual practice may be effective in preventing the above mentioned disorders or at least helping to deal with their symptoms. This information will be crucial to keep in mind when

analyzing the way in which spiritual practice can be used to improve the well being of individuals with temporal lobe epilepsy.

Chapter 6: Conclusion

With a link between spiritual practice, mystical experience, and temporal lobe epilepsy established, we will now switch our attention to how spiritual practice and mystical experience may have therapeutic implications within the context of individuals with temporal lobe epilepsy. We have seen that sustained spiritual practice can change not only the chemical, but also the structural composition of an individual's brain. These neurobiological changes are overwhelmingly positive in nature. However, what's even more important is that these changes in brain structure resulting in improved emotional wellbeing are available to nearly all individuals to varying degrees based on the plastic nature of the brain.

Neuroplasticity

Recent neuroscientific research has revealed that the human brain has the capacity for change, growth, and transformation of its own structures (Newberg, 2009; Persinger, 2001; Beauregard and O'Leary, 2007; Lazar et al., 2005). In fact, we have already touched upon these points when we investigated the way that spiritual practices literally restructures the brains of long term practitioners. Increased activation of the frontal and temporal lobes and decreased activity in the amygdala, hypothalamus, and parietal lobes can be seen as co-occurring with meditative practices, but there are lasting changes that happen to the brain structure that persist even when long term spiritual practitioners are not practicing at the moment.

Changes of this variety are what we previously described as “increased grey matter.” The increased grey matter in areas of the brain associated with spiritual practice helps to prepare the practitioners for a positive and beneficial experience as well as provides lasting benefits such as increased emotional control and stability, decreased anxiety, decreased stress, less propensity for anger, and overall greater emotional well being. The efficacy of neuroplasticity through spiritual practice in terms of providing therapy for individuals with has been demonstrated. For example, this neural rewiring through spiritual practice has been shown to reduce stress in neuro-typical individuals with chronic stress (McEwen and Lasley, 2002).

Additionally, this spiritual intervention has been proven effective for individuals with neurological disorders as well. The application of Buddhist mindfulness meditation to the treatment of obsessive compulsive disorder can produce tangible change in an individual’s neural circuitry and brain structures (Beauregard and O’Leary, 2007, 128). The structures that are hyper active causing the obsessive compulsive tendencies can be quieted with repeated meditative practice. During the meditation, the areas of the brain associated with eliciting these tendencies decrease in activity, eliciting a reprieve from the symptoms. Moreover, with repetition, the activity these areas can be permanently decreased and reduced to more normal levels so that the individual feels lasting relief of symptoms such as anxiety and paranoia (Beauregard and O’Leary, 2007, 135).

Spiritual Practice and Neuroplasticity

And while all individuals may vary in terms of the plasticity of their brain, it would seem that spiritual practice may even increase plasticity, thus helping to mold even the least plastic of brains. A study was conducted to assess the cortical thickness of twenty participants during extensive insight meditation involving focused attention to internal experiences using MRI scans. The images showed that regions associated with attention, introspection, and sensory processing were thicker in meditators versus non-meditators, particularly in the prefrontal cortex.

These results reflect the results of several other studies of long term meditators previously mentioned. However, in this study in particular, the researchers concluded that the data provides structural evidence for neuro-plasticity associated with meditation implying that increased spiritual practices means increased neuro-plasticity (Lazar et al., 2005).

Implications of Neuro-Plasticity for Individuals with TLE

The implications of the neuro-plasticity of the brain and the benefits of spiritual practice are that for individuals with TLE, spiritual practice would be highly effective in quieting areas of the brain that are responsible for many of the condition's comorbid symptoms. TLE epilepsy has high rates of comorbidity with depression, anxiety, stress, impaired emotional recognition, and anger. Spiritual practice, as we have discussed, has a multitude of beneficial effects that counteract these comorbid symptoms. Decreased activity in the amygdala and hypothalamus associated with spiritual practice help to decrease stress, anxiety, depression, and anger in

individuals whereas increased activity in the temporal lobe and frontal lobe improve emotional awareness and visual processing. With repetition, these changes may become permanent. This means an overall improved quality of life for individuals who report overall lower quality of life scores than average.

These changes, while important and certainly impactful, do not address the larger issue of the stress, anxiety, anger, and depression caused by the mystical experiences induced by epileptic events themselves. While spiritual practice will not eliminate seizures that result in mystical experiences, it can help to prepare and strengthen the brain so that these experiences, which were once a source of discontent, can actually benefit the individual.

Neuroplasticity and Mystical Experience

As we discussed, for spiritual practitioners, mystical experiences are primarily positive. The experience itself is one of absolute unity and is followed by sensations of serenity and profound peacefulness. For individuals with TLE, however, these experiences are, overall, less positive. They are not absolute unity experiences but rather what we referred to earlier as “lesser mystical experiences” where an individual has an experience with a divine other outside of themselves. This experience is often frightening and disconcerting. And whereas experiences of absolute unity are followed by peacefulness, “lesser mystical experiences” are often, for individuals with TLE, followed by anxiety, anger, and depression.

Based on our discussion thus far, the reason seems to be lack of neurological preparation. By this I mean that key differences in the brain structure of individuals with TLE

and long term spiritual practitioners seem to be at the root of the difference in the experiences among the two groups. Individuals who have undergone long term spiritual practice have prepared their brains for the intensity of their mystical experiences. The brain areas that will be activated during the experience have been conditioned and the areas that lead to negative effects such as anger, depression, stress, and anxiety have been quieted over time. This preparation results in a primarily positive experience. Without this preparation, the brain is overwhelmed by the sudden intensity of the experience and cannot effectively manage the experience. This sudden hyper-arousal of the system without the proper preconditioning leads to negative psychological consequences. These consequences are of particular concern because individuals with TLE already have an increased risk for depression, anxiety, stress, and anger. Therefore, spiritual practice added to the routines of individuals with TLE would not only improve their general well being, but also improve the mystical experiences during their seizures and their outcomes.

Anticipated Improvements

As the highest, most intense incarnation of spiritual practice, mystical experiences preceded by spiritual practice are overall very positive and beneficial experiences. Mystical experiences often fulfill the needs of the individual's D state. The needs that the individual sought to address through spiritual practice are most fulfilled through intense and profound mystical experiences. In addition to the benefits of the spiritual practice itself, the self-fulfilling effects of the mystical experience allow the individual to enter an altered state of mind, gain a new

perspective, and solve problems. Spiritual practice exercises and strengthens the parts of the brain that are key to a mystical experience as well as connected areas that will help to navigate the entirely novel and intense experience and contribute to beneficial after effects.

Additionally, the background of spiritual practice will give the individual preparation and context for the intense and profound mystical experience, enabling them to have the most meaningful after-glow period of the mystical experience. This also will enable the individual to most effectively communicate their experience. Mystical experiences can be difficult to articulate already due to their ineffable nature. With previous experience and a defined context within which to interpret the experience, articulating the experience can be easier and help the individual to better understand the experience themselves.

In addition to the emotional health benefits that modifying the mystical experiences of individuals with TLE would imply, there are also psychological benefits. Because mystical experience is the highest, most intense incarnation of spiritual practice, mystical experiences preceded my spiritual practice are overall very positive and beneficial experiences and can be fulfill the needs of the individual's D state. To recall, an individual may feel depressed, anxious, stressed, or otherwise unfulfilled or deprived when in Maslow's D state. These feelings are frequently identified in individuals with TLE and therefore they may have a higher than average state of deprivation. Spiritual practice and mystical experience may address the unfulfilled needs of the D state. However, should the mystical experience happen without appropriate preparation, it is likely that not only will the experience not fulfill the needs of the D but reinforce and intensify the negative emotional state the individual was already in. However, were the state preceded by spiritual practice so the individual's brain had been trained and

prepared for the intensity of the mystical experience, the individual would experience a peak B state and have their emotional needs fulfilled. Spiritual practice prepares and strengthens the parts of the brain that are key to a mystical experience which will help the individual better interpret, understand, and integrate the entirely novel and intense experience allowing for the most beneficial after-glow period.

Gaining Control over Mystical Experience

In addition to the neuro-biological preparation that spiritual practice will provide, the background in spiritual practice will also give the individual context for the intense mystical experience. The individual may then more effectively interpret and integrate their mystical experience within a familiar paradigm. This also will enable the individual to most effectively communicate their experience. For many individuals with TLE, communication of their experience is crucial for self-validation. The ineffable nature of mystical experiences make them difficult to describe to begin with. However, without any context, mystical experiences become nearly impossible to interpret and understand. With preparatory spiritual practice providing a defined context within which to interpret the experience, articulating the experience can be easier and help the individual to better understand the experience themselves.

In this way, we come back to the notion of constructivism when approaching mystical experience and mysticism. For a spiritual practitioner, the experience has been prepared for and self-constructed in a manner of speaking. The brain has been self-structured so that the individual is prepared for the experience. More in line with the original meaning of

“constructivism” however, is that the spiritual practitioner is also constructing a psychological reality for themselves within which they can experience and interpret the mystical experience. An individual with TLE, however, has not had the opportunity to construct this reality for themselves. The brain is unprepared for the intense experience and therefore overwhelmed. The response to this overwhelmed state is to revert to emotions with which the individual with TLE’s brain is prepared for because of the neurological conditioning of the disorder meaning the individual will likely feel depressed, anxious, stressed, and angry. In this way, it is the disorder, not the choices of the individual, that is constructing the nature of the experience. In the more traditional sense, the individual has not constructed a psychological reality conducive to having a mystical experience either. For individuals without spiritual preparation, there is no adequate context within which these intense and profound experiences can be created or understood. Therefore, the individual is left unable to interpret or articulate their own experiences.

Cautions for Inducing Mystical Experience

The preparation required to have a beneficial mystical experience is important to keep in mind when thinking of the possibility of inducing mystical experiences in individuals with TLE. Some researchers have suggested that mystical experience may be beneficial to individuals with TLE and therefore might be induced (Persinger, 1983, 1262). These proposed episodes are referred to as temporal lobe transients or TLTs. While it is true that mystical experiences of absolute unity do have overall beneficial effects, as discussed above, unprepared for mystical experiences are not as rewarding and can in reality be harmful. While I agree with Persinger

that it is possible to have beneficial and rewarding TLTs or mystical experiences within TLE, I argue that they must be prepared for through spiritual practice, neurological conditioning, and psychological preparation. Meditation exercises seem to be the most effective method of training the brain and preparing an individual for mystical experiences. Forced thinking, repetition of sounds, repetition of movements, and deep relaxation all prove to be effective methods of training crucial areas of the brain to prepare for mystical experiences. It is through this training that “lesser mystical experiences” may become absolute unity experiences benefit the individual.

Integration and Alteration not Elimination

While it may seem odd to suggest altering the mystical experiences associated with TLE rather than eliminating them, it seems to me that the removal of such experiences would do more harm than good for the individual. In fact, Persinger notes that threat of removal of these experiences or challenges to their validity is a source of distress resulting potentially in depression, anxiety, and aggression (Persinger, 1983, 1261). It seems best, therefore, to work to improve the outcomes of the experiences rather than attempt to eliminate them entirely.

Additionally, the idea of integrating spiritual practice into the routines of individuals for health related reasons is not a foreign one. In fact, American medicine is becoming increasingly more integrative and Americans are becoming more open to using spiritual practice as a method for improving health and well being. Over the past five years, the use of deep breathing exercises, meditation, and yoga for health purposes has shown steady increases. Thirty-nine

percent of American adults say they meditate at least once a week (Pew Religious Landscape Survey) and about 3 million Americans say that they practice yoga at least twice a week and this number was exhibiting drastic upward trends (Moran, 2006). These numbers suggest that integrating spiritual practices such as meditation into the routines of individuals with TLE would likely be acceptable to patients and not necessarily a difficult or inconvenient addition.

Glossary

Afferent: a neuron conducting impulses inwards to the brain or spinal cord

Amygdala: an almond-shape set of neurons located deep in the brain's medial temporal lobe. Shown to play a key role in the processing of emotions. Specifically linked to both fear responses and aggression.

Anterior Cingulate Cortex: a region that is located towards the front of the corpus callosum, in the medial frontal lobe. This region is involved in decision making and emotional regulation as well as vital to the regulation of physiological processes, such as blood pressure and heart rate.

Basal Ganglia: a group of structures linked to the thalamus in the base of the brain and involved in coordination of movement

Brainstem: the central trunk of the mammalian brain, consisting of the medulla oblongata, pons, and midbrain, and continuing downward to form the spinal cord

Cerebellum: the part of the brain at the back of the skull in vertebrates. Its function is to coordinate and regulate muscular activity.

Cortisol: a hormone produced by the adrenal cortex that mediates various metabolic processes, has anti-inflammatory and immunosuppressive properties, and whose levels in the blood may become elevated in response to physical or psychological stress

Deafferentation: the interruption or destruction of the afferent connections of nerve cells

Dopamine: a neurotransmitter acting within the brain to help regulate movement and emotion

Electroencephalogram (EEG): a test that detects electrical activity in your brain using small, flat metal discs (electrodes) attached to your scalp.

Endorphins: any of a group of peptide hormones that bind to opioid receptors and act as neurotransmitters. Endorphins reduce the sensation of pain and affect emotions

Epinephrine: a hormone secreted by the adrenal gland in response to stress, anger, or fear.

Frontal Lobe: The part of each hemisphere of the brain located behind the forehead that serves to regulate and mediate the higher intellectual functions. The frontal lobes are important for controlling thoughts, reasoning, and behaviors

Frontal Lobe Epilepsy: a neurological disorder that is characterized by brief, recurring seizures that arise in the frontal lobes of the brain, often while the patient is sleeping.

Gaba-Aminobutyric Acid: An amino acid that occurs in the central nervous system and is associated with transmission of inhibitory nerve impulses.

Grey Matter: the darker tissue of the brain and spinal cord, consisting mainly of nerve cell bodies and branching dendrites.

Hippocampus: the elongated ridges on the floor of each lateral ventricle of the brain, thought to be the center of emotion, memory, and the autonomic nervous system.

Hypothalamus: a region of the forebrain below the thalamus that coordinates both the autonomic nervous system and the activity of the pituitary, controlling body temperature, thirst, hunger, and other homeostatic systems, and involved in sleep and emotional activity.

Idiopathic Generalized Epilepsy: a group of epileptic disorders that involve the whole brain at once and are believed to have a strong underlying genetic basis. Patients with an IGE subtype are typically otherwise normal and have no structural brain abnormalities

Intermittent Explosive Disorder: a behavioral disorder characterized by explosive outbursts of anger, often to the point of rage, that are disproportionate to the situation at hand (i.e., impulsive screaming triggered by relatively inconsequential events).

Limbic Structures: a ring of interconnected structures in the midline of the brain around the hypothalamus involved with emotion and memory and with homeostatic regulatory systems

Locus Coeruleus: a nucleus in the pons (part of the brainstem) involved with physiological responses to stress and panic

Magnetic Resonance Imaging (MRI): a form of medical imaging that measures the response of the atomic nuclei of body tissues to high-frequency radio waves when placed in a strong magnetic field, and that produces images of the internal organs.

Mirror Neurons: a neuron that fires both when an animal acts and when the animal observes the same action performed by another

Melatonin: a hormone secreted by the pineal gland that inhibits melanin formation and is thought to be concerned with regulating biorhythms

Mesial Temporal Sclerosis (MTS): can cause a form of temporal lobe epilepsy with partial (focus) seizures that can spread or secondarily generalize and affect other areas of the brain

Neuro-Plasticity: refers to changes in neural pathways and synapses due to changes in behavior, environment, neural processes, thinking, emotions, as well as changes resulting from bodily injury

Orbito-Frontal Cortex: the area of the cerebral cortex located at the base of the frontal lobes above the orbits (or eye sockets), involved especially in social and emotional behavior

Partial Epilepsy: seizures which affect initially only one hemisphere of the brain often localized to one of the four lobes (frontal, parietal, temporal, occipital) of the brain

Pons: the part of the brainstem that links the medulla oblongata and the thalamus

Positron Emission Tomography (PET): an imaging test that helps reveal how your tissues and organs are functioning. A PET scan uses a radioactive drug (tracer) to show this activity. The tracer may be injected, swallowed or inhaled, depending on which organ or tissue is being studied by the PET scan. The tracer collects in areas of your body that have higher levels of chemical activity, which often correspond to areas of disease. On a PET scan, these areas show up as bright spots.

Serotonin: a neurotransmitter that is responsible for regulating brain functions such as mood, appetite, sleep, and memory

Single Photon Emission Computerized Tomography (SPECT): a type of nuclear imaging test, which means it uses a radioactive substance and a special camera to create 3-D pictures. A SPECT scan produces images that show how your organs work. For instance, a SPECT scan can show what areas of your brain are more active or less active.

Inferior Temporal Gyrus: lowest level of the temporal lobe, involved in visual processing, associated with the representation of complex object features, such as global shape

Thalamus: either of two masses of gray matter lying between the cerebral hemispheres on either side of the third ventricle, relaying sensory information and acting as a center for pain perception

White Matter: the paler tissue of the brain and spinal cord, consisting mainly of nerve fibers with their myelin sheaths

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