

# *Thinkpieces*

## MYSTERIUM TREMENDUM

by Gregory R. Peterson

*Abstract.* In recent years, interest in the scientific basis of religious experience has resurged. In particular, research and publications by V. S. Ramachandran and by Eugene d'Aquili and Andrew Newberg have sparked considerable curiosity and debate over the reality and basis of religious experience. This article puts such research into a broader context and examines the extent to which scientific research supports or undermines particular religious and theological claims. I argue that such experiments show that religious experience has some biological basis and is not simply a product of cultural suggestion. At the same time, such experiences are not completely self-interpreting, so that cultural context, including theological claims, are needed to make sense of such experiences. By itself, scientific research does not prove or disprove the reality of religious experiences generally, but it does shape how we think of the possibilities and interpretations of such experiences.

*Keywords:* Buddhist meditation; Eugene d'Aquili; neuroscience; Andrew Newberg; V. S. Ramachandran; religious experience; SPECT scan.

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In the fall of 1997, neuroscientist V. S. Ramachandran presented a research paper claiming that certain kinds of religious experience originated in the temporal lobe of the brain. While Ramachandran's observations were careful and tentative, the claim that there existed a "God-spot" in the brain was quickly picked up by the press and circulated nationally. The implications seemed profound, but they could be taken in two ways. For

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some, a God-spot suggested that religious experience is integral to human nature—that humans are made to communicate with God, and scientists had finally stumbled onto a clue as to how such communication worked. In the mind of others, however, the existence of a God-spot demonstrated the exact opposite: Religious experiences could now be explained as a kind of neurological aberration, and people who claimed to speak to God or see visions of the virgin Mary were in fact doing no such thing—their brains were merely short-circuiting.

Such varied reactions reveal the profound ambivalence that research into religious experience generates. Because science and scientists hold such high status in our technological society, any scientific validation of religious claims is highly desirable. Yet, science characteristically explains by reducing higher-order phenomena to the operations of lower-order objects. If religious experience is real, and if we are physical beings, one would presume that it would leave some telltale trace in its wake. But if the sciences can completely explain why and how religious experiences occur, some would argue that such experiences would cease to be genuinely religious, arising not from the actions of God but from the activities of neurons.

Can neuroscience alone fully explain religious experience? Probably not. In addressing the question of religious experience, cognitive science explores a subject that is often perceived to be at the borderlands of science. Good research on the subject is sparse and interpretations rarely clean cut. As a result, research into the biological basis of religious experience is not determinative, but it is suggestive and worthy of consideration, providing a small window into how we might think of the most important of life's events.

#### ON THE ROAD TO DAMASCUS

It might be asked whether research into religious experience is really an issue for Christian thinkers. Historically, after all, the church has had an ambivalent attitude toward claims by individuals regarding direct revelations from God or inspiration of one sort or another. Clearly, the Jewish and Christian traditions have been significantly shaped by individuals who had profound religious experiences. Isaiah had visions of God's throne; Paul had a vision of Jesus on the road to Damascus. At the same time, individuals who claim to have direct inspiration from God can cause divisiveness and fanaticism. The later, pastoral epistles of the New Testament thus warn against false prophets, and early-second-century bishop Ignatius of Antioch insisted on the priority of the bishop over and against those who might claim more direct communication with God. Although medieval Catholicism allowed the growth of mysticism, it was with a wary eye. While the Reformation emphasized the category of faith, the dominant

Protestant churches quickly intellectualized it into a more controllable form, only to experience an upswell of experiential emphasis in the Pietist and Wesleyan revivals of the eighteenth and nineteenth centuries. It would be safe to say that, generally speaking, Christianity as an institution has encouraged some religious experience, but not too much.

Despite this institutional ambivalence, religious experience of one form or another has been centrally important to many believers throughout the centuries, whether in approved or unapproved forms. Such significant figures as Saint Augustine, Catherine of Siena, and Søren Kierkegaard are only a few of those who have, in their own ways, emphasized this point. Religious experience is also important as the basis of scripture itself. Not only is the Bible widely considered to be inspired, but the significance of the biblical message depends on the authenticity of the voice of prophets and apostles who are understood to be not merely voicing their own opinion but in an authentic way speaking God's word. Indeed, the central claim of the Christian faith dwells on the incarnation of God in Jesus, presumably a category of experience apart from what we can fathom.

Religious experience is also manifested in the historical trajectories of specific denominational traditions. While many (though obviously not all) get deep spiritual fulfillment out of traditional worship, some traditions are distinctive in the way that they characterize and approve of certain kinds of religious experience. Catholicism has retained a rich and pluriform religious experience in both popular and official forms. Such movements as the Quakers and Pentecostalism have embraced particular kinds of religious experience that are, in many ways, at odds with other mainstream Protestant denominations.

Religious experience both unifies and divides Christians. At the same time, religious experiences are not confined to Christians alone, posing a different kind of opportunity and challenge. Surveys, for instance, indicate that from 40 to 70 percent of individuals interviewed in the United States and Great Britain claim to have had some kind of religious experience in their life, a percentage potentially higher than church attendance in these countries (see Hood et al. 1996, 246–68). These numbers, however, hide considerable complexity. Religious experience is itself a vague term, and different people are apt to include different kinds of experiences. More than this, even a casual perusal of the quite varied testimonies given by individuals of their religious experiences quickly indicates that not all religious experiences fit into a single framework. Whatever perspective we take, we must finally decide that some experiences are either falsely reported and the result of intentional deception or the result of self-deception or psychological states that have other, purely naturalistic explanations. This means that religious experience plays a complex role in apologetics. One of the great selling points of religious traditions that

emphasize meditative practices such as Zen Buddhism and forms of Hinduism is that they can claim a sort of empirical confirmation. One need not rely on faith; one can experience directly.

Realizing the diversity of religious experiences makes the theological task more difficult, for interpreting the reality and significance of religious experiences implies interaction not only with psychology and neuroscience but with a diversity of religious traditions as well. Because of this, research on religious experience gives theology an empirical content that it is not normally perceived to have. That religious experiences have the potential for confirmation or disconfirmation has not been lost on scholars and lay persons alike. Indeed, this point has been made by a number of contemporary theologians, although they are careful to point out that theological claims do not rely solely on such experiences (Alston 1991; Murphy 1990; van Huyssteen 1999). The danger is that religious experience can be used to defend narrowly polemical agendas. The promise, however, is that religious experiences might be able to provide the basis for a kind of genuine dialogue and insight that is sometimes lacking in interreligious discourse.

#### ARE THEY REAL?

When confronted with someone else's claims for some kind of religious experience, our first tendency tends to be one of disbelief. There are many kinds of incredible, first-person reports, from ghost stories to UFO abduction accounts, that, however sincerely delivered, seem impossible to believe. Likewise, more religiously oriented claims such as past-life regression, visions of the virgin Mary, glossolalia, and demon possession seem equally dubious to many, both because they do not fit very well into a scientifically informed view of the world and because the sheer variety of such experiences and the truths and values they are taken to imply are difficult to account for theologically. Indeed, the more extravagant the experience, the more likely we are to associate it with psychological pathology of one form or another than to take it seriously.

It is not always clear when an experience should be designated as religious in character. Religious experiences can range from the extraordinary out-of-body experience to the relatively ordinary though no less significant experience of awe or of overpowering joy. While a sense of overpowering joy may indeed have religious significance, it can be difficult to define what is distinctively religious about it. At least in some cases, a religious experience is defined as much by its context as by the quality of the experience itself. Both the Grand Canyon and intense prayer may provoke a sense of awe and wonder, but we are more likely to classify the latter as religious than the former.

Because of this ambiguity, scholars such as Wayne Proudfoot (1985) and Stephen Katz (1992) have argued that religious experiences do not

form any separate category of experience. Religious experiences are products of culture, which is why Buddhist monks do not have visions of the virgin Mary and Catholic nuns do not go on vision quests. When mystics claim that their experiences cannot be put into words but nevertheless insist that such experiences provide significant insight and information as to the nature of things, Katz and Proudfoot argue, the reason they cannot be articulated is that they lack any content to begin with. What content they have is provided by the cultural expectations of the community of which one is a part. The implication of this view is that religious experiences are not real, in the sense that their agency stems from God or a higher plane of reality; religious experiences are, rather, reducible to forms of cultural expression. Any claim to the contrary is simply mistaken.

There is some merit to this view, inasmuch as cultural conditioning can play a significant role in the formation and interpretation of experiences generally and religious experiences specifically. In a well-known experiment by Stanley Schachter and Jerome Singer, subjects injected with adrenaline reacted differently to the sudden agitation of their body according to social cues of other subjects planted in the room by the experimenters. When the planted subjects acted angry, they acted angry; when the planted subjects acted euphoric, they acted euphoric as well (Schachter and Singer 1962). As described below, there is certainly evidence that such cultural conditioning can play a significant role in the formation and interpretation of religious experiences. Indeed, it would be surprising if this were not the case, for one of the hallmarks of many religious traditions is the elaborate preparations that are made precisely for the purpose of provoking such responses, whether it be the ecstatic dancing of dervishes or the asceticism of medieval monks.

To reduce all religious experiences to the category of culture, however, is a profound mistake. This mistake partly rests upon the philosophical claim influenced by the later writings of Ludwig Wittgenstein (among others) that all experiences are mediated by language and, more strongly, that all experiences are reducible to modes of linguistic and cultural expression. On this analysis, religious experience is no exception. Just as the experience of pain is not separable from its verbal expression, so too is religious experience inseparable from its description.

Such a view, while once influential, is highly problematic for several reasons. Certainly, language plays a dramatically important role in our cognitive processes, so much so that we can fairly safely say that virtually all of our conscious thinking is linguistically mediated. But it would be a mistake to say that experience cannot be separated from language and culture or that experiences have no meaning in and of themselves. For one thing, it would imply that all those who do not have language—animals, infants, and some stroke victims—do not have experiences or, by implication, thoughts! Interestingly enough, some firsthand accounts do exist of

stroke and epilepsy victims who have temporarily lost linguistic comprehension. While they suffered significant hardship and confusion, they were far from incapable during this difficult episode (Damasio 1999; Gardner et al. 1983). More generally, it shears away the significance of a great deal of our everyday experience, much of which is simply not reducible to words. The colors I experience are not limited to my relatively impoverished color vocabulary, and no amount of reading about parental love can equate with and prepare one for the actual blend of emotions.

A broader problem with such cultural approaches is the extent to which they seem to neatly separate culture from biology and, consequently, mind from body. Not only does it imply that culture/mind is completely separate from biology/body, it also implies that the former is active and the latter passive. Yet, as Damasio's research on the role of emotion in cognition shows (Damasio 1999), the situation is much more complex. Biology, emotions, and thought are intertwined in a way that prohibits such neat disjunctions. Thus, while experiences are often (and in some cases perhaps always) culturally conditioned, they are not culturally determined.

It is at this point that the cognitive sciences begin to become important. Because cultural realities are not completely separable from cognitive and biological ones, any understanding of religious experience must include cognitive and biological factors. Consequently, while the causes of religious experiences may be beyond the grasp of science, the physical correlates of religious experience certainly are not. Realizing this has provided a suggestive ground for research, and the result has been the development of a quite varied set of studies. The results, while intriguing, do not tell a single story. They are nevertheless provocative in their potential for helping us think through the issue of the reality of religious experiences and how they are to be interpreted.

#### RELIGION ON THE BRAIN

A primary obstacle to the study of religious experience by psychologists and cognitive scientists has, strangely enough, been acknowledging its existence. For much of the twentieth century, religious experiences have often been relegated to the category of pathology. William James, who proved an early exception to this rule, criticized the medical materialists of his day who attributed Paul's conversion experience to epilepsy and who reduced religious experience to the "perverted action of various glands which physiology will yet discover" (James 1902, 14–15). Psychoanalysts, following Freud, tended to be equally dismissive, and in many psychology texts and manuals, including the widely used *Diagnostic and Statistical Manual of Mental Disorders*, religion was rarely mentioned except as a means to illustrate various mental illnesses (Hood et al. 1996, 407). Early speculation as to the neurological roots of religious experience proved to be equally

unpromising. In his 1976 *The Origin of Consciousness in the Breakdown of the Bicameral Mind*, Julian Jaynes argued that early religious experiences (and therefore the origin of religion as well) stemmed from an earlier stage of brain evolution when the two hemispheres of the cerebral cortex were not fully connected, resulting in the conscious left hemisphere hearing voices from the right hemisphere. These voices were interpreted by the ancients as the voices of gods, giving rise to the mythological worldview of both the *Iliad* and the *Odyssey* as well as the Hebrew prophets. It was only after this period that the hemispheres fully united, with the result that such religious experiences now occur only among the mentally ill in states associated with schizophrenia.

Many people took this thesis seriously, despite the lack of any genuine evidence and some significant leaps in reasoning. Jaynes's ability to synthesize a wide range of material into a single thesis was no doubt impressive, and his association of religious experience with the functioning of the right hemisphere may, as we shall see, have some merit. His claim that such a major change in brain function and organization occurred as recently as the Homeric age, however, not only lacks any supporting paleoanthropological and genetic evidence (how did such changes get to Australia?) but does a serious disservice to the complexity of ancient literatures from across the world. If anything, its initial success suggests the lengths some scholars will go to in order to categorize religious experience as a pathology. To treat religious experience seriously is to give credibility to something that seems, to a reductive modern mindset, too much like voodoo.

Interestingly, early empirical research into religious experience by psychologists that went beyond simple surveys emerged largely under the rubric of altered states. The experimentation with drugs and Zen Buddhism (and sometimes both) in the 1960s and '70s provided an avenue for exploring religious experience that was amenable to experimental control. A number of these studies seem to support the thesis that religious experience is defined more by cultural context than by the experience itself, at least in the case of artificially controlled situations when ambiguous stimuli are introduced.

Research into the potential of psychedelic drugs for triggering religious experiences by Robert Masters and Jean Houston (1966), for instance, revealed that the use of such drugs as LSD did often produce religious imagery, although the hallucinations were not perceived to be religious as such by the users. Rather, a study by Timothy Leary (1964) indicated that the likelihood of a drug experience being described as a religious experience correlated with the religious context of drug use. Studies of drug use in this form eventually became illegal and were followed by a quite different approach to exploring altered states using sensory-deprivation tanks. Subjects were placed in one of these tanks, essentially a closed coffin filled



with a neutral buoyancy liquid at body temperature that allowed subjects to float with virtually no physical sensation. Deprived of any sensory stimulation, it is not unusual to experience the spontaneous appearance of images. In a study conducted by Ralph Hood and Ronald J. Morris (1981), it was found that individuals with strong religious commitments were more likely to experience religious imagery and that religious imagery was more likely if subjects were cued for it.

Such experiments do not tell us a great deal. Certainly, plants with hallucinogenic effects have been used in a variety of religious contexts throughout history and are still used by some Native American groups today. They also say something about the importance of cultural context, although even this is fairly minimal, since in neither case do we have a full theory for why or how the religious experiences are generated in the first place or even whether these cases should be regarded as genuine religious experiences.

More definite results have been obtained from experiments monitoring brain waves in the EEG (electroencephalogram) of individuals practicing meditation. Brain waves are a measure of the aggregate activity of large groups of neurons within areas of the brain, allowing researchers to detect broad patterns of brain activity during specific kinds of activities. In an array of early experiments that measured the brainwave patterns of meditators, it was regularly found that meditational states corresponded to distinct brainwave pattern activity and even that transitions into more advanced stages of meditation could be correlated with further brainwave changes. (For a summary and evaluation of this research, see Hood et al. 1996, 196–98; Austin 1998, 20–22.) To give one specific example, M. Kasamatsu and T. Hirai studied twenty-three Zen disciples during meditation. They found that a meditator goes through a series of four stages during each meditation session, beginning with alpha waves (typical of both inward-focused attention and deep relaxation) and ending for advanced practitioners with theta waves that are usually associated with drowsiness and hypnotic states. Only those who had meditated for more than twenty years showed theta-wave activity. Interestingly, the Zen master responsible for the disciples' development could clearly and accurately distinguish between disciples who were at different meditational stages without recourse to the brainwave data. Barring some kind of extrasensory perception on the part of the Zen master, the achievements made during meditation had clear outward effects discernible by someone trained to observe them (Kasamatsu and Hirai 1969).

It would be a mistake to assume that such results prove Buddhist claims about enlightenment or (to go in the other direction) that enlightenment is reducible to brain states. What they do suggest is that embarking on a path of meditational practice can lead to a kind of experience that is, in a limited way, quantifiable. In the case of Zen Buddhism, prolonged medi-



tation leads to distinctive patterns of brain activity, and these distinctive patterns of brain activity presumably correlate with certain kinds of experiences. While such evidence does not fully disprove the position of Katz and Proudfoot that religious experience is merely a product of cultural conditioning, it makes the position more difficult and, it would seem, puts the burden of proof on their position. If religious experiences are purely a cultural construct, the physiological states (including brain states) during meditation should not matter. What appears to be the case, however, is that culture context over time produces new physiological states, which in turn lead to new cultural possibilities. Levels of human experience turn out to be integrated, not separate.

Despite this, brainwave patterns are limited in their potential for telling us what is going on in the brain during a religious experience and fall well short of providing a full theory of the kind that Jaynes ambitiously attempted. Brainwave measurements provide little help in localizing brain correlates to religious experience. For this, neuroscientists turn to two other methods that provide more specific data. The first of these utilizes patients with existing, localized brain damage who, as a consequence of their brain damage, seem to experience new or increased religious experiences. The second relies on brain scans of individuals shortly after activity that correlates with religious experience. Such research is still quite partial, but these approaches have captured significant attention in recent years.

Correlations between brain damage and religious experience have been explored in different ways by Michael Persinger and V. S. Ramachandran, both of whom have drawn inspiration from studies of temporal-lobe epilepsy (Ramachandran and Blakeslee 1998; Persinger 1987). Described by Hippocrates as the "sacred disease," epilepsy has long had an association with religious inspiration, likely because the dramatic seizing that epileptics suffer suggests the control of individuals by outside forces. Some epileptics, however, do experience a kind of euphoria prior to the onset of seizure that is sometimes described in religious terms. The Russian writer Dostoevsky is perhaps the most famous sufferer of this malady, and the religious quality of his seizures was conveyed in novels such as *The Idiot*.

Ramachandran's experience with patients suffering from temporal-lobe epilepsy led him to speculate that there may be an area of the brain significantly responsible for religious experience. Temporal-lobe epileptics in his care seemed to have an interest in religion that occluded everything else. Could it be that such people simply saw overwhelming significance in everything? One of the functions of the temporal lobe is to process the emotional significance of visual images. Perhaps this temporal-lobe salience detector, as Ramachandran called it, becomes overactive in temporal-lobe epileptics, resulting indirectly in their religious preoccupation. If so, this would imply that there is a distinctive area in the brain responsible for religious belief.

To test this, Ramachandran, used three groups of subjects. The first group had temporal-lobe epilepsy with extremely religious behavior. Those in the second group had no brain abnormality but were determined by means of a questionnaire to be highly religious. Those in the third group had no brain abnormality and were not religious. Ramachandran displayed on a computer screen a variety of words and images to these subjects while measuring galvanic skin responses (GSR, the basis of lie detector tests) that unconsciously reflect a person's emotional arousal. The pictures shown to the subjects were quite varied, including such ordinary items as shoes and tables but also emotionally provocative ones involving sex, extreme violence, and horror. Included in the presentations were religious words and images. The GSR response of the temporal-lobe epileptics to all emotional imagery was lower than one would expect for normal subjects but significantly higher to the religious words and images. These results led Ramachandran to speculate that there exists in the temporal lobe an area responsible for religious experience, and it was this speculation (and particularly his use of the term "God-module") that led to the brief but significant media interest following the initial report in 1997. Ramachandran even briefly speculated about a "Godectomy" caused by removing this crucial area of the temporal lobe.

Such speculations are more whimsical than useful and, at least to date, have not constituted a serious research project. The vast majority of individuals are not temporal-lobe epileptics, and it is far from clear that all religious experiences are of the same nature as those experienced by such individuals. They are not even universal among temporal-lobe epileptics. Further, the group of normal individuals who were classified as "very religious" showed no significant increase in GSR to religious stimuli, suggesting that the increase noted in the epileptic subjects was a symptom of pathology and not an index of religious experience or devotion per se. So it is problematic to associate the temporal lobe with religious experiences or practices in people without brain damage. The small sample size (two!) and the lack of peer review are also complicating factors. The result has been a quite cautious evaluation of such cases of temporal-lobe epilepsy for thinking about religious experience generally (Albright 2000; Wildman and Brothers 1999). Nevertheless, Ramachandran's findings are significant to the extent that they indicate the general approach that neuroscience takes toward religious experiences. If people do have religious experiences (and there is little doubt about this), such experiences must in some way be an activity of the brain. In finding this brain activity we may not find the ultimate source of such experience (about which Ramachandran is agnostic), but we could at least understand why religious experience takes the form that it does.

Such a broader project was the focus of the late Eugene d'Aquili and Andrew Newberg (1999). Coining the term *neurotheology* to describe their

work, d'Aquili and Newberg sought to explain the neural basis of all religious experience. In their approach, the brain works by means of seven cognitive operators: the holistic operator, the reductionist operator, the causal operator, the abstractive operator, the binary operator, the quantitative operator, and the emotional value operator (d'Aquili and Newberg 1999, 52). These operators, somewhat analogous to Immanuel Kant's categories, act on the information that the brain continually receives. The causal operator, for instance, is responsible for seeking out causal relationships, a task obviously important for the physical sciences as well as many situations in ordinary life. The reductionist operator analyzes an object or idea in terms of its parts, while the contrasting holistic operator tries to perceive parts as part of a larger whole, much as a gestalt. Generally speaking, these operators are understood to be located in specific areas of the brain according to our current knowledge of neuroanatomy and function, although the evidence for some of the operators, such as the emotional operator identified with the limbic system, is better than others, such as the binary operator, which is not assigned any location in the brain.

Because these operators are understood to give an essentially complete account of the brain's cognitive operations, d'Aquili and Newberg claim that they can be used to understand all forms of religious expression and experience. Building on the work of anthropologist Claude Lévi-Strauss (1963) that understands myths in terms of the resolution of opposites, d'Aquili and Newberg claim that such mythic narratives are a construct of the binary operator. Ritual is a physical attempt at resolving these polarities. This resolution of polarities, whether in myth, ritual, or meditation, is seen to be at the core of religious experience, understood by d'Aquili and Newberg as a state of Absolute Unitary Being (AUB) that occurs across cultures.

The most important element of d'Aquili and Newberg's account of religious experience (and the one that has attracted the most attention) deals with how AUB arises in the brain. Activities such as ritual and meditation work toward achieving various levels of AUB by causing a cascade of events that stimulate emotional pathways at the same time that areas in the parietal lobe of the cerebral cortex associated with spatial orientation are cut off in a process called *deafferentation*. The proposed model claims that deafferentation of the right parietal lobe results in a loss of spatial distinctions resulting in a sense of wholeness, while deafferentation of the left parietal lobe results in a loss of the self-other distinction, resulting in an experience of unity. Deafferentation is said to occur as a result of the overstimulation of the sympathetic and parasympathetic systems of the brain, described by d'Aquili and Newberg as being responsible for states of arousal and quiescence respectively. While these two systems usually compete with each other (the sympathetic system is active when the parasympathetic system is passive, and vice versa), it is claimed that specifically

religious activities such as repetitive ritual dancing and focused meditation often result in a kind of spillover effect that activates both systems. Deafferentation is said to be the result, creating the conscious state of AUB.

In a test of this hypothesis, an experiment was conducted with eight Tibetan Buddhists experienced at meditation (Newberg et al. 1997). In each case, when a meditator had achieved an advanced meditational state, he was injected with a radioactive compound that labels brain areas according to the amount of blood flow in each area. More blood flow is associated with greater brain activity, less blood flow with less activity. Twenty minutes after injection, subjects were given a SPECT scan (Single Photon Emission Tomography) to image the radioactivity bound in the brain. When compared to initial baseline scans, the results were consistent with their hypothesis, showing in particular decreased activity in the left parietal lobe.

What do such results imply? On the one hand, d'Aquili and Newberg are careful to avoid a form of reductionism that denies the existence and reality of the phenomenal state that the meditators experience. That is, because there are brain states that correlate with the experience of AUB does not mean that AUB does not exist or that the insights that it provides are false. All states of consciousness are brain states of one sort or another, d'Aquili and Newberg point out, and whatever mode of consciousness we experience will in fact have such correlative brain states. Indeed, they argue, there is no real reason to suppose that normal states of consciousness should be privileged over the forms of consciousness experienced in ritual and meditation, which may indeed provide genuine insights into the nature of reality that are actually cloaked during normal experience. Because of this, they argue that God and religion is an integral part of human experience, and the biological roots of religion explain why, contrary to the expectations of many secular thinkers, religious belief not only failed to disappear but even experienced something of a resurgence in the late twentieth century (Newberg, d'Aquili, and Rause 2001).

On the other hand, their work clearly suggests (although it is left unsaid) that brain states are the primary causative agent in the formation of such meditational experiences. This point may not be important for some Buddhists, since enlightenment is to a significant extent something that is pursued (somewhat paradoxically) by the individual. For Christians, however, the question of causation is of greater importance, since it has been traditionally assumed that a genuine religious experience will have God as its source. Newberg and associates performed a similar study on Franciscan nuns during prayer (2001, 000). SPECT scans of the nuns showed deafferentation in the parietal lobe, seeming to confirm that the nuns experienced a form of AUB during intense, focused prayer. Assuming that these scans do in fact reveal a component of religious experience associated with prayer, should we suppose that we are seeing the hand of God (so to

speak) in the minds of the nuns? Or is the religious experience self-generated by the concentration and verbalization that is a necessary part of prayer? The scans of the nuns' brains show heightened activity in the forebrain and in verbal association areas, but this is what one might expect in any verbal task. Without a control group, we cannot tell whether this pattern is distinctive or not. Additionally, because prayer is not always accompanied by religious experience (a fact that can be testified to by many, both sincere and insincere in their faith), it is not clear that we should.

Both Ramachandran's work and d'Aquili and Newberg's research raise significant questions about how we think about religious experience. Work that shows a biological basis for religious experience seems to be a two-edged sword, for at the same time that it confirms the reality of such experience it threatens to undermine the broader religious claims about its nature and cause. As with Ramachandran's work, d'Aquili and Newberg's is preliminary and raises as many questions as it claims to solve. Would, for instance, damage to the left parietal lobe affect a meditator's ability to achieve states of enlightenment? Are such experiences truly cross-cultural, suggesting a potential unifying principle to religions after all? Perhaps more to the point, is that all there is to it?

#### MESSAGES FROM WHOM?

It is important to recognize that research on religious experience remains in its infancy. With only limited data, we are a long way from providing a scientific account that could claim to be both authoritative and comprehensive. Nevertheless, even this early research poses the important conceptual question of how religious experience should be understood and what ways we should see religious experience manifested (or not) in the brain. Such work suggests that there is a biological basis to certain kinds of religious experience that is not merely formed by cultural expectations, undermining the claim that religious experiences are *merely* derivatives of culture. At the same time, however, these experiments do not show that there is *no* cultural element, and it is important to recognize this as well. To achieve such meditative states requires significant preparation that itself is a product of long-developed religious practice. While d'Aquili and Newberg's theory makes sense of the experiences of unity and bliss that mystics across the world have attested, it does not support the stronger religious claims regarding the origin and significance of these experiences. As far as the biology is concerned, there is plenty of room to culturally interpret such states as an experience of nirvana or of the love of God. Indeed, if mystics from different traditions could be shown to be having the same brain states despite their different interpretations, would this validate or invalidate their claims? What, after all, are these brain states experiences of?

There appear to be three different interpretations of the evidence obtained so far from brain wave studies, Ramachandran's work with temporal lobe patients, and d'Aquili and Newberg's work with Tibetan meditators. First, one may argue that the existence of brain states that correlate with religious experiences shows that such religious experiences have no basis in reality, they are essentially illusory states that are on par with hallucinogenic and drug-induced states. While this is Persinger's interpretation, such a move is resisted by Ramachandran, d'Aquili, and Newberg, and with good reason. To show that a brain state correlates with a certain kind of experience is not to show that such an experience is false. Since, for any given experience, there are also correlative brain states, such an argument would imply that all our experiences are delusional—a clearly absurd conclusion.

Acknowledging this, however, does not by itself establish that such experiences do have significance, only that it is false to simply assume that they do not. It may well be that these states of the brain are purely natural and do not have any supernatural component but nevertheless do provide insight into the nature of reality. This position, however, would have to be argued and, therefore, part of a larger religious (and in Proudfoot and Katz's sense, cultural) framework. Religious experiences may be significant but are not self-interpreting. Far from negative, this would suggest a positive, constructive role for a larger religious framework based on multiple considerations, of which such experiences would be one component. Indeed, James Austin's personal narrative in *Zen and the Brain* (1998) provides a powerful account of how such experiences can have a significant transformative impact within the broader context of Zen Buddhist discipleship, even though the purely naturalistic basis of the enlightenment experiences themselves is acknowledged. Recognizing the insight from these experiences may also provide a basis for interreligious dialogue. If religious experiences of this kind are universal (a long-standing claim of many philosophical students of mystical experience), and if they are taken to give genuine insight, they can at least present one common ground for mutual understanding and exchange of ideas.

Another option would be to recognize that knowledge of brain states is not sufficient for understanding these religious experiences. That is, there is a quality to these experiences above and beyond what is supported by neuroscience. Such a position would perhaps be necessitated by some versions of Hinduism and Buddhism. According to tradition, for instance, one of the signs of enlightenment was the Buddha's ability to perceive all of his past lives, an ability that clearly goes beyond our current understanding of the brain and natural science. Such claims relate to the nature of consciousness and represent some significant challenges of coherence.

It should be emphasized, however, that it is far from clear that d'Aquili and Newberg's state of AUB and Ramachandran's temporal-lobe modules

are sufficient to account for all forms of religious experience, and good reason to suppose that they are not. Religious experiences are diverse and complex, and it would be somewhat surprising if all could be reduced to a single kind of brain activity. It is important to note that in all the cases discussed so far, no claim is made that the religious experiences have an external source. Even in the case of Ramachandran's temporal-lobe patients, their difference lies in their attenuation and even obsession with religious objects and in their experience of unity with God, not in their claims to have (say) received messages of some kind from an external source.

The claim that God communicates directly or indirectly with human beings in one way or another has been integral to Jewish and Christian history. The significance of the prophets, for instance, lay not in their personal insights but in their ability to speak the word of God, made explicit in the frequently used preliminary phrase, "Thus sayeth the LORD." Furthermore, many Christians, as well as Jews and Muslims, claim to receive some kind of divine communication, whether as a response to prayer or unbidden at times of important transition and crisis. Such divine responses may take the form of broad feelings of love or reassurance, or they may be more specific and include visual or verbal components. While the former type of experience is more typical and has generally had wider support (as reflected in many of the testimonies that William James [1902] recounts in his chapters on conversion), the latter have been more controversial, and any prominent inclusion of them is limited either to the distant past or to particular denominations (e.g., visitations of Mary in Catholicism or glossolalia and prophecy in Pentecostal traditions).

William Alston in particular has articulated a defense of God as the causal source of religious experience (1991). He argues that religious experience can be understood as a form of sensory perception, where sensory perception is understood as a process of reliable presentation to one's consciousness. Nancey Murphy has built on this approach, incorporating the practice of Christian discernment derived from Quaker practice as a means of confirming/disconfirming the authenticity of such experiences (Murphy 1990). In both cases, however, the provenance of such experiences is external to the person. This is quite different from the experience of AUB, which can be understood as something that is achieved internally, even though the effect is to provide insight into a deeper understanding of reality.

Austin claims that there need be no separate sensory organ for detecting God's communication. But if one takes the integration of brain and mind seriously, then such communications would presumably have some effect on the brain and would, at least in principle, be detectable in a sufficiently sophisticated brain scan. Recognizing this, Arthur Peacocke has argued (1991) that experiences of God can be understood as the imparting of information in a manner that invokes top-down causation. In this view,



God would be seen as directly activating the relevant emotional and cognitive areas of the brain responsible for the experience in question. How would we know such states are from God? Peacocke does not address this, but one might presume that such experiences might have a quality of externality to them.

While Peacocke's position has some potential, it does raise questions. If God's action does work in this fashion, then it is at least theoretically possible to simulate God's voice by stimulating these same areas of the brain, either by design or by dint of mental illness. Bizarrely, Michael Persinger has claimed to do precisely this. Using transcranial magnetic stimulation (TMS), in which a focused magnetic pulse stimulates neurons in a targeted brain area, Persinger claims that he has been able to induce religious experiences in subjects and even himself (Ramachandran and Blakeslee 1998, 174). While Persinger's claims (which are nothing more than that at the time of this writing) should be treated with some skepticism, they do raise the authenticity question anew: In what sense can we be sure such experiences are truly divine?

In truth, we cannot—and once again we are thrown back onto a larger theological framework to interpret such experiences and claims. In addressing the reality of religious experiences, William James argued that we cannot simply take the validity of someone's claims of religious experience at face value. In the end we must judge the authenticity of religious experiences by their effects. Theologically, we are still left in much the same situation. Cognitive neuroscience can provide evidence for the reality of such experiences but in the end cannot tell us what they mean. While religious experiences are real and hold the potential for significant personal and communal experience, they are not in the end completely self-interpreting. Rather, they represent one important component in the broader theological endeavor of understanding the most basic questions of life: Who am I? What is out there? Where am I going? Religious experiences give at least some of us profound insight into such questions. At the same time, they are only the beginning of the journey, not the end point, and the wisdom they provide must accompany and cohere with others in the difficult task of living and growing in a varied, complicated world.

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