

**Are Mystical Experiences Evidence for the Existence of a Transcendent
Reality?
Evaluating Eugene d'Aquili and Andrew Newberg's Argument for Absolute
Unitary Being**

Jonathan Scott Miller, Bowling Green State University

The neuroscientists Andrew Newberg and Eugene d'Aquili have developed, over the course of several decades of research, an influential model of what happens in the brain during mystical experiences.¹ Their model of mystical experiences is often brought up in scientific discussions of religion and mysticism.² D'Aquili and Newberg have also argued that mystical experiences provide evidence for the existence of a transcendent reality, which they refer to as "Absolute Unitary Being," or AUB. While d'Aquili and Newberg's model of mystical experiences is full of testable hypotheses, and may serve as a useful guide to future research, their speculations about the existence of a transcendent reality are problematic, for a variety of reasons to be discussed below. In what follows, I will first briefly explain d'Aquili and Newberg's neuroscientific model of mystical experiences, and then discuss their argument for the existence of AUB.

D'Aquili and Newberg attribute four main phenomenological features to mystical experiences.³ The first is a breakdown in the usual sense of the passage of time; the second is a breakdown in the usual sense of the extension of space; the third is a breakdown in the differentiation between objects in the external world; and the fourth is a breakdown in the differentiation between the self and the external world. They claim that mystics in many different traditions have had experiences with these characteristics, and they attempt to provide a model for what happens in the brain during this kind of experience.

D'Aquili and Newberg contend that mystical practices, such as meditation and ritual, can lead to the hyperactivation of the prefrontal cortex of the brain, which can in turn activate the hippocampus, causing it to inhibit neural signals into parts of the parietal lobes—specifically, the posterior superior parietal lobules, or PSPLs. It is this inhibition of neural signals into the PSPLs that causes some of the characteristic phenomenological features of mystical experiences.⁴

The PSPLs are believed to be responsible for maintaining certain aspects of the usual sense of the self, and when the neural input to them is cut off, the usual sense of the self alters.⁵ The elimination of neural input to a part of the brain is called "deafferentation." Deafferentation is referred to as "functional" when neural input is temporarily cut off, and "physical" when there is

permanent physical damage to the brain which prevents the usual neural signals from flowing. D'Aquili and Newberg propose that mystical experiences involve either the partial or the total functional deafferentation of the PSPLs of both the right and left hemispheres of the brain. Partial functional deafferentation of the PSPLs leads to so-called lesser mystical experiences, while total functional deafferentation of the PSPLs leads to the experience of AUB.

The right and left PSPLs perform different functions, so the deafferentation of each is responsible for different aspects of the phenomenology of mystical experiences. The right PSPL is responsible for generating the usual sense a person has of her orientation in space. Its neurons fire differently based on the spatial relationship between a person and the particular objects she perceives in her environment. When the right PSPL is totally functionally deafferented, this is experienced as a sense of spacelessness.

The left PSPL is responsible for generating the usual sense of the separation between the self and the world. Its neurons fire differently based on whether or not objects in the environment are perceived to be within grasping distance. The usual sense of the separation between the self and the world is evidently based on this distinction between objects that are and are not within grasping distance.⁶ When the left PSPL is totally functionally deafferented, this is experienced as a lack of separation between the self and the world.

D'Aquili and Newberg's model of mystical experiences has recently been updated in a paper on meditation by Newberg and J. Iversen.⁷ Newberg and Iversen propose an alternative means by which activity in the prefrontal cortex leads to the inhibition of signals into the parietal lobe. D'Aquili and Newberg proposed that activation of the prefrontal cortex during meditation could cause the hippocampus to inhibit signals to the PSPLs. Newberg and Iversen instead hypothesize that increased activity in the right prefrontal cortex may lead to increased activity in the reticular nucleus of the thalamus, which could cause decreased sensory input into the PSPLs. There is no direct evidence in support of Newberg and Iversen's hypothesis, because of limitations with respect to the resolution of brain imaging technology.⁸ However, a SPECT study did show a general increase in activity in the thalamus during meditation, which is consistent with Newberg and Iversen's hypothesis that it is the reticular nucleus that leads to the deafferentation of the PSPLs.⁹

While Newberg and Iversen retain the role of the PSPLs in their model of meditation, they note that one study has seemed to show that the superior temporal lobe plays a more significant role than the PSPLs in the spatial representation of the body.¹⁰ There is also research which seems to show that the PSPLs are involved in the representation and orientation of the body in space, and in the differentiation of objects in space.¹¹ In other words, the relative contribution of the PSPLs and the superior temporal lobe to the usual sense of the relation between the self and the world remains unclear.

There is evidence, however, which supports d'Aquili and Newberg's and Newberg and Iversen's contention that the PSPLs are deafferented in mystical experiences. A study of Yoga meditative relaxation showed decreased activity in the PSPLs during meditation.¹² A SPECT study of Buddhist monks engaged in meditation and Catholic nuns engaged in prayer found a decrease in the activity in the PSPLs and an increase in the activity in the prefrontal cortex.¹³ Another SPECT study of meditators found that there was a negative correlation between the regional cerebral blood flow in the subjects' left dorsolateral prefrontal cortexes and the regional cerebral blood flow in their left superior parietal lobules.¹⁴ In other words, the more activity there was in the subjects' prefrontal cortexes, as measured by the amount of blood flowing to the area, the less activity there was in their left superior parietal lobules, which may indicate that the latter structures were partially functionally deafferented. More recently, a study of mystical experiences in Carmelite nuns showed that increased activity in the prefrontal cortex was correlated with decreased activity in parts of the parietal lobes, which the authors interpreted in terms of Newberg's theory of the functional deafferentation of the PSPLs.¹⁵

In addition, Newberg and Iversen propose that the limbic structures of the temporal lobe play a significant role in mystical experiences. They hypothesize that the deafferentation of the right PSPL, in addition to the increased activity of the thalamus itself, both stimulate the right hippocampus. According to Newberg and Iversen, if the right hippocampus is stimulated in this way during meditation, then it likely stimulates the right lateral amygdala as well, because of the reciprocal interaction between these two limbic structures. The intense activation of the hippocampus and amygdala could lead to the intense feelings of peace and joy often reported during mystical experiences.

D'Aquili and Newberg's model of mystical experiences has not been fully confirmed, and there are other, competing models, such as that of the psychologist Michael A. Persinger, which focuses exclusively on changes in the temporal lobe of the brain.¹⁶ It is also possible that there is more than one kind of mystical experience, and that not all of them can be explained by a single neuroscientific model. On the other hand, d'Aquili and Newberg's model is full of testable predictions, and it may prove a useful guide to future research. The real problem with their work on mystical experiences lies in their attempt to defend the existence of a transcendent reality, AUB, on the basis of their model. D'Aquili and Newberg claim that AUB is just as real as, and perhaps more real than (in the sense of 'more metaphysically fundamental than') baseline reality (i.e., the world as it appears in ordinary waking consciousness). In contrast with Ralph Hood, who emphasizes the importance of a phenomenological perspective when evaluating the epistemological status of mystical experiences,¹⁷ d'Aquili and Newberg argue that AUB can be regarded as real regardless of whether one looks at the evidence from an external perspective or from a subjective perspective.

Before we can discuss d'Aquili and Newberg's argument for AUB, however, we must make a few terminological clarifications. First, what exactly is a transcendent reality? For the purpose of this discussion, the term "transcendent reality" will be defined as an entity that is not known (or at least not directly known) through sense experience, or through the other forms of experience that are accessible in ordinary waking consciousness (such as ordinary introspection). Sense experience includes sensory input both from outside of the body, as with vision, and from inside the body, as with the experience of pain in an organ, or the experience of the motion of a limb. A transcendent reality is known (directly) only through certain extraordinary states of consciousness, including mystical experiences, in which a person temporarily gains special access to information outside of the realm of ordinary experience. It is possible that a transcendent reality could be known indirectly through ordinary experience, however, if there were sufficient reasons to infer its existence on the basis of certain features of ordinary experience (together, perhaps, with certain background assumptions).

Are all transcendent realities supernatural? The term "supernatural" is typically defined in opposition to the natural. Specifically, something is supernatural just in case it cannot be accounted for as part of the order of nature. A supernatural being stands outside the ontology of nature and outside of natural laws. Transcendent realities are not known directly through ordinary experience, but only through extraordinary states of consciousness. If extraordinary states of consciousness can give knowledge only of supernatural things, then all transcendent realities are supernatural. If they can also give knowledge of natural things, then some transcendent realities may be natural. If they do not give knowledge of anything, then there may be no transcendent realities (and no one has knowledge of them).

There are also a couple of terminological issues which stem from d'Aquili and Newberg's argument for AUB. First, they use the term "AUB" ambiguously. Sometimes, "AUB" refers to a transcendent reality, and at other times it refers to the state of consciousness through which this transcendent reality is experienced. Similarly, they use the term "baseline reality" to refer both to a state of affairs and to the state of consciousness through which it is experienced. In order to avoid this ambiguity, in the following discussion the term "AUB" will be used exclusively to refer to the transcendent reality that is experienced through mystical states of consciousness, and not to the states of consciousness themselves (which will be referred to as "mystical experiences" or "experiences of AUB"). Likewise, the term "baseline reality" will be used to refer to a state of affairs, and not to the corresponding state of consciousness (which will be referred to as "ordinary waking consciousness" or "the experience of baseline reality").

The second terminological problem in d'Aquili and Newberg's discussion is the ambiguity of the term "reality." There are at least four senses in which they use the term "reality." First, they use

“reality” to refer to an entity or state of affairs, as in the terms “transcendent reality” and “baseline reality.” Second, they use “reality” to refer to a perspective or point of view, as in the terms “external reality” and “subjective reality.” Third, they use “reality” to claim that a given hypothetical entity or state of affairs is an actual entity or state of affairs, as in the phrase, “the reality of AUB.” Fourth, they use “reality” to refer to the metaphysical status of an entity, that is, to how metaphysically fundamental it is, as in the statement, “AUB is more real than baseline reality.” With respect to the latter sense of the term reality, while it may seem odd to speak of degrees of reality, intuitively, the existence or nature of some entities depends on that of other entities, such that an entity which depends on another for its existence or nature can be said to be less metaphysically fundamental, and hence less real in this fourth sense, than the other entity.

Unfortunately, d’Aquili and Newberg do not clearly distinguish between any of these four senses of the term “reality.” In what follows, the term “reality” will be used exclusively in the first sense, that is, to refer to an entity or state of affairs. In order to lend clarity to the discussion, three different terms have been substituted for the three further senses of the term “reality.” Specifically, the second sense of the term will be referred to as a “point of view,” the third sense of the term will be referred to as “existence,” and the fourth sense of the term will be referred to as “metaphysical status.” These substitutions have required a bit of creative interpretation on my part, but I have attempted to capture the sense of their argument. There is also one exception to this attempt to bring clarity to d’Aquili and Newberg’s argument: I have not renamed their term “subjective vivid sense of reality” (which refers to an epistemological criterion used to evaluate the veridicality of an experience) simply because it would have been too awkward to do so; the term can be understood, however, as referring to the subjective vivid sense that something exists or that it is metaphysically fundamental.

D’Aquili and Newberg’s discussion of the existence and metaphysical status of AUB begins with a discussion of whether external reality (that is, an external point of view) or subjective reality (that is, a subjective point of view) ought to be regarded as primary.¹⁸ They claim that a different solution to the problem of the existence and metaphysical status of AUB is reached, depending on whether one adopts an external or subjective point of view. The external point of view is based on material objects, while the subjective point of view is based on the phenomena of consciousness. D’Aquili and Newberg claim that a scientific approach takes the external point of view as primary, while a phenomenological approach takes the subjective point of view as primary.

While there are significant problems with d’Aquili and Newberg’s use of terminology here, I will attempt to focus instead on the substance of their claims. They claim that it is not decidable whether the external or subjective point of view should be taken as primary, since there are equally compelling grounds for regarding each point of view as primary. They therefore attempt to draw out

the implications for the existence and metaphysical status of AUB of adopting either point of view as primary. Their argument takes the form of a constructive dilemma: if the external point of view is regarded as primary, then AUB is shown to exist and to have the same metaphysical status as baseline reality; whereas, if the subjective point of view is regarded as primary, then AUB is shown to exist and to be more metaphysically fundamental than baseline reality. Either way, AUB exists, and is at least as metaphysically fundamental as baseline reality.

First, if one takes the subjective point of view, d'Aquili and Newberg propose that the "subjective vivid sense of reality" of an experience is the only criterion which can determine whether the object of the experience exists and its metaphysical status.¹⁹ Their evaluation of AUB from a phenomenological point of view therefore utilizes the subjective vivid sense of reality of an experience as the sole basis for its existence and metaphysical status. They reject other criteria, including coherence with one's own experience over time, and consistency with the experience of others, by claiming that these beg the question against mystical experiences. According to d'Aquili and Newberg, the criterion of coherence with one's own previous experience begs the question against mystical experiences, because in mystical experiences a person neither has the sense that she is self-identical over time, nor the sense that she has a sequence of experiences that are *her* experiences. Only by assuming a different perspective, such as that of ordinary waking consciousness, can a person compare her experiences over time to see if they cohere. Similarly, the criterion of coherence with the experience of others begs the question against mystical experiences, because in full-blown mystical experiences there is no experience of other persons. The only way to compare one's experience with that of other subjects is by adopting a perspective other than that of mystical experiences themselves, such as the perspective of ordinary waking consciousness. Therefore, according to d'Aquili and Newberg, the subjective vivid sense of reality of an experience is the only epistemological criterion which does not beg the question against the perspective of mystical experiences, because it does not assume any of the contents of other states of consciousness.

Based on the criterion of the subjective vivid sense of reality of an experience, d'Aquili and Newberg claim that the experience of AUB wins hands down over the experience of baseline reality. The experience of AUB is coupled with a vivid sense of reality during the experience itself, which, they claim, is greater than the sense of reality during experiences of baseline reality. D'Aquili and Newberg further claim that, unlike dreams and hallucinations, the experience of AUB retains its vivid sense of reality even from the standpoint of later episodes of ordinary waking consciousness. They thus conclude that AUB not only exists (that is, it is not a dream or hallucination), but that, from a phenomenological point of view, AUB is more metaphysically fundamental than baseline reality, in that baseline reality depends on AUB for its existence, but not vice-versa. As they put it,

“God” (i.e., AUB) “generates” baseline reality, including both its subjective and objective components.²⁰

A different conclusion is reached, however, if one takes the external point of view as primary. D’Aquili and Newberg claim that, from this point of view, AUB exists just as does baseline reality, and it is not possible to decide whether AUB or baseline reality is more metaphysically fundamental. The experience of AUB is accompanied by changes in the brain, but so is the perception of physical objects, and this does not show that physical objects exist only in the mind. They thus conclude that God (AUB) is just as real (that is, it exists and has the same metaphysical status) as external objects, from a scientific point of view.

D’Aquili and Newberg’s argument for the existence and metaphysical status of AUB faces numerous problems. To begin with, their equation of the terms “God” and “AUB” is problematic. Even if it could be shown that AUB exists, this would not necessarily mean that God exists, in any of the senses in which the term “God” is generally used. God is usually conceived of as a person, that is, as a conscious being with thoughts and feelings. Even if the phenomenology of the experience of AUB is assumed to represent accurately the properties of a transcendent reality, the most that could be said of this reality is that it is united, outside of the usual categories of space, and beyond or larger than the self of ordinary waking consciousness. Experiences of AUB, as conceived of by d’Aquili and Newberg, are not experiences of a conscious being with whom a person could discuss prophecy or sexual mores (for example). If AUB were real, then it is possible that AUB could be a personal God, but this is not certain given the phenomenology of the experience of AUB itself.

Setting this issue to the side, let us now examine d’Aquili and Newberg’s arguments for the reality of AUB from the subjective and external perspectives. With regards to the former, it is unclear whether d’Aquili and Newberg have the resources to reject all other epistemological criteria besides the subjective vivid sense of reality of an experience. Let us assume, with d’Aquili and Newberg, that the criteria of intersubjective and intertemporal coherence depend upon the perspective of ordinary waking consciousness. It seems impossible, however, to discuss the epistemological status of an experience at all without first assuming the perspective of ordinary waking consciousness. Rational discussion rests on the presumption that experiences, objects, concepts, and so on can be meaningfully differentiated from one another, which is possible in ordinary waking consciousness, but not in mystical experiences. Indeed, d’Aquili and Newberg’s own discussion of the epistemological status of mystical experiences assumes the distinction between the external and subjective points of view, but it is not possible to make this distinction from the perspective of mystical experiences. In other words, the distinction between the external and subjective points of view begs the question against mystical experiences just as much as do the

criteria of intertemporal and intersubjective coherence of experiences. To be consistent, d'Aquili and Newberg must either abandon rational discussion about AUB, or make the case that such discussion is somehow possible. If the latter, though, they would have to admit alternative epistemological criteria to the subjective vivid sense of reality. If the former, then, even if mystical experiences were genuine sources of knowledge, this fact could not be meaningfully discussed. The most one could say is to agree with Ludwig Wittgenstein that "What we cannot speak about we must pass over in silence."²¹ In that case, d'Aquili and Newberg would not be entitled to make claims about the existence or metaphysical status of AUB.

Another problem with the claim that (from the subjective point of view) the subjective vivid sense of reality of an experience is the sole epistemological criterion is that this criterion does not rule out experiences which are clearly not sources of knowledge. Relying solely on the subjective vivid sense of reality criterion would seem to give the same epistemological weight to delusions and hallucinations as to mystical experiences, despite d'Aquili and Newberg's claims to the contrary. D'Aquili and Newberg attempt to give preferential treatment for AUB over hallucinations by claiming that AUB retains its vivid sense of reality even after the experience is over, and by claiming that this is not the case with such experiences as dreams and hallucinations. While it is true that dreams do not retain their vivid sense of reality once a person has awoken, hallucinations and delusions may, especially in the case of persons suffering from psychological disorders such as schizophrenia. Such delusions and hallucinations are rejected, not because they lack a vivid sense of reality to those who experience them, but rather because they fail the criterion of intersubjective coherence.

If the criteria of intertemporal and intersubjective coherence are retained, in order to differentiate the experience of AUB from delusions and hallucinations, then this may pose problems for the epistemological status of the experience of AUB. *Prima facie*, the experience of AUB does not cohere with the experience of baseline reality. In other words, the experience of AUB fails the criterion of intertemporal coherence. But, on this view, so would the experience of baseline reality, if a person also had experiences of AUB. D'Aquili and Newberg do not address this *prima facie* incoherence; instead, they focus on the fact that, even from the standpoint of ordinary waking consciousness, mystical experiences retain their subjective vivid sense of reality. This raises a puzzling question. If the experience of AUB seems real from the standpoint of an experience of baseline reality, does this mean that the two actually cohere with one another, despite the initial appearance of incoherence?

The answer seems to depend in part on the particular beliefs of a person who has had experiences of both AUB and baseline reality. A person who has had both kinds of experiences might believe one of three things. The first is that the experience of baseline reality is an illusion and

that the experience of AUB is veridical. One example of this view is the claim of Hindu mystics that the world of sense experience is an illusion (*maya*) and that only the transcendent reality Brahman is real. The second belief a person could have is that the experience of AUB is an illusion and that the experience of baseline reality is veridical. As noted by d'Aquili and Newberg, this does not seem to be a common belief among mystics, because the experience of AUB generally has a stronger subjective vivid sense of reality than does the experience of baseline reality. But there is a third possibility. A person could believe that the experience of AUB actually coheres with the experience of baseline reality. This seems to be the position taken by mystics who do not deny the reality of the world of sense experience, yet who affirm the reality of some transcendent reality. If it is possible for both the world of sense experience to exist and for a transcendent reality to exist, then the experience of baseline reality could cohere with the experience of AUB (or some other transcendent reality).

There are at least two ways in which this could be so. The first is that the transcendent reality could be a separate being over and above baseline reality. The second is that the transcendent reality could be numerically identical to baseline reality. In the latter case, the experience of AUB would have the same object as the experience of baseline reality, but this object would simply be experienced in a different way. For example, there may be one sense in which the world is fundamentally united (as appears to be the case in experiences of AUB), and another sense in which the objects of the world can be differentiated. To state just one example of the way in which this could be so: perhaps the world is united in the sense that it is a single physical system (with conservation of energy and so on), but that it is not united in the sense that there are local variations in the kinds or amounts of energy in different parts of the system. These parts, though, might not be fundamentally metaphysically distinct, if they are all causally interconnected with one another. If a person had this kind of belief, then the experience of AUB could conform to the criterion of intersubjective coherence. If a person believed that either the experience of AUB or the experience of baseline reality is an illusion, however, then the experience of AUB would fail the criterion of intersubjective coherence, and this criterion could not be fruitfully used by d'Aquili and Newberg to distinguish between experiences of AUB and delusions or hallucinations.

Even if the experience of AUB passes the criterion of intertemporal coherence, though, it does not seem to conform to the criterion of intersubjective coherence. Most people have not had experiences of AUB, but they have had experiences of baseline reality. There is thus a larger intersubjective consensus with respect to experiences of baseline reality than with respect to experiences of AUB. Everyone, including mystics, experiences baseline reality, but not everyone experiences AUB. The experience of AUB therefore has a lesser degree of intersubjective coherence than does the experience of baseline reality. Thus, if d'Aquili and Newberg are forced to appeal to

the criterion of intersubjective coherence in order to distinguish the experience of AUB from delusions and hallucinations, then the experience of AUB would lose out to the experience of baseline reality in terms of this criterion.

So much for d'Aquili and Newberg's evaluation of the existence and metaphysical status of AUB from a phenomenological point of view. Their evaluation of the existence and metaphysical status of AUB from a scientific point of view is likewise problematic. D'Aquili and Newberg claim that it is not decidable whether AUB or baseline reality is more metaphysically fundamental from this perspective, but there are at least three problems with their argument. This first is that there is substantial consensus among independent observers both about the existence of external objects and about the existence of changes in the brain due to the perception of them, but there is not substantial consensus among independent observers about the existence of AUB or another transcendent reality. When a person perceives an external object, independent observers can perceive not only the relevant changes in the person's brain, but also the external object itself. Other people can agree that an external object exists just as easily as they agree that the person who perceives it has the relevant sort of brain activity; but this is not so with AUB.

The second problem with d'Aquili and Newberg's evaluation of AUB from a scientific point of view is that, unlike in cases of sense perception, there is no known mechanism by which AUB is contacted in mystical experiences. Even if more people started experiencing AUB, perhaps through the widespread practice of meditation or other methods for attaining mystical experiences, this would not prove the existence of a transcendent reality, any more than seeing lights when one is punched in the face proves the existence of an external light source, transcendent or otherwise. In both cases, there is no account of the mechanism by which information is transmitted from the object to the sense organs of the observer, and thence to the brain, to induce the relevant sorts of brain activity.

The third problem with d'Aquili and Newberg's evaluation of AUB from a scientific point of view is that their neuroscientific model of mystical experiences makes it seem unlikely that a mechanism for the transmission of information from a transcendent reality to a person having a mystical experience will ever be discovered. Of course, there is uncertainty about the model itself, and uncertainty about what a mechanism for contacting a transcendent reality ought to look like, but, at the same time, certain theories of mystical experiences seem less compatible with the hypothesis that a transcendent reality is contacted in them than others. On d'Aquili and Newberg's model, during mystical experiences, neural input to the PSPLs is reduced, and this prevents the brain from orienting the self in space, and distinguishing between self and other.²² According to Newberg and Iversen, the reticular nucleus of the thalamus, when it is stimulated by activity in the prefrontal cortex, inhibits the usual neural input from the sensory processing regions of the cortex to the

PSPLs.²³ Their model shows how the brain no longer processes information about baseline reality, but it does not show that the brain gains information from a transcendent reality. It is more plausible to assume that mystical experiences are simply occasions in which parts of the brain are not performing their normal function, rather than to assume they are occasions in which a transcendent reality is being contacted. It is difficult to see how d'Aquili and Newberg's neuroscientific model of mystical experiences counts as a confirming instance of the hypothesis that such experiences are occasions of contact with a transcendent reality. Such experiences seem to be occasions of sensory or cognitive impairment, and not of super-sensory contact. Further, while the hypothesis that there is a transcendent reality contacted in mystical experiences is consistent with what is known about such experiences, it is not necessary to explain them, and adds nothing to our understanding of them, because no useful predictions about the nature of mystical experiences follow from it.

D'Aquili and Newberg's attempt to show that mystical experiences are sources of knowledge about a transcendent reality must therefore be regarded as a failure. Their failure does not itself prove that there is no transcendent reality, nor that some other account might not be able to give reasons for thinking that such a reality is contacted in mystical experiences. An advocate of the existence of a transcendent reality would have to explain, however, why the hypothesis of contact with a transcendent reality is to be preferred to the alternative hypothesis that mystical experiences can be completely explained in terms of our ordinary experience. Given d'Aquili and Newberg's own model of PSPL deafferentation, it is even possible that the more scientists learn about mystical experiences, the more difficult it will be to interpret them in terms of contact with a transcendent reality.

Notes

¹ Representative works include: Eugene d'Aquili and Charles Laughlin, "The Biopsychological Determinants of Religious Ritual Behavior," *Zygon* 10 (1975): 32-58; Eugene d'Aquili, "The Sense of Reality in Science and Religion: A Neuroepistemological Perspective," *Zygon* 17 (1982): 361-84; Eugene d'Aquili and Andrew B. Newberg, "Religious and Mystical States: A Neuropsychological Substrate," *Zygon* 28 (1993): 177-200; Eugene d'Aquili and Andrew B. Newberg, "The Neuropsychological Basis of Religions, or Why God Won't Go Away," *Zygon* 33 (1998): 187-201; Eugene d'Aquili and Andrew B. Newberg, *The Mystical Mind: Probing the Biology of Religious Experience* (Minneapolis: Fortress P, 1999); Eugene d'Aquili and Andrew B. Newberg, "The Neuropsychology of Aesthetic, Spiritual, and Mystical States," *Zygon* 35 (2000): 39-52; Andrew B. Newberg, "Putting the Mystical Mind Together," *Zygon* 36 (2001): 501-7; Andrew B. Newberg et al., "The Measurement of Cerebral Blood Flow During the Complex Cognitive Task of Meditation Using HMPAO-SPECT Imaging," *Journal of Nuclear Medicine* 38 (1997): 95; Andrew B. Newberg et al., "The Measurement of Regional Cerebral Blood Flow During the Complex Cognitive Task of Meditation: A Preliminary SPECT Study," *Psychiatry Research* 106 (2001): 113-22; Andrew B. Newberg and Eugene d'Aquili, "The Neuropsychology of Religious and Spiritual Experience," *Journal of Consciousness Studies* 7 (2000): 251-66; Andrew Newberg, Eugene d'Aquili, and Vince Rause, *Why God Won't Go Away: Brain Science and the Biology of Belief* (New York: Ballantine Books, 2002); Andrew B. Newberg and J. Iversen, "The Neural Basis of the Complex Mental Task of Meditation: Neurotransmitter and Neurochemical Considerations," *Medical Hypotheses* 61 (2003): 282-91; and Andrew B. Newberg and S. K. Newberg, "The Neuropsychology of Religious and Spiritual Experience," *Handbook of the Psychology of Religion and Spirituality*, ed. R. F. Paloutzian and C. L. Park (New York: Guilford P, 2005), 199-215.

² See, for example, Scott Atran, *In Gods We Trust: The Evolutionary Landscape of Religion* (New York: Oxford UP, 2002), and James Austin, *Zen-Brain Reflections: Reviewing Recent Developments in Meditation and States of Consciousness* (Cambridge, MA: MIT P, 2006).

³ D'Aquili and Newberg, *The Mystical Mind*, 188.

⁴ D'Aquili and Newberg, *The Mystical Mind* 110-12, 114.

⁵ See James Austin, *Zen and the Brain: Toward an Understanding of Meditation and Consciousness* (Cambridge, MA; London: MIT P, 1998); James Austin, "Consciousness Evolves When the Self Dissolves," *Journal of Consciousness Studies* 7 (2000): 209-30; James Austin, *Zen-Brain Reflections: Reviewing Recent Developments in Meditation and States of Consciousness* (Cambridge, MA: MIT P, 2006), and Rhawn Joseph, *Neuropsychology, Neuropsychiatry, and Behavioral Neurology* (New York: Plenum, 1990).

⁶ Rhawn, *Neuropsychology, Neuropsychiatry, and Behavioral Neurology*.

⁷ See Newberg and Iversen, "The Neural Basis of the Complex Mental Task of Meditation," 282-91; cf. Newberg and Newberg, "The Neuropsychology of Religious and Spiritual Experience," 199-215.

⁸ Newberg and Iversen, "The Neural Basis of the Complex Mental Task of Meditation," 285.

⁹ Newberg and Iversen, "The Neural Basis of the Complex Mental Task of Meditation," 285. See also Newberg et al., "The Measurement of Regional Cerebral Blood Flow during the Complex Cognitive Task of Meditation," 113-22.

¹⁰ Newberg and Iversen, "The Neural Basis of the Complex Mental Task of Meditation," 285-86. See also H. O. Karnath, S. Ferber, and M. Himmelbach, "Spatial Awareness is a Function of the Temporal Not the Posterior Parietal Lobe," *Nature* 411 (2001): 950-53.

¹¹ See James C. Lynch, "The Functional Organization of Posterior Parietal Association Cortex," *Behavioral and Brain Sciences* 3 (1980): 485-99, and M. A. Steinmetz et al., "Functional Properties of Parietal Visual Neurons: Radial Organization of Directionalities within the Visual Field," *Journal of Neuroscience* 7 (1987): 177-91.

¹² See Herzog, H. et al., "Changed Pattern of Regional Glucose Metabolism During Yoga Meditative Relaxation," *Neuropsychobiology* 23 (1990-1991): 182-87.

¹³ See Newberg et al., "The Measurement of Cerebral Blood Flow during the Complex Cognitive Task of Meditation Using HMPAO-SPECT Imaging," 95.

¹⁴ See Newberg et al., "The Measurement of Regional Cerebral Blood Flow during the Complex Cognitive Task of Meditation," 113-22.

¹⁵ See M. Beauregard and V. Paquette, "Neural Correlates of a Mystical Experience in Carmelite Nuns," *Neuroscience Letters* 405 (2006): 186-90.

¹⁶ See M. A. Persinger, *Neuropsychological Bases of God Beliefs* (New York, NY: Praeger, 1987); M. A. Persinger, "Increased Geomagnetic Activity and the Occurrence of Bereavement Hallucinations: Evidence for Melatonin-Mediated Microseizuring in the Temporal Lobe?" *Neuroscience Letters* 88 (1988): 271-74; M. A. Persinger, "The UFO Experience: A Normal Correlate of Human Brain Function," *UFOs and Abductions: Challenging the Borders of Knowledge*, ed. D. M. Jacobs (Lawrence, KS: U of Kansas P, 2000) 262-302) and M. A. Persinger, "The Neuropsychiatry of Paranormal Experiences," *Neuropsychiatric Practice and Opinion* 13 (2001): 515-24). For a critique of Persinger, see James Austin, *Zen-Brain Reflections*.

¹⁷ See Ralph Hood, Jr., "The Mystical Self: Lost and Found," *The International Journal for the Psychology of Religion* 12 (2002): 1-14.

¹⁸ D'Aquili and Newberg's arguments concerning AUB can be found in their *The Mystical Mind*.

¹⁹ D'Aquili and Newberg, *The Mystical Mind*, 191.

²⁰ D'Aquili and Newberg, *The Mystical Mind*, 193.

²¹ Ludwig Wittgenstein, *Tractatus Logico-Philosophicus* (1921), trans. D. F. Pears and B. F. McGuinness (New York: Routledge, 1997) 74.

²² See *The Mystical Mind* for d'Aquili and Newberg's original model of mystical experiences.

²³ See Newberg and Iversen's "The Neural Basis of the Complex Mental Task of Meditation: Neurotransmitter and Neurochemical Considerations," 282-91.

Bibliography

Atran, Scott. *In Gods We Trust: The Evolutionary Landscape of Religion*. New York: Oxford UP, 2002.

Austin, James. *Zen and the Brain: Toward an Understanding of Meditation and Consciousness*. Cambridge, MA; London: MIT P, 1998.

Austin, James. "Consciousness Evolves When the Self Dissolves." *Journal of Consciousness Studies* 7 (2000): 209-30.

Austin, James. *Zen-Brain Reflections: Reviewing Recent Developments in Meditation and States of Consciousness*. Cambridge, MA: MIT P, 2006.

Beauregard, M., and V. Paquette. "Neural Correlates of a Mystical Experience in Carmelite Nuns." *Neuroscience Letters* 405 (2006): 186-90.

D'Aquili, Eugene. "The Sense of Reality in Science and Religion: A Neuroepistemological Perspective." *Zygon* 17 (1982): 361-84.

D'Aquili, Eugene, and Charles Laughlin. "The Biopsychological Determinants of Religious Ritual Behavior." *Zygon* 10 (1975): 32-58.

D'Aquili, Eugene, and Andrew B. Newberg. "Religious and Mystical States: A Neuropsychological Substrate." *Zygon* 28 (1993): 177-200.

D'Aquili, Eugene, and Andrew B. Newberg. "The Neuropsychological Basis of Religions, or Why God Won't Go Away." *Zygon* 33 (1998): 187-201.

-
- D'Aquili, Eugene, and Andrew B. Newberg. *The Mystical Mind: Probing the Biology of Religious Experience*. Minneapolis: Fortress P, 1999.
- D'Aquili, Eugene, and Andrew B. Newberg. "The Neuropsychology of Aesthetic, Spiritual, and Mystical States." *Zygon* 35 (2000): 39-52.
- Herzog, H. et al. "Changed Pattern of Regional Glucose Metabolism During Yoga Meditative Relaxation." *Neuropsychobiology* 23 (1990-1991): 182-87.
- Hood, Ralph, Jr. "The Mystical Self: Lost and Found." *The International Journal for the Psychology of Religion* 12 (2002): 1-14.
- Joseph, Rhawn. *Neuropsychology, Neuropsychiatry, and Behavioral Neurology*. New York, NY: Plenum, 1990.
- Karnath, H. O., S. Ferber, and M. Himmelbach. "Spatial Awareness is a Function of the Temporal Not the Posterior Parietal Lobe." *Nature* 411 (2001): 950-53.
- Lynch, James C. "The Functional Organization of Posterior Parietal Association Cortex." *Behavioral and Brain Sciences* 3 (1980): 485-99.
- Newberg, Andrew B. "Putting the Mystical Mind Together." *Zygon* 36 (2001): 501-7.
- Newberg, Andrew B., and Eugene d'Aquili. "The Neuropsychology of Religious and Spiritual Experience." *Journal of Consciousness Studies* 7 (2000): 251-66.
- Newberg, Andrew B., Eugene d'Aquili, and Vince Rause. *Why God Won't Go Away: Brain Science and the Biology of Belief*. Rev. ed. New York: Ballantine Books, 2002.
- Newberg, Andrew B., A. Alavi, M. Baime, P. D. Mozley, and E. G. d'Aquili. "The Measurement of Cerebral Blood Flow during the Complex Cognitive Task of Meditation Using HMPAO-SPECT Imaging." *Journal of Nuclear Medicine* 38 (1997): 95.

-
- Newberg, Andrew B., A. Alavi, M. Baime, M. Pourdehnad, and E. G. d'Aquili. "The Measurement of Regional Cerebral Blood Flow during the Complex Cognitive Task of Meditation: A Preliminary SPECT Study." *Psychiatry Research* 106 (2001): 113-22.
- Newberg, Andrew B., and J. Iversen. "The Neural Basis of the Complex Mental Task of Meditation: Neurotransmitter and Neurochemical Considerations." *Medical Hypotheses* 61 (2003): 282-91.
- Newberg, Andrew B., and S. K. Newberg. "The Neuropsychology of Religious and Spiritual Experience." *Handbook of the Psychology of Religion and Spirituality*. Ed. R. F. Paloutzian and C. L. Park. New York: Guilford P, 2005. 199-215.
- Persinger, M. A. *Neuropsychological Bases of God Beliefs*. New York: Praeger, 1987.
- Persinger, M. A. "Increased Geomagnetic Activity and the Occurrence of Bereavement Hallucinations: Evidence for Melatonin-Mediated Microseizuring in the Temporal Lobe?" *Neuroscience Letters* 88 (1988): 271-74.
- Persinger, M. A. "The UFO Experience: A Normal Correlate of Human Brain Function." *UFOs and Abductions: Challenging the Borders of Knowledge*. Ed. D. M. Jacobs. Lawrence, KS: U of Kansas P, 2000. 262-302.
- Persinger, M. A. "The Neuropsychiatry of Paranormal Experiences." *Neuropsychiatric Practice and Opinion* 13 (2001): 515-524.
- Rhawn, Joseph. *Neuropsychology, Neuropsychiatry, and Behavioral Neurology*. New York: Plenum, 1990.
- Steinmetz, M. A. et al. "Functional Properties of Parietal Visual Neurons: Radial Organization of Directionalities within the Visual Field." *Journal of Neuroscience* 7 (1987): 177-191.
- Wittgenstein, Ludwig. *Tractatus Logico-Philosophicus*. 1921. Trans. D. F. Pears and B. F. McGuinness. New York: Routledge, 1997.