



## Neuro Wine In Old Vessels: A Critique Of D'Aquili And Newberg

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#### *1. Abstract*

The work of Eugene d'Aquili and Andrew Newberg has enhanced the study of human spirituality by showing how myth, ritual, morality, theology, and mysticism have all been shaped by neurological and evolutionary factors. However, a systematic inspection of their position suggests that the authors' neuropsychology and neurotheology rely heavily on traditional

philosophical underpinnings which are neither scientific nor theoretically adequate. Their mind/body position, a hybrid of dual aspect and epiphenomenalist theories, fails to do justice to human mentality, individuality, and freedom, while their epistemology, a neurological Kantianism, does the same with subjects, objects, causality, and time. Process philosophy provides in many respects a more plausible, naturalistic way to harmonize brain science and evolution with human spirituality, as well as to re-interpret the alleged loss of time, space and self in mystical states.

## 2. *Keywords*

d'Aquili; brain science; deafferentation; dual aspect theory; epiphenomenalism; Hartshorne; mind; mysticism; neuropsychology; neurotheology; Newberg; panexperientialism; Popper; process philosophy; spirituality; Whitehead.

### *Part One: A General Overview and Critique of D'Aquili and Newberg's Neuropsychology and Neurotheology<sup>1</sup>*

#### 1. *Introduction*

Psychiatrist/anthropologist Eugene d'Aquili, M.D., and radiologist Andrew Newberg, M.D., have published a series of articles in recent years on the scientific dimension of human spirituality. Relying on a mix of brain science, evolutionary theory, spirituality studies and philosophical analysis, the authors have contributed significantly to the fledging fields of neurotheology and neuropsychology. Their collaboration has culminated in the publication of *The Mystical Mind: Probing the Biology of Religious Experience* and *Why God Won't Go Away: Brain Science and the Biology of Belief*. As a novel analysis of key issues in theology and psychology, the pioneering work of d'Aquili and Newberg is an important test case for assessing the adequacy of a neurological approach to those fields.

While applauding the authors' originality, I find their work problematic in at least three respects. First, although they marshal scientific data in new and intriguing ways, the authors interpret their data through well-entrenched philosophical doctrines with equally well-entrenched flaws. Despite studying spirituality through the latest brain imaging techniques, d'Aquili and Newberg rely heavily on modernist philosophical psychology and classical Eastern and Western theology. While I reject the view that newer is always better, my own acceptance of a certain brand of

process philosophy leads me to see the authors' theoretical assumptions as archaic. However, I shall argue that whether or not one accepts the views of Alfred North Whitehead or Charles Hartshorne, one should grant that the authors' traditionalist assumptions lead them to taint the new wine of neurology by pouring it into tarnished old vessels of ancient and modern metaphysics. Second, because their traditionalist depiction of the human mind in particular greatly diminishes the mind's significance, the authors reaffirm mystics' own interpretation of mystical experience as involving the complete disappearance of time, space and the self. I will argue that there are good reasons to doubt that interpretation. Third, because I accept Karl Popper's criterion of demarcation between scientific and metaphysical claims in terms of the empirical falsifiability of the former, I am concerned that work such as the authors' will be construed as scientific *in toto* even though many of its conclusions are inherently non-empirical. While this Popperian theme will be a subsidiary one here, I will argue in passing that it is impossible in principle for the authors' scientific data to provide decisive evidence on many of the issues they address. In response to Michael L. Spezio's complaint (479) that the authors' first book neglected much current neuroscientific research, Newberg himself recently acknowledged that "some of the 'big' questions regarding theology, epistemology, and phenomenology are in many ways immune to the advances of the neurosciences" (Newberg, "Putting" 504). But if so, it remains to be explained how those questions do in any way hinge on neuroscientific discoveries.

Assessing d'Aquili and Newberg's work is complicated by the fact that the former author had previously defended on his own or in conjunction with Charles D. Laughlin, Jr. and John McManus a position termed biogenetic structuralism that expanded structuralist concerns to include neurological, genetic and evolutionary data. Moreover, after d'Aquili's death in 1999, Newberg has collaborated with freelance author Vince Rause in the writing of *Why God Won't Go Away*. While it is not my intent here to critique views of those other authors, I will occasionally cite passages from d'Aquili's early writings—as Newberg and Rause do—which support (or conflict) with his later positions.

In examining those positions, the two remaining sections of Part One of this article summarize the authors' system and focus critically on their views regarding the human mind, individuality, and freedom in everyday, baseline reality, which set the stage for their interpretation of mystical

experience. I limit myself in Part One to criticisms that do not assume any commitment to process philosophy. In Part Two, I re-visit some of those issues from the perspective of process philosophy and its position on the mind/body problem, known recently by the daunting, though accurate, label of panexperientialism. The first two sections of Part Two provide an overview of panexperientialism and of its advantages over the authors' account of the human mind in baseline reality. The final section of Part Two criticizes their position on time, space, self and deity in the context of the ultimate mystical state, Absolute Unitary Being, concluding with some comments about the limited value of the neuroscientific approach to these issues.

## *2. An Overview of D'Aquili and Newberg's Neuropsychology and Neurotheology*

A key point at which to begin describing the authors' position is their depiction of the relation of the body, and particularly the brain, to the mind. In his early writings, d'Aquili had accepted a version of materialism which insisted that "there exists no reality intervening between the central nervous system and the environment" (*Biogenetic* 11) and that mind is merely an abstraction from the behavior those two realities generate. As late as 1983, d'Aquili seemed to equate neural and mental events while conjecturing that "time may have no ontological reality outside the neural events which constitute the perception of it" ("Myth-Ritual" 252). Both authors in fact began their project with the assumption that "nothing can be more real than the material universe within which all real things are contained" (d'Aquili, Newberg & Rause, *Why* 140). Eventually, however, they came to hold that the subjective awareness apparent to common sense could not be adequately explained either by materialism or by a dualism which depicts mind as somehow lifting off the material base that generates it. Though not fully satisfied with any solution to the mind/brain problem, d'Aquili and Newberg came to favor a position usually known as the dual aspect theory, according to which, "'mind' and 'brain' are two views of the same reality—mind is how the brain experiences its own functioning, and brain provides the structure of mind . . . they are two ways of describing the same thing" (*Why* 183, note 29). As this and other passages indicate, there are several ways in which the authors seem to contrast the two aspects of the mind/brain. One sort of contrast is based on differences of perspective in that mind is somehow

known from the inside or as a subject, while brain is known only from the outside or as an object of sense perception. A second sort of contrast involves differences of role, insofar as mind is identified with function and brain with structure. A third sort of contrast consists in differences in causal efficacy, for “the mind cannot exist without the brain, and the brain cannot exist without striving to create the mind” (*Why* 33). Every item of human experience must be produced by the brain, for the mind by itself has no ability to create or influence its own states or those of the brain. By this third sort of contrast, d’Aquili and Newberg are grafting onto their dual aspect theory the epiphenomenalist doctrine that mind is a totally inert by-product of the body (d’Aquili & Newberg, *Mystical* 185; d’Aquili, Newberg & Rause, *Why* 33-34; d’Aquili & Newberg, “Consciousness” 244-45).

Given this understanding of the mind and brain, the remainder of the authors’ views can be summarized largely by reference to their account of the partial localization of brain function. That is, every cognitive or organic activity of a human being resides somehow in some areas of the brain. The localization is only partial because every area of the brain is richly interconnected in structure and function with every other one and with other parts of the body. As an example of brain function localization, the human concept of space is generated primarily by what the authors term the orientation association area of the brain, composed of the posterior superior parietal lobe and areas providing sensory, motor and other data (d’Aquili & Newberg, *Mystical* 33-34). With regard to spiritual matters, the authors recognize two ways in which certain brain areas are specially involved, corresponding roughly to non-cognitive and cognitive areas of experience.

The partial localization of brain function involving non-cognitive matters occurs through a process called deafferentation, in which there is blockage of neuronal input to certain brain areas from other brain areas and from sensory (afferent) neurons throughout the body. Deafferentation can occur by physical interruption, as when a brain tumor blocks transmission of impulses between the hemispheres or when surgery is used to block that transmission for prevention of general epileptic seizure; it can also occur functionally when impulses from inhibitory nerve fibers block messages between neural structures (d’Aquili & Newberg, *Mystical* 41-42). Functional deafferentation can proceed either in bottom-up fashion, starting with the autonomic nervous system that regulates basic

bodily processes and moving upward to affect higher functional areas of the brain, or else in top-down fashion, starting with human intentions expressed in those higher brain areas and moving downward to the autonomic nervous system (d'Aquili & Newberg, *Mystical* 23-27, 99-101; d'Aquili, Newberg & Rause, *Why* 38-42, 117-23). In behavioral terms, bottom-up and top-down approaches correspond with such spiritual practices as ritual and meditation, respectively. The efficacy of ritual has been shown to derive from its rhythmic, repetitive character, whether the ritualistic dancing, chanting, prayer or other activities are slow and deliberate or fast and wild. Milder forms of ritual activate that part of the autonomic nervous system known as the parasympathetic system, which maintains homeostasis and conserves bodily energy, while wilder forms activate the sympathetic system, which constitutes the body's fight-or-flight system in response to extreme environmental stimuli. Those two components of the autonomic nervous system typically act in opposition to each other, with the quiescent activation of the former inversely related to the arousal activation of the latter; sometimes, however, when one of them becomes maximally activated, there is a sudden spillover effect or maximal activation of the other, often yielding remarkable states of consciousness. Ritual-based deafferentation has the advantages that it can be sustained with at least moderate intensity for long periods of time and can be achieved jointly by a group of people, thereby increasing group harmony. However, in its more intense, longer-lasting, less body-dependent form, deafferentation often needs to be achieved through formal meditation techniques that facilitate hyperlucid states of consciousness through the top-down approach. The techniques may be passive insofar as the volitional area of the brain tries merely to clear all thoughts from the mind or active insofar as that area sustains the mind's attention on a single object, but the eventual outcome either way is an unusually restful or aroused state of mind.

The authors recognize not just ritual and meditation but a whole continuum of spiritual phenomena, varying in terms of how much unity the individual feels with his or her surroundings, and ranging from simple, everyday aesthetic feelings to near-death-experiences, apparent encounters with God, and the seeming absorption of the self in Absolute Unitary Being or AUB (*Mystical* 96-98; *Why* 115-16). As the ultimate mystical experience, AUB is unique in involving total deafferentation of the relevant brain areas in ways that involve their "absolute functioning" (*Mystical* 166)

or continued activity in an isolated, self-directed manner. For instance, consider the role of the orientation association area in such a state.

If this structure is totally deafferented so that it receives no input from the outside world, then it cannot form a sense of space and time abstracted from sensory input. It is still trying, however, to generate an orientation in space and time. It is still working by its internal logic. It continues to attempt to generate a sense of space and time even without input from the external world to work on. The result is a sense of no space and no time, or conversely, it might be described as infinite space and infinite time. No matter how it is defined, it is the same sensation. The worldly mystical literature is replete with experiences of no space and no time or infinite space and infinite time. Therefore, it appears that total or near-total deafferentation of the orientation association area may be involved in the generation of such mystical states. (*Mystical* 42)

While AUB cannot be generated on command, the authors devised experiments using SPECT (single photon emission computed tomography) brain imaging equipment to study the brain states of Buddhist monks in meditation and Franciscan nuns in prayer. A radioactive tracer was injected into the subjects' blood streams at their self-identified moments of peak spiritual intensity to see whether such spiritual exercises yield changes in cerebral blood flow that could signify regional changes in brain function. The authors were able to corroborate their hypothesis that during spiritual activities the orientation association area undergoes decreased activity—suggestive of deafferentation—while other areas, associated with attention, undergo increased activity (d'Aquili & Newberg, *Mystical* 188-219; Newberg, Alavi, et al, "Measurement" 95P; Newberg, Alavi, et al, "Cerebral" 1104).

Along with the extreme transformations of time and space, AUB embodies so much unity that the human being involved seems to lose the sense of being an independent self or feels absorbed into his or her surroundings. In epistemological terms, subject-object differentiation seems to vanish, even though experiencing continues. Fortunately, the emotions involved with loss of personal identity in AUB are almost never unpleasant but rather either positive or neutral, whereby AUB is experienced as the God of theistic religions or the Void of non-theistic ones, respectively.

While deafferentation is crucial for mystical states, d'Aquili and Newberg recognize a second, more cognitive sort of brain function localization

involving spirituality. Human cognition in baseline conditions is driven by a cognitive imperative or irresistible urge the brain has to know the world (*Mystical* 50-57, 163-66, 196-98; *Why* 46-53, 60-66, 190-91 note 8). That drive is manifested most clearly in cognitive operators or basic functions of brain structures which organize sense-perceptions, thoughts and emotions analogously to the way in which the multiplication sign and other mathematical operators organize numbers. For example, the inferior parietal lobe of the dominant hemisphere is the brain locus for the abstract operator, which allows the derivation of general concepts—such as brown or cow—from diverse sensory input, and also for the binary operator, which organizes those abstractions into contraries, such as up/down or good/evil. Some cognitive operators are vital for human spirituality. For example, the causal operator routinely leads us to interpret the items abstracted from sense perception as organized into sequences of causes and effects and to assign a cause tentatively even when none is experienced directly as the sequence origin (*Mystical* 171); when certain brain structures focus attention on the source of the world as a whole, the causal operator gives rise to popular myths about gods and to philosophical arguments about a first or uncaused divine cause of the world (*Mystical* 150-52, 170-72; *Why* 63-76). Myths also rely heavily on the binary operator by always incorporating into foundational tribal stories a conflict between contrary elements, such as good/evil or Heaven/Hell, that is eventually resolved in a way which reassures and unifies tribal members. In that manner, myths provide a network of beliefs that contribute to the creation of formalized religions and add a crucial element of explanatory coherence to spiritual experiences derived from deafferentation.

The two modes of brain function localization for spirituality suggest to d'Aquili and Newberg how neurology could be the basis of a metatheology and a megatheology (*Mystical* 177, 195-203). The former would have no theological content of its own but would lay out the most abstract, formal principles of how a theology must be structured. The latter would summarize the contents of actual theologies of the world's major religions, showing how a new concrete theology could combine their universal features, minus their idiosyncrasies. In proposing their own metatheology, the authors claim that their account of the cognitive imperative and cognitive operators provides the necessary explanation of why myths and theologies are created, while their deafferentation account explains the incorporation of those myths and theologies into vital ceremonial rituals.

As for their own megatheology, at least in *The Mystical Mind*, the authors speculate that their deafferentation-based interpretation of AUB provides a neurotheological explanation of that most intense spiritual phenomenon, in both its non-personal and theistic forms.

One wonders whether it would be helpful in constructing a megatheology to see void consciousness as the anterior nature of God and to see AUB suffused with positive affect or bliss as the posterior nature of God. The anterior nature of God would represent a total and infinite conscious potentiality, as counterintuitive as the juxtaposition of the notions of consciousness and potentiality may be. The posterior nature of God might be seen as the total actuality. Thus... the concepts of an anterior and a posterior nature of God... have the virtue of being able to unite God seekers and void consciousness seekers in one subordinate conceptual framework. (201)

While providing a potential means of harmonizing diverse religious traditions, the authors' megatheology leaves open the crucial question of whether the human brain merely produces God as it produces everything we experience in baseline reality or else acquaints us somehow with a reality independent of itself. D'Aquili and Newberg insist that spiritual experiences are real—"at least internally real" (*Why* 174, note 5)—in the sense of using brain regions analogously to how they are used in baseline experience. But are they real in a fuller sense of that term?

According to the authors, that question presents us with an irresolvable dilemma. We could assume, along with scientists and many Westerners, that what is fundamentally real is the material order, including the human brain through which it is known; that starting point leads to the conclusion that AUB and other mystical phenomena are simply products of the human brain, though certainly no less real than the physical phenomena we perceive in baseline reality. On that horn of the dilemma, anything independent of the human brain either in baseline reality or in hyperlucid states is in principle unknowable. On the other hand, we could assume with most Easterners that subjective awareness is primary and conclude that a strict phenomenological analysis will show mystical states to be more real than baseline reality by the only available standard, that they simply feel more real to those who have them. Reliance on such a standard may seem non-scientific in some respects, and indeed, recent comments by Newberg underscore the extent to which the authors' intellectual journey has taken them from quasi-materialistic roots to a faith that is "beyond reductionism, beyond determinism, and possibly even beyond science"

("Putting" 505). But the authors insist that such a standard still allows for crucial distinctions to be drawn between mysticism and insanity. People suffering from delusions and hallucinations may find those states while they occur to be more real than everyday experience, but mystics consider their hyperlucid states more real even after returning to baseline, real enough to bring tranquility to their lives.

In *The Mystical Mind*, the authors see no way to resolve the dilemma over the primacy of matter and mind. However, they seem to conclude that our inability to determine which horn should be accepted grants a certain correctness to both and provides a basis for accepting the Higher God of AUB under both, either as a product of the brain or as the producer of subjects and objects. "Since it is in principle impossible to determine which starting point is more 'fundamental,' external reality or the awareness of the knower, one is forced to conclude that both conclusions about God (AUB) are in a profound and fundamental sense true---namely, that God is created by the world (the brain and the rest of the central nervous system) and that the world is created by God" (193). In *Why God Won't Go Away*, the authors seem more content to dissolve or downplay the dilemma by placing more emphasis on the extent to which both science and theology rest on metaphor (157-73). As for the former field and the sense perception it is based on,

The best that science can give us is a metaphorical picture of what's real, and while that picture may make sense, it isn't necessarily true. In this case, science is a type of mythology, a collection of explanatory stories that resolve the mysteries of existence and help us cope with the challenges of life. . . . The human mind is incapable of purely objective observations. . . . There's no way we can slip free of the brain's subjectivity to see what's really out there. All knowledge, then, is metaphorical; even our most basic sensory perceptions of the world around us can be thought of as an explanatory story created by the brain. (170-71)

On this understanding, the pretense that science is the final arbiter of what is real by its reliance on purely objective, quantitative measurements can be dropped in a way that removes any inherent incompatibility it has with theology. At the same time, recognition can be given to the prominence of metaphor in theology. While still acknowledging that AUB can be experienced in both personal and nonpersonal ways, the authors conclude that the former should be considered metaphorical or that attempts to

characterize AUB as a personal deity simply prop up a weak symbol in place of an unknowable reality. In fact, the authors claim that insistence on the personal nature of God is often just a reflection and reinforcement of a dangerous egotism at the human level, which neurotheology shows to be quite misguided when the distinct human self dissolves in AUB. While aware that placing greater emphasis on the non-personal deity may be hard for Westerners to accept, the authors consider that emphasis to be sanctioned by brain science. "The realness of Absolute Unitary Being is not conclusive proof that a higher God exists, but it makes a strong case that there is more to human existence than sheer material existence" (*Why* 173). This line of thought culminates in the conclusion that AUB is the ultimate reality, which transcends, precedes and creates all subjectivity and objectivity (198, note 9). By recognizing metaphor at the heart of science and theology and shifting theological focus to the Higher God of AUB, the authors hope to have softened both horns of the dilemma and to have reaffirmed that neurotheology can harmonize religions with each other and with science.

### *3. A Critique of D'Aquili and Newberg's Neuropsychology*

Before addressing the authors' views on individuality and freedom, I will focus on the most troublesome part of their account of baseline reality, its unusual blend of dual aspect and epiphenomenalist positions on the mind/body problem. While d'Aquili and Newberg should be commended for avoiding the widely discredited positions of dualism and materialism, their own hybrid doctrine is equally problematic. Historically, the dual aspect theory was put forth by Baruch Spinoza as a way to avoid having to explain how interaction could occur between such radically dissimilar entities as Cartesian minds and bodies. The avoidance was achieved by denying that the mental and physical actually interact with each other, on the ground that they are simply distinct, though correlated, attributes of one all-encompassing substance. While d'Aquili and Newberg are not obliged to explain the influence of a Cartesian body on a Cartesian mind, they do affirm a sharp distinction between brain and mind as something evident to common sense and do hold that the former somehow produces the latter. As a result, the authors are obliged to address Spinoza's concern with regard to the intelligibility of at least the one-way action of brain on mind. Interestingly, they themselves seem to acknowledge that the precise nature of the mind/brain relationship remains mysterious on

their terms. "The inexplicable unity of the biological brain and its ethereal phenomenon of mind is the first aspect of what we have defined as the mind's mystical potential" (*Why* 34).

But in addition to explaining how matter could influence mind, the authors must explain how one aspect of an entity could affect a second, apparently simultaneous aspect of that entity. At least on the difference-in-perspective sense of the author's dual aspect theory, whereby a mental state is just a brain state felt from the inside, the simplest way to view that is for the two to be simultaneous. But how could either aspect affect the other if they become definite at the same moment? The fact that the authors never explicitly affirm simultaneous brain-mind causality may indicate that, like Spinoza, they recognize its unintelligibility. But even if such causality were possible, would it not be arbitrary to identify one brain/mind aspect as cause and its simultaneous other aspect as effect? To avoid these problems, the authors might recognize a time-lag of a split-second between a brain state and its corresponding mental state. But that implies the absurdity that someone dying could have a final brain state whose mental flip-side was prevented by death from ever accompanying it. Besides, while function might follow structure and effects follow causes, would it not be implausible to affirm a time lag between distinct but correlated perspectives on a single entity? If truly distinct temporally and ontologically, then how correlated? And even if such a time lag were plausible, why would the knowing of an entity from the inside be later rather than earlier than the knowing of the entity from the outside?

Aside from the preceding difficulties, the authors' dual aspect theory faces a major problem in its difference-in-roles version. D'Aquili and Newberg contrast the brain as structural element with mind as functional element but also at times, as in the passage quoted above, with mind as experience of the functional element. But these are clearly distinct, incompatible assertions. Both cannot be intended without leading to an infinite regress in which the mind would be the functioning of the brain, the experience of the functioning of the brain, the experience of the experience of the functioning of the brain, and so on. But if both assertions are not intended, then which one is? Should we interpret brain functioning as merely electrochemical processes occurring inside the skull or else as experiences resulting from them? If the former is meant, then mind seems reduced to the brain, but if the latter is meant, then mind seems so separate from the brain that the original problem of understanding

their relationship reappears. Hence depending on how one interprets the structure/function dichotomy here, one seems left either with a troubling infinite regress or a suppressed form of materialism or dualism.

Furthermore, the authors' dual aspect doctrine is problematic in affirming a correspondence between one aspect driven solely by laws of nature and a second led by logical or at least cognitive/emotive factors. How does such an amazing correspondence come about? Do the laws of nature creating and directing the brain just happen by pure luck to involve mental aspects which can manifest the intellectual virtues of truthfulness and rationality? The authors indirectly address that issue by acknowledging, at least on the hypothesis that matter has priority over mind, that some isomorphism must exist between those two domains for evolutionary reasons. But they concede that the degree of isomorphism may only be enough to bestow survival advantage on human beings, not enough to support a decisive role for truth.

What degree of isomorphism is required for an individual organism to adapt to its environment? The answer simply is not known. Perhaps only a mild to moderate degree. . . . Assuming that subjective awareness evolves from matter can lead only to an epistemological inference of adaptiveness, never to truth. If the traditional definition of truth as the *adaequatio intellectus ad rem* is taken at all seriously, then truth can be at best an approximation, perhaps a weak one at that. ("Consciousness" 246)

These views involve severe problems, including the following paradox. If the authors' theory is true, then on the priority of matter hypothesis, they can never infer or know its truth but only its adaptiveness. But if truth can never be known, then they cannot know it to be true that their theory is even adaptive. But if they cannot know their theory to be adaptive, then it is false for them to say that they can infer or know its adaptive character. In short, if their theory is true, then it is false. But even aside from this paradox, if the opening premise were somehow true that we can know only the adaptive quality, not the truth, of theories, then the authors could not consistently or rationally try to persuade us of the truth of their position. At best they could defend only the dubious claim that by accepting their views, we would be increasing the likelihood of our surviving long enough to procreate. To an aging Irish bachelor, this is hardly the stuff of reassurance.

But there are other troubling aspects of their position. The laws of

physics are often regarded as more basic than the laws of biology, and the authors' acceptance of that view is suggested by their characterization of the physicists Einstein and Schrödinger as "two great thinkers who have perhaps understood the nature of scientific reality most clearly" (*Why* 153). If so, that would imply that our mental states derive ultimately from what are traditionally considered blind, purposeless forces described by the laws of physics. But then no rational warrant would remain for any argumentation, since all thoughts would be mere epiphenomena of gravity, nuclear forces, and electromagnetism. Insofar as physical forces would convey their putative purposelessness to biology, arguing with the inert byproducts of blind neurological processes—though "arguably" a physical compulsion—would be no more reasonable than arguing with the inert byproducts of blind gastrointestinal or pulmonary processes. Why then argue with someone's ideas but not with their excretions or bad breath? Of course, the authors may evade such questions and salvage a more robust notion of truth insofar as they forsake the materialist hypothesis for belief in the ultimacy of AUB as a source of matter and mind; however, their stance on the mind/body problem would then be shifting to something like the occasionalism of Malebranche or the pre-established harmony of Leibniz, in which the correspondence of mental and physical states would be ensured not by mind/body interaction but by divine arrangement, operating from moment-to-moment or from the start of cosmic history, respectively. But by retaining the Spinozist denial of causality between mind and body, those post-Cartesian positions would conflict with the authors' belief in the brain's creation of the mind.

Along with the foregoing mind/body problems, d'Aquili and Newberg's account faces serious difficulties regarding individuality. The main problem is that awareness has unity which finds no clear counterpart in brain anatomy or physiology. At least up to the point of personal disintegration in split-brain or multiple personality cases, a human being seems to a considerable extent a unified center of experience or genuine individual, both within a moment and from one moment to the next; however, as the authors stress, brain states involve an amazingly complex, continually shifting multitude of neuronal and hormonal events. How then could the felt unity of human experience be the flip-side of such a multitude? The question pertains both to the brain as a whole and to the many brain areas cited by the authors as centers of activity that explain human thought and behavior. What is it to be an individual in the neurologist's universe?

What is it about the hippocampus, the attention association area or the entire brain that would make any one of them a full-fledged individual entity to which activity could be attributed? The mere spatial proximity of their components is an inadequate basis for individuality, since neurons can be spatially close for years to bone, flesh and hair without them all constituting a unit in any obvious sense. Always acting in an apparently coordinated or mutually adjusted manner seems a much more telling sign of individuality, but what exactly is coordinated action in this instance? Do neurons need to fire together in a facilitative or inhibitory manner? to emit or receive neurotransmitters? to have the capacity for absolute functioning following total deafferentation? to exercise that capacity? If at least one of those criteria—say, the first—has to be met before various neurons can constitute a unit, does that mean that non-firing neurons adjacent to them are not a part of that unit of which some experience is the flip-side? If so and the idle neurons do fire a moment later along with the others, does that then make them all into a new unit at that moment with a new corresponding mental state? Since the authors attribute agency to many brain structures that often act simultaneously, must there not be multiple minds or sub-minds constituting their flip-sides? If so, then what grounds are left for attributing individuality, even for a moment, to a human being? Or if a human being is indeed an individual, then who or what coordinates the agencies of the multiple brain structures to yield a single corresponding mental state, since those structures have no presiding officer among them and the mind has no power of its own?

These are not the only serious questions facing the authors on individuality. In an early work, d'Aquili and his co-authors had criticized what they saw as a common tendency in social science to commit the fallacy of emergence. That tendency consists in attributing properties of some level of systemic organization to a lower level of systemic organization, and their illustration of the fallacy directly concerns the mind/body issue.

“For example, if one deludes oneself into believing that the elements and organization of thought can be reduced to the reflexive, neuronal, or similar elementary unit, one is more likely to fall into the trap of trying to reconstruct thought from only that element and to ignore competing approaches” (d'Aquili, Laughlin & McManus, eds., *Spectrum* 344). Despite d'Aquili's early sensitivity to the emergence fallacy, he and Newberg appear to commit it systematically by attributing characteristics of the human mind to portions of the central nervous system. Consider, for

example, their description of the amygdala, “the ancient limbic watchdog that monitors all incoming sensory information for signs of danger and opportunity” (*Why* 67). The authors describe the amygdala as registering even the significance of an unusual bow as a sign of ritualistic or other exceptional behavior, for “the amygdala performs environmental surveillance and can direct attention toward something of interest in the environment” (*Mystical* 100-101; *Why* 88). But is this not excessively loose, metaphorical speech when the authors say that a network of neurons “monitors” or “performs surveillance” for “something of interest” in the environment? Science and introspection would seem to sanction only a more literal statement to the effect that “when a human being’s circumstances are dangerous or promising, the nerve cells of the amygdala convey impulses and emit chemicals in characteristic ways that are often followed by analogous events in other parts of the central nervous system and accompanied by emotions, thoughts and actions appropriate to the situation.” Literally ascribing to neurons such abilities as monitoring for or detecting items of human interest constitutes a case of the emergence fallacy, even if scientists make a habit of it. The often overlooked reason is simple. Neurons are morons. For all our experience shows, they are nothing but tiny electrochemical worms which lack even the slightest ability to assess situations in a conscious, let alone cognitive, manner. The fact that even human beings, after decades of maturation and socialization, are still often oblivious to social dangers and opportunities underscores how absurd it is to attribute to a neuron or set of neurons the ability to assess the significance of events outside the body.

It is surprising that d’Aquili in particular would make such attributions. His early writings had been criticized for “blurring the distinction between cells, organs, and organisms” (Holmes 210) and for depicting neurons in panpsychist fashion as consciously learning how to maximize their ionic outflow and hence their pleasure, thereby setting up reverberating neuronal circuits as a basis for AUB (Holmes 207-10). In the ironic words of critic H. Rodney Holmes, “What began as panpsychism (mind in everything) has become panentheism (God in everything). Having placed mind squarely within the neuron (panpsychism), d’Aquili and his coauthors must also conclude by the same line of reasoning that individual nerve cells have mystical experience of oneness with God. It may very well be that their mysticism overlaps best with Whiteheadian metaphysics, but that is a very different system of justification from

positivistic natural science.” (210) D’Aquili responded that it is more a philosophical than a scientific question as to what constitutes an organism, since it is obvious that some one-celled entities are organisms but not so obvious whether some multi-cellular entities are (“Apologia” 264). More importantly, he claimed that his attribution of higher level characteristics to neurons was meant only in an analogical sense. “The use of the words *pleasure* and *pain* with reference to neuronal behavior is clearly an analogy to higher order structures such as the entire brain. Analogical meaning is not literal meaning. We do not believe that neurons are happy or sad little creatures that consciously formulate goals and try to attain them. Such a position would indeed be both panpsychistic and absurd.” (“Apologia” 262) While analogical language seems quite appropriate in this context, d’Aquili’s response renders his analogy fatally obscure. The author denies quite plausibly that neurons have consciousness but also that they can feel emotions or make an effort, apparently on the common intellectualist assumption that those abilities require consciousness. But once that assumption is made, what is left positively of the analogy? Without the recognition of some simple, primitive aesthetic feeling and striving in neurons, what remains as the analogy’s fourth term? How is neuronal “excitation,” in the sense of increased membrane permeability to ion exchange (d’Aquili, Laughlin & McManus, *Brain* 37-38), at all similar to the higher level experience of pleasure? And if the similarity is zero, why bother declaring that “living *cells*, not some vague sort of inorganic microchips, are interacting to form neuronal systems within the organism” (d’Aquili, Laughlin & McManus, *Brain* 42)? And finally, why does d’Aquili cite the entire brain as the higher level structure in the analogy? Is it not a human being who literally feels pleasure and pain? It seems then that d’Aquili, on his own and with Newberg, wavers on the issue of individuality between committing the fallacy of emergence and lapsing into obscurity.

The same fallacy and other problems appear in the authors’ treatment of human freedom. At least when speaking in a scientific framework, d’Aquili and Newberg depict reality as occurring in strips or sequences, with a cause being whatever initiates a sequence. They portray a human being within a sequence as free and responsible only if he or she, rather than some cause external to the sequence, is the sequence initiator. “Whether or not causality exists within a given sequence of a people’s reality is what determines if they have free will. Therefore, causality within a sequence of reality allows

for free will, while causality that exists external to a given sequence leads to determinism” (*Mystical* 171). Even aside from the fallacy of emergence, there are serious problems with this account of freedom. One is that it illustrates again the authors’ problem with individuality by failing to clarify what units reality might freely come in. While strip may imply something continuous, sequence clearly implies a series of discrete entities. But what exactly are those entities? What are the sequences sequences of? In what sense are there partly distinct building blocks of reality that succeed one another in a free or determined manner? D’Aquili and Newberg fail to explain why there would be any ontological distinctness between a free cause of a sequence and whatever preceded it or between a deterministic external cause and the sequence it determines. The fact that the authors refer to strips in the plural suggests that they do not mean to affirm a monistic block-universe in which all strips would blend into a single continuous entity, but what prevents reality from being such a universe? That question could be rephrased in causal rather than ontological terms by asking how there would be any separateness causally within or between strips of reality. What prevents the power of a cause from being simply a transmission of power from previous causes? What terminates, reduces or re-directs the force of prior causes? If the answer to those questions is nothing, then the authors are in fact affirming a block-universe, but the causes they recognize are not really free then in the sense of being able to bring about alternative possibilities. In fact, they are not even causes in the sense of being spontaneous powers but merely arbitrarily selected portions of a single, unbroken cosmic strip.

If the preceding problems show the authors’ failure to account for the discontinuity they attribute to the causal order, other problems show a similar failure regarding causal continuity. The authors, perhaps inspired by their study of Aristotle’s uncaused cause, seem to depict causes as little uncaused Aristotelian gods that emerge at random in cosmic history. But insofar as causes do appear in cosmic history, how do they transmit the power of the past if they simply appear inexplicably at irregular intervals in what would otherwise be a causal vacuum? In what sense, if any, is there a connection between a new strip of reality, including its initiating cause, and the world that preceded it? If that cause conforms to the past somewhat, is it not then also an effect? If not, does the initiating cause have no constraints at all, so that it could initiate any strip whatsoever, despite its circumstances? Of course, d’Aquili and Newberg might account

for causal continuity by recognizing some underlying cause of the causes, but none of their usual suspects is likely to fit that role. To attribute that function to human subjective awareness leads directly to solipsism, while to attribute it to the causal operator leads to a similarly solipsistic form of brain idealism in which the brain's act of perceiving portions of the world as causes makes them such. The authors' position ultimately seems to place AUB in the meta-causal role, but without explaining why anything as non-providential as AUB would bother playing it or how anything as undifferentiated as AUB could give rise to a multifaceted world employing countless subordinate causes. In the end, the authors present us with a causal universe that is a hodge-podge of freedom and determinism, with the free and the necessitated parts miraculously not violating each other's modal status. It is as if Neil Armstrong's first step on the moon could have been absolutely inevitable just as it happened, even though he might have freely chosen not to make the trip. Such a patchwork quilt of absolute necessity and absolute contingency is a modal masquerade in which modal status is never really what it says it is.

Illustrations of the authors' account of freedom involving the mind and brain show new instances of the emergence fallacy, at the same time they support my contention that the authors' mind/body position incorporates epiphenomenalism. There are admittedly many texts in which d'Aquili and Newberg seem to represent mind as a free, creative power. For instance, they note that while animals' fears are mostly stimulus-bound to currently perceived dangers, human beings' fears are expanded by abstract thought to include potential, non-present dangers. "Humans are able to trigger a biological fear response simply by thinking of danger" (*Why* 59). Yet while these remarks suggest a free, creative role for mind, they are quickly negated by the comment that "Thankfully, the same big brain that generated these fears also provided a way to resolve them through invention" (*Why* 59). Such passages reinforce the sense that the authors' dual aspect doctrine serves to blur systematically the mind/brain distinction, while (unsuccessfully) underwriting an epiphenomenalism in which any apparent attribution of spontaneity to mind is really one to brain. Consider another example from *Why God Won't Go Away* involving the initiation of passive meditation, and note again the sudden shift in causal attribution from mind to brain.

All mystical spirituality begins as an act of will. In our model, passive meditation: begins with the willful intention to clear all thoughts,

emotions, and perceptions from the mind. This conscious intention is instated by the brain's right attention association area—the primary source of willed actions—as the need to shield the mind from the intrusion of sensory, as well as cognitive, input. To this end, the attention area, via the thalamus, causes the limbic structure known as the hippocampus . . . to dampen the flow of neural input. (117)

What appears at first to be an affirmation of the mind's crucial volitional role in meditation quickly morphs into an account of how a brain structure activates the will, embodies needs, has ends, starts deafferentation, and generally directs neuro-chemical traffic for the sake of creating an altered state of mind. The terminology in *The Mystical Mind* is even more bluntly materialistic, asserting that “one starts in the right attention association area with the will or intent to clear the mind of thoughts and words” (110). Even with active meditation, which might seem to demand a non-materialistic account of the mind focusing its attention on a sacred image, the brain shoves the mind out of the picture as “the image is then fixed and attended to by the right orientation association area” (114). Unless the authors intend such passages to be shorthand for accounts that recognize a partly independent role for the mind, it is hard to avoid the conclusion that their position falls prey once more to the fallacy of emergence by transferring human freedom and responsibility, as it had transferred human individuality, to the neuronal level. But rendering the human mind a puppet of its neurons would involve enormous theoretical and practical problems, depriving us of all moral and legal responsibility—“Sorry, Officer, but my orientation association area thought I had the right-of-way!” It would even preclude past human experiences, as opposed to their neuronal correlates, from ever affecting future human experiences. In fact, although d'Aquili and Newberg present their views as if they were trying to persuade their readers, a more literal but absurd description would have to state that the authors' neurons were trying to persuade their readers' neurons.

Hopefully, the preceding critique has led the latter neurons to keep an open mind about alternatives to the authors' views on subjectivity, individuality and freedom that do not rest on archaic philosophical beliefs. Part Two of this article will raise additional questions about those views and about the authors' interpretation of mystical states.

*Part Two: A Process Critique of D'Aquili and Newberg's  
Neuropsychology and Neurotheology*

*1. A Summary of Panexperientialism*

As its homely name suggests, panexperientialism is the view that concrete reality is composed of nothing but experiences or feelings and that to be a unit or individual entity means ultimately to be a center of feeling (Hartshorne *CSPM* 1-18, 298-302; *ZF* 133-50; Griffin *Unsnarling in toto; Reenchantment* 94-128). Feeling in turn is conceived as a cosmic variable of indefinitely great range, extending from the most simple, primitive sentience of sub-atoms, atoms, molecules and cells to the sometimes conscious, self-conscious and rational sentience of human beings and finally to the omniscient or supremely receptive, infallible sentience of God. This obviously constitutes a denial that the physical world is composed of the matter affirmed by dualism as well as materialism, a set of vacuous actualities, each of which is said to be a single thing yet somehow devoid of feeling. Panexperientialism acknowledges that nature contains compound individuals, such as a molecule, ant, human being or God, each of which has a body or network of partly subordinate lower individuals. However, it views many items treated as single things in everyday life and speech—a rock, a car or a marching band—as mere aggregates, an aggregate being a multitude of individuals not unified into a higher center of experience and hence not qualified to be an actual entity. What makes panexperientialism a process doctrine is that each center of feeling, from the sub-atomic to the divine, is conceived as a society through time, with each new feeling in the society summarizing the society by creating itself as an aesthetic reaction to its predecessors and to the past feelings of all other individuals in reality. While each new feeling largely conforms to the character of those earlier feelings, it also involves at least a minute degree of freedom or self-causation and thereby contributes a novel element to cosmic history. Conformation to the past is overwhelmingly predominant in simple individuals, whose extremely monotonous habits constitute the laws of nature, developing and shifting slowly over cosmic history. Higher individuals have a far greater capacity for creativity, sometimes sufficient for moral responsibility. Each center of feeling is extended in space, with compound individuals roughly co-extensive with their bodies and God co-extensive with the whole world of subdivine individuals. Mind/body interaction is possible and comprehensible because it consists simply in

the inheritance of feelings between minds of radically different degrees of complexity and sophistication.

For human beings, that inheritance involves two very different modes of perception (Whitehead *S in toto*; Griffin, *Unsnarling* 132-51). Perception in the mode of causal efficacy is a non-sensuous form which yields direct and insistent, though vague or subconscious, access to the feelings of all individuals, but most notably, of those composing one's body; it provides one's only direct acquaintance with causality, temporal passage, one's past experiences and other minds. By contrast, perception in the mode of presentational immediacy is the highly abstract, sensuous characterization one gains of the world outside of one's body insofar as the world is reflected in one's bodily individuals when one directly perceives their causal efficacy; it acquaints one with regions of space featuring colors, sounds, and other such secondary or non-quantifiable qualities of modern philosophy. The latter mode of perception is derivative from the former, since one cannot experience the world through one's sense organs without first experiencing one's sense organs, and it also misleads by inverting the emphasis among the properties apprehended by the former. Causal efficacy acquaints one primarily with the emotions of one's neurons and of external individuals, and only secondarily with the geometric relations between the two; presentational immediacy, on the other hand, stresses the spatial relations, while muting the emotional content. The effect of that inversion is to give the impression that secondary qualities are reducible to size, shape and other quantifiable primary qualities rather than to emotional or tertiary qualities inhering in nature. Sense-perception is a blend of the two perceptual modes, termed symbolic reference, because data from presentational immediacy help in the interpretation of the typically much less prominent data from causal efficacy with which they are correlated. The dominance of sense perception by presentational immediacy is illustrated by the way in which a visual image of a sunset, for instance, all but totally eclipses, except in cases of eye pathology, the reception of feelings of the individual ocular neurons making the image possible.

Sense-perception does not allow direct identification of other individuals. However, in case of bodily sensations it does allow at least tentative cross-references, for instance, between the finger-shaped patches of white that I visually perceive retracting quickly from a hot stove and the painful feelings that I inherit from a multitude of neuronal individuals who

occupy and provide causal information on roughly the same regions of space. In the sensing of external individuals, causal efficacy is typically apprehended subconsciously and hence with negligible accuracy as to spatial location. While peripheral neurons can be apprehended consciously but not individually, cranial neurons, like external individuals, happen to be apprehended subconsciously, so the question of whether the brain as a whole or in part is as much an individual as a quark or an elephant must be guessed by the degree of cohesion observed between its parts. Hence the question is more one for scientists than for philosophers, as long as the former tentatively attribute individuality to a portion of the world only if its parts are always observed to act with at least as much mutual adjustment among themselves as do the parts' parts. Given the extraordinarily complex and shifting interactions among cranial neurons, it seems most likely that an entity such as the orientation association area is merely a very well-organized aggregate of neuronal individuals, not an individual in its own right. If so, the higher level mind intimately associated with the neurons in that brain area is not a sub-mind of that area but the human mind as a whole, frequently, skillfully playing on them as if they were an octave of piano keys.

Once it is granted that the octave is not playing itself, all the strictly scientific information discovered by researchers can be incorporated into a panexperientialist framework in which the partial localization of brain function involves a spatialized but insensible mind that is distinct from and interacting in diverse ways with various neural structures and with smaller units composing the body. While each bodily individual has a minimal degree of spontaneity, it is the human mind which greatly dominates the interaction, monitoring and utilizing neuronal feelings as symbolic devices to conduct its functions. Hopefully Part One of this article has reinforced the belief that such a concept of mind cannot be treated as a theoretical extravagance, awaiting excision by Occam's Razor, without fatally truncating human experience, individuality and freedom.

## *2. A Panexperientialist Critique of D'Aquili and Newberg on Baseline Reality*

The superiority of panexperientialism to the authors' dual aspect/epiphenomenalist position can be seen by examining their views on subjects, objects, causality and time. First, however, let it be noted that the root experience behind the authors' mind/body position is the naïve observer's

dualistic impression that reality is composed of two radically different sorts of stuff, experience or subjectivity and matter or objectivity. According to the authors, everyday experience, especially when contrasted with dreams and hallucinations, forces us to affirm both the reality and the essential difference of the two (*Why* 144, 152). On this naïve view, matter is “heavy, substantive reality” (*Mystical* 178) or “solid, objective, external reality” (*Why* 143), while subjects have a “light, changeable, and ethereal quality” (*Mystical* 178). The authors retain that view even after studying Husserl’s phenomenology, which they understand to mean not only that subjectivity contains the material order, but that “what also exists within subjective awareness is the vivid sense that the external world is substantively real and that matter is something other than consciousness” (“Consciousness” 246).

These seemingly innocent dualistic roots involve a host of problems regarding subjects, one of which, illustrated in the preceding quote, is that d’Aquili and Newberg often make the unwarranted equation of subjectivity with its high level form, consciousness. They acknowledge that subjectivity can vary across species and that subhuman animals have emotions or subjective awareness (*Why* 42, 45, 57, 83-85, 88-89; “Consciousness” 238), but d’Aquili, at least, makes that acknowledgement only insofar as animals have a complex central nervous system (Laughlin, McManus & d’Aquili, *Brain* 91). Hence the authors rarely discuss lower sorts of subjectivity, and, as Part One noted, d’Aquili responded to the charge of being a panpsychist with the irrelevant denial that he attributes consciousness to neurons. By ignoring lower forms of mentality or assuming that they would have to be identical to the consciousness often possessed by human beings, the authors are guilty of what panexperientialism considers an inappropriately anthropocentric view.

Another problem for the authors’ treatment of subjects is the proportionality thesis just mentioned whereby d’Aquili claims that animals have subjectivity only to the extent that they have complex brains. While plausible by itself within a certain range, that thesis is less so when joined with the authors’ mind/body stance. If mind is simply a correlate of brain, then there can be no subjectivity for simpler organisms which lack brains, including the individual neurons that d’Aquili once recognized as subjects. In addition to and arising out of that inconsistency, however, is a trilemma the authors recognize regarding evolution and subjectivity. Either the material order created subjective awareness or the opposite occurred

or AUB created both matter and mind. While discussing the possibility that sufficiently complex computers could have consciousness, the authors express reservations about the first horn of the trilemma for the residual mystery it would involve as to why a machine such as a brain or computer would bother creating an inert by-product such as subjectivity. That by-product has no active role in the matrix of causal relations in nature and therefore no adaptive value in evolution (“Consciousness” 243-51).

The gnawing question of why subjective awareness should exist at all profoundly haunts our speculations. . . . There is a fundamental discontinuity between the machine and consciousness. And so awareness may be unknowable in itself . . . although we may someday come to know everything there is to know about the neurophysiology underlying the content and phases of consciousness. . . . The relationship of consciousness or subjective awareness to the machine, any machine, is a mystery and will likely remain so. (“Consciousness” 251)

This mystery of consciousness is avoided on the second horn of the trilemma, which has subjectivity giving rise somehow to the material order, but the authors recognize that the priority of subjectivity calls into question whether evolution ever happened and in any case leads to solipsistic beliefs and practices. The third horn of the trilemma, the authors’ tentative conclusion, holds that subjectivity and the material order are both generated by AUB, but that conclusion still provides no reason for the generation of subjectivity in evolutionary history. By contrast, pan-experientialism, by recognizing that feeling can range indefinitely in high and low directions, with or without the presence of brains, can interpret evolution as the development of higher forms of subjectivity out of lower, not out of allegedly insentient stuff termed “matter.”

Another problem of d’Aquili and Newberg’s view of subjects is the notion of self it involves. As with the preceding problem, the authors acknowledge a trilemma regarding human selfhood. On the materialistic hypothesis, the self is said to arise when the infant brain distinguishes that part of its sensory input which results from its own behavior from that part which does not, thereby recognizing the former as self and the latter as world (*Mystical* 63; *Why* 149-51; “Consciousness” 248-49). Unfortunately, this concept based on reified brain functioning seems to confuse selfhood with self-consciousness. The latter might well result from the self’s noticing the sensory effects of its own actions, but self-consciousness presupposes a self with consciousness. The authors implicitly ordain the

brain as the everyday self, but doing so re-opens all the problems from Part One of trying to locate individuality amidst billions of interacting neurons. At the other extreme from the brain-self, the second horn of the trilemma would designate a pre-existing subjectivity as the self, but again in the implausible form of a solipsistic dreamer of the world. Finally, on the AUB horn of the trilemma, the human self would evaporate in the face of the impersonal Void, a view I criticize below.

In addition to the foregoing difficulties, some of the authors' problems with subjects involve objects as well. One major problem is the unwarranted assumption they appear to make that the status of an entity as subject or object is fixed or unchanging, so that a subject is always a subject and an object always an object. That assumption is never explicitly stated by the authors, but the texts quoted above on the dualistic roots of their mind/body position strongly suggest that entities as dissimilar as subjects and objects could never be transformed one into the other. But if so, that assumption begs the question against the core process doctrine that every self-creating momentary subject must crystallize into a permanent object for later subjects and every object must have been a subject or aggregate of subjects. Clearly, within one's own awareness, what was once a feeling in the process of defining itself routinely stabilizes into an object for later feelings, and there is no obvious reason to assume such a sequence impossible for subhuman individuals. D'Aquili and Newberg should have acknowledged then that current sense data, dominated by such objects as sounds, odors and colored regions of space, could be abstractions from the feelings of microscopic individuals and that each state of each individual could be first a subject, then an object.

Along with assuming subject/object status to be fixed, the authors echo an assumption implicit in materialism and dualism that sense perception directly acquaints us with matter or clearly distinguishes objects from subjects, presumably because "heavy, solid" entities can be perceived to lack the "light, ethereal" quality of awareness. But if that is indeed the authors' thinking, it misrepresents sense perception in important ways. Above all, it suggests that sense perception could in principle acquaint us with a subject—either a momentary feeling or an accumulating series of feelings—so we could then know when it had failed to do so. But is such acquaintance possible? As Charles Hartshorne pointed out, failing to detect a presence in experience is not the same as detecting an absence, unless the item of interest would have to have its presence manifested in a discernible degree

(*CSPM* 79). Exactly how would subjectivity be manifested discernibly in sense perception? If not literally through lightness or ethereality, then by what qualities? At age 100, Hartshorne reformulated his point as an attack on the zero fallacy or mistaken claim that the complete absence of some quality which varies in degree but does not have a known minimal degree can be empirically confirmed (*ZF* 166). The authors' belief in insentient matter leads them to commit that fallacy by implying that sense perception could show the total absence of subjectivity in nature. But again, how could that absence be known? Where is the evidence that there exists a quantum of subjectivity in nature, analogous to a photon of light, whose failure to be discerned through sense perception would confirm its complete absence? Just as the authors err if they mean to claim that experience could show a zero time lag—that is, absolute simultaneity—between a brain state and its mental correlate, so they are making a fallacious claim about the capacity of human observation to detect an absolute zero of subjectivity. Sense perception by nature abstracts from subjectivity and hence could never provide a litmus test for the presence of subjects in a given region of time and space. The authors should have recognized that sense perception leaves open the subjectivity question, as evolution might suggest, since sense perception presumably gained prominence in biological history for its survival value, not its ability to resolve metaphysical disputes.

Another problem with the authors' assumption of the perceptibility of matter is its conflict with their general doctrine of the external world. Without achieving the tortured complexity of Immanuel Kant's system, the authors do in effect propound a neurological Kantianism insofar as they affirm a real but intrinsically unknowable world, while holding that our experience is shaped by our own cognitive apparatus, in this instance the brain rather than Kant's mental assembly line ("Liminality" 32-34; "Neuropsychological" 198-201). Regardless of everyday impressions about the alien heaviness and solidity of matter, strict adherence to their doctrine should have led the authors to a Kantian agnosticism about the ultimate nature of the external world. If we simply cannot know the world as it really is, then we have no basis for denying that it contains subjects existing independently of us. Of course, panexperientialism rejects that agnosticism on the ground that the perceptual mode of causal efficacy offers direct, though vague, acquaintance with other subjects, while the two perceptual modes together routinely achieve tentative identification of

subjectivity in the cohesion of parts mentioned above. That is, some sense data again consistently show what appears to be intricate coordination in reaction to environmental changes of a sort suggestive of an underlying unity. Since I am aware of my own body as such a highly cohesive set of sense data and of my own individuality directly through causal efficacy, I can reason analogically that other cohesive sets I encounter through sense perception are also probably linked with individuals in their own right. While this reasoning must remain tentative, it has been reinforced by the testimony of countless other apparent human observers whose massive consensus is that certain sets of sense data signify the body of a horse or human being. By contrast, the limited cohesion of a rock or a table suggests that neither can be more than an aggregate.

The authors unfortunately dismiss the tentative indications from sense perception that certain data are manifestations of subjects. For example, when d'Aquili and Newberg characterize intersubjective agreement as a question-begging standard for measuring what is really real, they state that "The 'subjects' who agree or disagree about entities' being real are themselves only images or representations within the sensoricognitive field of the analyzing philosopher. Thus, it is unfortunately true that any person analyzing his or her own experience must start out, at least, as a naïve solipsist" (*Mystical* 191). This passage shows that just as Kant faced a challenge of avoiding certain types of idealism, d'Aquili and Newberg are at risk of falling into a neurological idealism with the world as my brain's dream, and that they again falsely attribute to sense perception an ability to confirm the absence of subjects in nature. But the passage also illustrates the authors' failure to acknowledge the tentative analogical evidence of subjectivity in sense perception in two ways. First, the authors treat apparent subjects in their perceptual field as "only images," with no concession that the parts of each image are remarkably consistent in their behavioral correlation with each other in response to environmental changes. That correlation is striking even in the case of what we take to be the body of an ant or antelope, but it is staggering in the case of sense data which resemble me bodily and actually converse with me in a language that I remember them teaching me. While such perceptual evidence for other human subjects is still not definitive, it at least casts serious doubt on the belief that solipsism is a neutral starting point from which to investigate reality. The second way in which the quoted passage fails to acknowledge analogical evidence through the senses is in its refer-

ence to the “sensoricognitive field,” which the authors routinely depict in a materialistic sense, speaking of the brain as a machine or mechanism. The possibility that a brain is itself a multitude of primitive, microscopic subjects seems never to be considered, even though a perceived neuron constitutes one of those highly cohesive sets of sense data suggestive of subjectivity. How a machine could be composed of what d’Aquili once recognized as cellular organisms is never explained.

In addition to the authors’ difficulties with subjects and objects, there are several problems in their account of causality. First and foremost is their unwarranted belief that the human brain has a causal monopoly on the determination of human experience. Consider the following passage, which appeals to medical science in support of that conclusion and hence of epiphenomenalism.

As far as we can determine, all human experience eventually enters human awareness via the function of the brain. It certainly seems reasonable to reach the conclusion that the brain is the structure that gives all of us our thoughts, feelings, and experiences. . . . Even if there is a soul, our experience of whatever we mean by “soul” must pass through the brain. . . . Imaging studies . . . have explored almost all of the basic components of human behavior and experience. . . . It seems that no matter what happens to us or what we do, there is a part of the brain that becomes activated. . . . The brain appears not only to react to everything that happens to us, but is eminently responsible for everything that we do or experience. In this way, studies of brain function help to show that . . . it is the brain by which all of our thoughts, feelings, and experiences are derived. (*Mystical* 44-45).

To say that all human experience is “given by” or “derived from” the brain reinforces the impression from other passages that “eminently responsible” here really means “exclusively responsible.” But what evidence is there that the brain is not only necessary but sufficient for our experience to occur? In support of their belief in the partial localization of brain function, d’Aquili and Newberg appeal to three sorts of scientific study. Activation studies can show that performance of a certain task involves neuronal firing in certain brain structures, dysfunction studies can show that damage to a particular brain structure yields the loss of a certain function, and stimulation studies can show that electrical stimulation of a given brain structure induces a particular function or behavior (*Mystical* 42-45; *Why* 17-18, 25, 27, 30, 42, 50, 53, 93-94). While I have no reason or scientific credentials to challenge the findings of those studies,

I do believe that the authors, like many other scientists, routinely misinterpret them. Each type of study might show that an area of the brain is involved in a given function but could never show how it is involved or that other factors, possibly undetectable by sense perception, are not also involved. To claim that any of the studies shows the brain's exclusive responsibility for human experience is to confuse causation with correlation or to commit the *post* (or here *simul atque* or 'at the same time as') *hoc ergo propter hoc* fallacy. The real causality involved could run in either direction or, as panexperientialism holds, both directions. If Hartshorne, following Popper, is right that metaphysical views in principle cannot be verified or falsified by scientific data, then panexperientialism cannot be established by empirical studies, but neither can positions which deny it, such as epiphenomenalism.

Even if the brain were somehow a necessary and sufficient condition for human experience in general, it would still provide an incomplete explanation of any experience in particular. In discussing the third sort of brain research, d'Aquili and Newberg treat electrical stimulation of a neural structure as an adequate explanation of why a particular feeling occurred. But what needs explaining is not just that a visual hallucination, for instance, occurred after stimulation of the right amygdala, but that this exact visual hallucination occurred at this exact time and place in cosmic history. Though practicality forces us to think and speak of experiences in general ways, even hallucinatory experiences are particular events—unique and indefinitely rich syntheses of concrete detail. A central thesis of process philosophy is that the exact character of each of those syntheses must be explained by an element of creativity or self-causation in the experience itself. It is not that prior causal factors, such as neuronal impulses, are irrelevant to explaining a human feeling. On the contrary, even listing all of those factors, if possible, would not explain and would only highlight the failure to explain how those factors, without any senior executive among them, managed to conspire in the production of this exact feeling here and now. Since there is in principle no way for any past causal factor to decide the extent to which each of the other such factors will influence the new feeling, that decision can be made only by the new feeling itself. In Hartshorne's words,

From *a, b, c, d . . .* one is to derive the *experience of a, b, c, d . . .* and not just *an* experience of them, but precisely *this* experience of them. There can be no logic for such derivation. The step is not

logical, but a free creation. Each experience is thus a free act, in its final unity a 'self-created' actuality, enriching the sum of actualities by one new member. (*CSPM* 2-3)

If the authors' causal account is too generic to explain the particularity of experiences, it is also inconsistent. D'Aquili and Newberg depict the causal operator as the source of our understanding of how experienced items are organized into chains of causes and effects. The problem is that the authors, like Kant, still claim that there is raw, pre-conceptual input independent of us which is unknowable but somehow linked to what our cognitive apparatus organizes. Unlike Kant, the authors affirm the linkage to be formal causality insofar as they conceive a stone to be the Aristotelian factor providing its form to a stone-image whose efficient cause is the neurological cognitive apparatus (*Why* 35-37). But as Kant would note, the authors have no warrant for applying the concept of causality, which can refer only to the organizing of items of experience, to the relation between the unknowable input and those items. The authors might deny any inconsistency by replying that, unlike Kant, they understand the concept of cause to be something routinely applied not only to experienced entities preceding other experienced entities but also, through the irresistible urging of the causal operator, to inferable but never experienced entities preceding experienced ones. But that reply would ignore the crucial difference between what has not been but could be perceived, such as a leopard leaving footprints, and what in principle could never be perceived, such as that which would exist independently of us in nature, as our brain would purportedly be creating the experience of a leopard. The latter would not be a portion of experience selected by the abstract operator or knowable as similar to such a portion, and therefore treating it as a cause is illegitimate in the authors' theoretical system. The authors might reply that the fault of misapplying the concept of cause lies not with them but with the causal operator or the "causal imperative" (*Mystical* 53) driving certain brain structures to infer a cause where none is evident. But such a reply would be an explicit confession that responsibility, in this case epistemic, inheres in areas of the brain, not human beings. Panexperientialism avoids that fallacy of emergence by conceiving of the causal imperative as a strong drive of a human mind using certain brain structures. Finally, the authors might argue that the unknowable input to the brain is merely a source and not really a cause of our experience, or else they might concede that these problems show

the need to deny the existence of that input. But the first response would face a fatal dilemma—either that input helps to determine human experience, in which case it must indeed be recognized as a cause, or else it does not, in which case the experience cannot meaningfully be said to be of the input. The second response would plunge the authors into an explicit form of brain idealism, if not solipsism, which could be avoided simply by allowing that the perceptual mode of causal efficacy provides a direct, though vague or subconscious, grasp of an independent world.

Like their concept of cause, the authors' concept of time in baseline reality involves an inconsistency. After d'Aquili's early conjecture that it is the human brain which endows events with temporal relations (d'Aquili, "Human" 252), the authors jointly declared it "obvious that time and duration are not absolutes, and that they derive their perceived qualities from brain function" (*Mystical* 191). But brain-dependent time would contradict the notion that biological evolution has occurred over real eons, an awkward fact given the authors' emphasis, "dating back" to d'Aquili's biogenetic structuralism, on the development of the human brain itself over evolutionary history. Equally awkward is the conflict between the notion of brain-dependent time and the fact that the brain's own operations themselves clearly involve time. What time does the brain run on while generating time? While that question does not arise for the Kantian instantaneously acting mind, the brain in d'Aquili and Newberg's system seems forced to order its own temporal relations "before" it creates time by ordering temporal relations.

Consider, for example, the binding problem in neurophysiology of understanding how past sensory input can be recognized as similar to present sensory input, since the former is broken down into components, stored in separate neural structures and never reassembled spatially in the brain; the answer seems to be that the old input is recognized as similar to the new on a temporal basis insofar as neurons storing it fire simultaneously, and perhaps with the same frequency, in their diverse locations ("Consciousness" 239-40; *Mystical* 181-82). But how could such simultaneous firing occur if the brain must first endow all the impulses of its neurons with temporal relations? Are there certain time-center neurons that assign temporal relations to all other neurons? If so, the original question re-focuses on them alone—on what time do they operate while creating time? And would the assignment of temporal relations to neuronal

firings occur before or during the firings themselves? If before, the brain would have to have a miraculous foreknowledge of the sequential order of its neuronal firings indefinitely into the future, while if during, the assignment would seem to be a vacuous addition to the firings themselves. The authors could rightfully reply that their final joint article declares it likely that time is real apart from us (“Creative” 62) and that the mind is creative, but it is hard to see how those declarations can be made consistent with their continuing claims that the mind is simply the product of the brain (54) and that “we create our own reality for ourselves” (67). Process philosophy strongly affirms the creativity of mind at all levels but not the ability of the brain to generate time.

### *3. A Panexperientialist Critique of D’Aquili and Newberg on Mystical States*

Hopefully, the preceding section has bolstered the claim of Part One that discredited metaphysical views have hampered the authors’ neuropsychology even before its immersion into the murky waters of AUB. But before discussing problems unique to the authors’ account of AUB and lesser mystical states, it should be noted that that account provides further illustrations of problems described in the preceding section. For example, the authors’ conclusion that AUB is the creator or cause of matter and mind constitutes another illegitimate application of the concept of cause to something inherently other than a portion of experience selected or selectable by the abstract operator. And since AUB is alleged to be utterly unknowable, the authors cannot even justifiably apply the concepts of absoluteness, unity and being to it. Knowledge of the most distinctive features attributed to AUB—its radical revision of time and space relative to baseline reality (*Mystical* 175, 183; *Why* 119, 150-51, 160-61) and its resultant eclipse of the finite human self (*Mystical* 188-91; *Why* 119, 122-23, 160-61)—also seems to involve an impossibility, if AUB is unknowable. But aside from these apparent inconsistencies in the authors’ account of AUB, derived from the paradoxical testimony of mystics, how plausible is that account in its depictions of eternally unchanging AUB time, AUB space that is described as either no space or else an infinite, undifferentiated expanse, and the human self’s absorption into AUB?

Perhaps the best place to begin is with the question of whether the human brain discovers or creates what is undergone in AUB. If the preceding has shown that d’Aquili and Newberg tend to attribute a creative role

to the human brain in baseline, then it seems that they are inconsistent in tending to attribute a discovery role to the brain in AUB. Moreover, even if they had depicted the brain as a discoverer in both contexts, their position would still be problematic. Given their inference from evolution that the degree of correspondence between awareness and baseline reality is low, doubts about that correspondence should be stronger, not weaker, in AUB. Since *homo sapiens* did not evolve and its powers did not develop within AUB, the authors should acknowledge that entry into that extraordinary context would be more likely to decrease rather than increase the brain's trustworthiness as a discoverer of independent reality. At least there is no reason to assume that the human brain becomes infallible in that role during AUB, so the authors should be more skeptical about the ability of those who experience AUB to characterize its features accurately. Consider, for instance, the fact that many mystics have described AUB or God in its personified form as timeless or unchanging. Given the evolutionary grounds for expecting mystical states to involve diminished cognitive ability, it would not be surprising if temporal relations simply fail to register accurately with most human beings who find themselves in a context composed of a single external individual. If process theology is right that God gives a benevolent initial push to each new feeling in reality, then divine pulses of feeling may be quicker than a quark's or much faster than could be recorded by creatures used to measuring time in heartbeats and the pelting of rain. Despite all the testimony of mystics then, it is quite possible that mystical states involve a shift not to timelessness but to a basic temporal order to which evolution has utterly failed to make us perceptually sensitive. Furthermore, there is no reason to doubt that perception can be colored by conception even in mystical states, and most mystics in human history have presumably had a conception of God that was based on the time-averse doctrine of classical metaphysics, in many cases the only theology known to them. If so, it would hardly be surprising if their reports of mystical experiences reflect that fact. If process philosophy's dipolar concept of God as an eternally unchanging essence embodied at each moment in a novel actual state should become popular for 1,000 years, one might expect those reports to trend in a more time-friendly direction, as mystics come to "see" fluidity in AUB.

While real time in AUB may well be indiscernible to mystics due to the supremely high frequency of the events underlying it, AUB space is probably disorienting by being all-encompassing and undifferentiated,

though those qualities would not imply being either “no-space” or infinite space. If process philosophy’s naturalistic theology is right in conceiving of God as spatially coextensive with all subdivine individuals, then a human being suddenly prevented by deafferentation from perceiving any of those individuals would not be creating AUB space but simply becoming baffled, again from a lack of evolutionary preparation, by the empty residual of divine space. And the authors are probably right that it is the severed acquaintance with space, time and other individuals from baseline reality that leads mystics to feel a loss of personal identity in or absorption into AUB. In addressing mystics’ claims about that loss, I should first concede that some form of absorption into God, as discussed below, may well be an afterlife eventuality for us all. However, despite the extensive traditional testimony to the contrary, I find it improbable that AUB involves the actual loss of self or even of one’s concept of self which the authors and many mystics attribute to it.

Consider first the latter alleged loss. The authors’ view that a concept of oneself requires one’s brain to distinguish sense perceptions which are the result of its own initiative from those which are not leads them to claim that in AUB the sudden loss of contact with baseline reality yields an inability to sustain that concept. Along with my earlier objection to that view, I believe that the authors’ extension of it errs by implying that loss of perceptual contact with whatever gave rise to a concept forces one to lose that concept. Clearly, once I have created the concept of ten or giraffe, I do not need to be counting my fingers or watching tall zoo animals in order to retain it. Now the authors would be right in arguing that the concept of self is unusual in that I know how to apply it in baseline reality very largely by contrasting myself with other individuals, so the dramatic disappearance of “them” in AUB would yield a diminished ability to denote myself as “not them.” But feeling some confusion about the application of the concept of self in that extraordinary context does not equate to complete loss of understanding of the denotation or connotation of the concept. The very fact that those who experience AUB identify the experience in retrospect as theirs and as “their experience of the loss of self” hints that they did retain some minimal grasp of the reference and meaning of the concept of self even during AUB as “something (of or about *me*) which is being lost or diminished.” Otherwise, why would mystics be shocked during AUB by the disappearance of something of which they had absolutely no concept?

As for the claim that mystics lose not only the concept but the reality of the self in AUB, I think, for reasons discussed below, that the truth of that claim is indeterminable and should not have been assumed by the authors. In a skeptical vein, I would also reiterate my earlier comment about the inconsistency of mystics' testimony itself. Mystics may refer to AUB as ineffable or indescribable, but they do in fact express or describe it as a context in which familiar features of baseline reality are radically changed; insofar as those features are radically changed, mystics' testimony is not only descriptive, but accurate in a very general way. Concerning mystics' particular claim about the loss of self in AUB, the preceding paragraph has argued that AUB probably involves a reduced but not eliminated ability to conceive of oneself or to be self-conscious, but self-consciousness is not essential to self-identity for any subject. Even consciousness is a capacity that human beings display only intermittently, and self-consciousness is probably one that most subhuman individuals simply never have. Reduced self-awareness then is not a reliable sign of loss of self. Besides, mystics recall their AUB experiences, like any others, as objects in the panexperientialist sense of entities whose full determination allows for inheritance by later selves or subjects; that suggests that mystics' experiences in AUB, like any others, were subjects in the process of self-determination. And since mystics seem aware during AUB of being absorbed into what was previously identified as "other," they must be at least vaguely, implicitly aware of an object. While subject/object differentiation may be suppressed then in AUB, the news of its death does seem greatly exaggerated.

Also exaggerated is the authors' claim that religious fanaticism results largely from belief in a personalized God and from mystical states involving less than the total unity of AUB, which encourage the sense that a powerful deity distinct from us supports our egotistical inclinations (*Why* 162-68). For process theology, it is belief not in a personal deity but in the omnipotence and impassability of God that fosters religious zealotry by providing a model of an all-powerful but heartless cosmic tyrant for us to imitate in our public lives. The authors' criticism of religious fanaticism seems to rest in part on an equation of selfhood with selfishness, but such an equation is clearly mistaken. Virtue is not the monopoly of a few self-denying Hindu masters but a possession of all who properly balance their interests with those of everyone else. The key to countering the selfishness of Western materialism lies in fostering virtue, not in persuading selves

to deny what they are. Hence the authors' claim that brain "machinery" stands ready to lead humanity to a state of ego transcendence (*Why* 168) is misguided, as well as being another fallacious example of the neuronal tail wagging the mental dog.

Before concluding, I must make one concession about the purported loss of self in AUB and note why we can never determine if that loss is real or only apparent. The concession is that the loss of self alleged to occur in AUB may well be the posthumous fate of all human beings, though being absorbed somehow into God may seem at odds with process theology's emphasis on objective immortality or being treasured everlastingly, along with all other past feelings in God's memory. Whitehead said little to support and Hartshorne openly dismissed the possibility for human beings of subjective immortality or the having of new experiences forever. But Hartshorne's main complaint against the latter was the aesthetic one that an infinity of new feelings would bring intolerable boredom to anyone but a deity who could undergo them in perpetually new ways, a complaint that weighs only against literal "immortality" or inability to die, not against temporary survival of bodily death (Griffin, *Reenchantment* 239-40). Naturalistic process theology can affirm then that human beings might survive bodily death and subsequently melt into God in a final afterlife episode. But whether AUB is a rehearsal for that possible fate remains an open question. The question is open because a human observer in baseline reality has no way to distinguish perceptually between the real and apparent loss of a mystic's self in AUB, while the mystic in AUB undergoes either real disappearance, in which case there is no self left to confirm that fact, or else sufficient reduction in self-consciousness to be unable to disconfirm it clearly.

Similarly indeterminable in a scientific sense is the more basic question with which this section began of whether mystical states are in some sense real. I have argued above that evolution casts doubt on the claim, implicitly affirmed by the authors, that human beings can discover AUB's features in a detailed and accurate way. But are there other scientific grounds for accepting the basic reality of mystical states? While the authors cite persuasive evidence that mystics differ physiologically and behaviorally from hallucinators (*Why* 111-13), it is not mere pathology but lack of objective reference that skeptics have in mind when questioning the reality of those states. Are those states really *of a Higher Reality*? They probably are, say the authors, since research confirms that they result from the physical process

of deafferentation. But it seems more accurate to say that the experimental findings are merely consistent with the objective existence of AUB, and consistent only because empirical data can in principle neither confirm nor refute such claims. If Popper is right, a metaphysical doctrine such as theism carries no implications at all about a scientific issue such as the brain states of mammals on a certain planet circling a certain star. The mammals, planet and star could all be non-existent and theism still be true. The same historical or logically arbitrary factors of evolution which produced the partial localization of baseline brain functioning probably did the same indirectly for mystical brain functioning, as the authors recognize. What they fail to acknowledge is that theism is committed to no particular conception of that functioning and could involve anything from the deafferentation of certain brain structures to the random firing of cranial nerves linked to a mind captivated by God. Theism is simply not a scientific claim, no matter how often scientists may express theological views or theologians scientific ones. Hence even if the authors had selected better metaphysical vessels in which to serve their neurological wine, they should have acknowledged that the two derive from distinct natural resources in experiential soil.

What may give an initial plausibility to the authors' unguardedly scientific approach to theology is that the brain areas deafferented in spiritual contexts are ones involved in areas of experience, such as the feeling of time, which change greatly between baseline reality and AUB. It was a reasonable conjecture that those brain areas would react to deafferentation by creating an AUB time, for instance, which could then be taken to explain mystics' claims that AUB is timeless relative to baseline experience. But if consistently maintained, that line of reasoning would suggest that science shows mystical states to be mere creations of the human brain. Aside from the fact that d'Aquili and Newberg shy away from that conclusion, its plausibility collapses when experimental results and the sense data they rely on are recognized as incapable of distinguishing between the creativity and the receptivity of a mystic's brain. The reason again is that an observer's sense perceptions, whether direct or mediated by imaging equipment, will yield the same thing on either hypothesis, namely, sense data of an apparently enraptured mystic and of images of a deafferenting brain. Hence sense data could never provide exclusive support for the authors' quasi-materialist interpretation of AUB, or for one in accord with process theism for that matter. Moreover, the mystic's own

perception in the mode of causal efficacy, even if recognized by scientists, would regrettably be too indistinct to furnish by itself conclusive evidence for any metaphysical interpretation.

Does the preceding criticism mean that the authors' whole project is undermined from the start? If intended to play a decisive role on theological issues, my answer would be yes, on Popperian grounds. If Popper is right that metaphysical claims are empirically undecidable, which suggests in Whiteheadian terms that their denotation is not exclusively to the clear but causally barren data of perception in the mode of presentational immediacy, then natural theology can never be an experimental field. Yet there can clearly be major secondary gains from projects such as the authors'. For one thing, scientific theories and observations can be, if not decisive, at least relevant metaphysically by appealing to the imagination on behalf of the truth of a metaphysical doctrine, as the cell theory and its supporting observations have suggested to some the truth of panexperientialism. Perhaps further research on deafferentation will suggest to someone a refinement of that process doctrine or at least an alternative to the overworked computer model of the brain. Along with its suggestiveness in promoting metaphysical views, science can refine everyday experience's grasp of the contours of the world to which a metaphysics must apply. If future science shows, for example, that certain brain structures each act with as much cohesion as a cell, then panexperientialism will need to apply its equation of individuality with feeling quite differently than before. And just as important as its survey of the landscape for metaphysics is the clarification that brain science can make of its presuppositions for the purpose of elucidating its borders with theology. The authors' appraisal of some of the materialistic and idealistic hypotheses that might underlie their scientific inquiry shows an admirable theoretical flexibility conducive to the achievement of that goal. Finally, there are clinical reasons for studying mystical experience, since doing so can shed light on Alzheimers, schizophrenia, or other medical disorders involving an altered sense of self, which can in turn reinvigorate theological and philosophical discussions of personal identity.

Despite the actual or potential benefits of the authors' neurologically-based project, I have chosen here to stress the attendant problems, most notably that of new research techniques being placed in the service of archaic materialistic or idealistic metaphysics.

While the work of d'Aquili and Newberg is bold, complex and

intriguing, their project requires great clinical wisdom so that cutting edge medical technology is not used to sustain ailing theoretical patients with inoperable conditions.

### *Endnotes*

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