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A CRITIQUE OF "NEUROTHEOLOGY" AND AN EXAMINATION OF SPATIAL PERCEPTION IN MYSTICAL EXPERIENCE

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SUMMARY

The "neurotheology" developed by d'Aquili and Newberg is critiqued, beginning with its modular conception of mental process and its understanding of the contribution of language, deafferentation, and autonomic and limbic arousal in mystical experience. Neurotheology makes claims about ultimate reality and the neuropsychological means of its realization. A spatial perception that conveys the sense of "unified undifferentiated oneness" reveals Absolute Unitary Being (AUB). The neurotheology of AUB is analyzed and compared with texts from the Buddhist and Vedantic traditions, leading to the phenomenological description and neuropsychological interpretation of a distinctly mystical form of spatial perception represented in three religious traditions. The conclusion illustrates neurotheology's overinclusiveness in equating all mystical experiences with AUB.

Key words: mysticism, spirituality, Vedanta, meditation

The "neurotheology" developed by d'Aquili and Newberg is presented as a comprehensive theory of belief, ritual, and subjective practices (d'Aquili & Newberg, 1993a, 1993b, 1999; Newberg, 2010; Newberg, Alavi, Baime, Pourdehnad, Santanna, & d'Aquili, 2001; Newberg, d'Aquili, & Rause, 2001; Newberg, Pourdehnad, Alavi, & d'Aquili, 2003; Newberg, Wintering, Morgan, & Waldman, 2006). Its "neuro" aspect would be familiar to a clinical neuropsychologist completing doctoral training. Its "theology" aspect does not concern the history and development of doctrine (as it does in the academy) but religious phenomena generally. The neurotheological interpretation of ritual is relatively strong; the interpretation of the near-death experience is unrivaled (d'Aquili & Newberg, 1999). The explanation of mystical experience is central to the entire project. Prayer, meditation, and ritual, when effective in generating intense religious experience, are explained in basically the same way as mystical experience. Little attention is given to asceticism, a major dimension of religious life that promotes moral transformation, mystical experience, and acute and chronic physiological changes (Wimbush & Valantasis, 1981).

Neurotheology advances claims about ultimate reality and the neuropsychological means of its mystical realization. An extraordinary spatial perception, in conveying the sense of "unified undifferentiated oneness," reveals the ultimate reality of *Absolute Unitary Being* (AUB; d'Aquili & Newberg, 1999). The authors insist on scientific neutrality, yet the presentations of AUB are occasionally excited and gnostic in tone. Hints of salvific intent and scientific messianism are suggested in statements like the following:

> As absolute, undifferentiated oneness, Absolute Unitary Being would resolve all existential questions and resolve the dilemma of opposites — life and death, good and evil, spirit and flesh, gods and humans — that compel us to make myths, and are the focus of all our spiritual strivings (Newberg et al., 2001, p. 198).

One imagines "Allahu Akbar" and from the Shema, "the Lord is one," when reading: "There is only absolute unity, and there cannot be two versions of any unity that is absolute" (p. 123). As a logical proposition, this may stand. But the point is to assert the one surpassing truth, and this gives pause.

The authors expect neurotheology to provide scientific answers to perennial religious questions. One question is "whether the soul exists, and, if so, how it might interact with both physical and non-physical aspects of reality (presuming the non-physical aspects exist)" (Newberg, 2010, p. 47). The authors say that neurotheology adheres to "strict materialistic reductionism," thus the search for the soul is a *nada por nada* proposition in which a nonexistent "reality" is studied in order to learn of its interaction with another nonexistent "reality" (d'Aquili & Newberg, 1993a, p. 5).

The aspirations of neurotheology include the creation of a megatheology that will "be seen as foundational to all the world's great religions" (d'Aquili & Newberg, 1999, p. 208). The megatheology will explain

> the overall principles underlying any and all religious or ultimate belief systems and their theologies.... [and] serve as a basis for a new and more universal specific theology by which human beings may guide their lives. Or, because of its generality, it may serve as a fundamental elaboration of most, if not all, of the existing specific theologies of the world's great religions. (p. 177)

Thousand of years of religious discourse and practice will be drawn into clarity through neurotheological explanation and distilled in the universal principles of megatheology.

Neurotheology may be uniquely grandiose compared with other work in the neuroscientific study of religious experience. But it is not alone in its totalizing aspirations and overinclusive claims. Neuroimaging procedures have been a boon to the field in conferring a halo of factual certainty around claims born of modular interpretations of brain activity. Rote interpretations and leaps of speculation are required to find coherent meaning in studies showing multi-focal bihemispheric activity stimulated by religious interventions such as prayer (e.g., Newberg et al., 2003; cf. Beauregard & Paquette, 2006). The patterns of activity associated with subjects reading religious material or remembering past religious experiences surely differ from what occurs during spontaneous religious experience, especially mystical experience (e.g., Azari et al., 2001). Spontaneity is a mark of mystical experience. The main problem is not to "catch" an experience at the time of occurrence but to address a basic property of mystical experience: its temporal quality of stark immediacy. If memory is the ascription process that confers the feeling of time, mystical experience may alter or circumvent its operation.

To exaggerate a little, the neuroscientific study of religious experience displays a level of erudition in the history and phenomenology of religion comparable to an advanced undergraduate course in religious studies. Genuinely interdisciplinary studies are rare (e.g., Arzy, Idel, Landis & Blanke, 2005). Problems flow from these circumstances. One is neglect of the theoretical problems posed by religious pluralism (cf. Griffin, 2005). Another is unexamined dependence on the perennialist belief that the primary truths of the world's religions are one and the same. Another is misinformed generalizations about religious phenomena, particularly in non-theistic and polytheistic traditions. For example, the following statement is misinformed and culturally biased: "Religions have as their *a priori* assumption the existence of God" (Newberg, 2010, p. 69). The *kami* worshipped in Shintoism are not the "God" mentioned in the quotation. The Buddha poked fun at belief in the supreme god Brahman and denied His substantial, perduring existence (Gombrich, 2009). The Tao described in writings attributed to Lao Tzu and Chuang Tzu is a process of change and light-years distant from classical conceptions of God (Chung-yuan, 1963).

Neurotheology is dualistic in its philosophical presuppositions and supernaturalistic in its understanding of mystical experience (cf. Gilroy, 2005). The result (implicit rather than acknowledged) is a web of confusion that suggests theoret-

ical incoherence from the start. A minor example is the personification of the brain, as when one reads that the brain or one of its parts "believes," "perceives," "assumes," "feels," and "attempts," as if it were a subject rather than a physical medium of subjective experience (e.g., Newberg, 2010, p. 100). This is not simply a metaphorical way of speaking. The problem is an inadvertent consequence of the odd combination of metaphysical dualism and strict materialistic reductionism. In neurotheology, mysticism is concerned exclusively with supernatural ("spiritual") phenomena (e.g., d'Aquili & Newberg, 1999, p. 176). Counterposed against the supernatural realm is the brain, which is merely physical and whose principle analogy is the computer. Neurotheology is without a mediating principle that might bridge the brain and the supernatural objects that are said to appear during mystical experience. It is trapped theoretically in a division of its own invention and left with the illusory option of personifying the brain, which is said to feel and perceive what in principle it cannot feel or perceive because it is merely physical.

The first part of this paper is a review and critique of neurotheology's modular conception of mental process and its understanding of the contribution of language, deafferentation, and autonomic and limbic activity in mystical experience[1]. AUB and the related spatial perception are analyzed in the second part and compared with texts from the Buddhist and the Vedantic traditions. The conclusion illustrates the overinclusiveness of neurotheological claims about AUB.

NEUROPSYCHOLOGY

Modular Conception of Mystical Experience

The neuropsychology can be summarized as follows:

> The principle of selective stimulation and deafferentation of various brain structures accompanied by various patterns and degrees of intensity of limbic (or emotional) stimulation may hold the key to explaining most, if not all, religious experience, whether generated by ritual, by meditation, or spontaneously (d'Aquili & Newberg, 1999, p. 103).

The modular proxy for the limbic system is called the *emotional value operator* (p. 56). "Maximal limbic stimulation" results from the activation of about two dozen inhibitory and excitatory connections spanning about one dozen "cognitive operators," neural structures, and functionally organized regions of the brain (pp. 111, 115). Interactions among the operators, structures, and regions lead to "ecstatic feelings generated within the limbic system" (p. 116). The names and number of the operators have varied slightly; later work describes eight (Newberg et al., 2001).

[1] "Deafferentation" refers to the interruption of nerve impulses traveling along sensory fibers toward or within the brain. The activity of neurons served by the fibers changes. Deafferentation may hinder their inhibitory activity; deafferentated neurons may also undergo an increase in excitability. In functional deafferentation, the interruption is based on physiological change rather than structural damage and may be reversible when conditions return to normal. In neurotheology, ritual, prayer, and meditation have the capacity to induce deafferentation

The operators are modules whose interrelationships follow a connectionist model of psychological organization. They "are not ... structures in the brain," although some are identified with structures in the brain (Newberg et al., 2001, p. 47). Cognitive abilities are reified and conflated with neural structure, eliciting an impression of *bricolage*. "Process" has recently substituted for "operator," perhaps to avoid the connotations of stasis, mechanism, and mother boards (Newberg, 2010; for a critique of modularity and a brief presentation of the alternative of microgenetic theory, see Brown, 2001a; 2001b; Pachalska et. al 2012; for process-oriented approaches to ascetic and mystical experience, see Brown, 2010, and Bradford, 2008; 2011b; in press).

Cognitive operators

Certain operators are familiar from their likeness to Luria's (1980) functional systems. The emotional value operator reprises Damasio's (1999) "somatic marker hypothesis." Other operators are philosophical in nature and strikingly abstract in their function. One example is the *existential operator* which "assigns a sense of existence or reality to sensory information" (Newberg et al., 2001, p. 51). Another is the *causal operator* which "enables the mind to interpret all of reality as a sequence of specific causes and effects" and is responsible for "the compulsion behind all the attempts by science, philosophy, and especially religion to explain the mysteries of the universe" (p. 50). Establishing reality and compelling the basic trends of human knowledge are challenging demands for invented operators with an indeterminate neural base.

Another example is the *holistic operator,* which "allows us to view reality as a whole or as a gestalt" and "likely resides in the parietal lobe of the nondominant hemisphere" (d'Aquili & Newberg, 1999, p. 52). The contribution of parietal cortex to gestalt-oriented visual perception is extrapolated to mystical experience and theological reflection: "The holistic operator might allow us to apprehend the unity of God or the oneness of the universe" (p. 52). This is a strained analogy, never mind that "divine unity" is either imperceptible or nonexistent for a theory that embraces materialistic reductionism and assumes the supernatural status of the spiritual objects encountered in mystical experience.

Orientation association area

The *orientation association areas*, situated respectively in association cortex of the right and the left parietal lobes, contribute directly to the experience of AUB. The left orientation area mediates "the 'self-other' or 'self-world' distinction" (d'Aquili & Newberg, 1999, p. 34). Its deafferentation accounts for "the obliteration of the self-other dichotomy" that the authors erroneously attribute to all mystical experiences (p. 112; cf. Idel & McGinn, 1999). The right orientation area is most important because its deafferentation engages the spatial perception of unified undifferentiated oneness and so discloses AUB. Deafferentation of the orientation area on the left, followed by deafferentation of the one on the right, lead to awareness of AUB (d'Aquili & Newberg, 1993b).

Deafferentation and Release

One strength of neurotheology is its emphasis on functional inhibition and deafferentation — as may result from meditation practices — followed by "release" phenomena that occur when the deafferentated area responds with a relatively heightened level of activity. Release phenomena occur along a "unitary continuum" that ranges from "lesser mystical states" to the ultimate experience of AUB (d'Aquili & Newberg, 1999, pp. 116). Deafferentation and release are widely applicable principles. Their explanatory power is evident in ascetically-induced changes in perception and mental functioning associated with restricted environmental stimulation (Bradford, 2008, 2011a).

Language

"Language elements are not integral to mystical states.... language elements are at best peripheral to the core experiences" (d'Aquili and Newberg, 1999, p. 117). Mystical experience is ineffable. The view is misinformed and common in the neuroscientific study of mystical experience (e.g., Saver & Rabin, 1997). Language elements can be integral to mystical states. An example is *gematria* in ecstatic kabbalism (Idel, 1988a, 1988b). Another, in the Buddhist tradition, is the "tetralemma," a form of verbal-conceptual analysis that can elicit awareness of the "empty" or insubstantial nature of phenomena (Garfield, 2001).

Autonomic Arousal

Another strength of neurotheology is the importance assigned to autonomic activity in mystical experience. Gellhorn (1967; Gellhorn & Kiety, 1972) is referenced in this context, but not Fischer (1971, 1975), whose novel extensions of Gellhorn's work recur in neurotheological explanations. In Fischer, patterns of disequilibrium in the activation of the branches of the autonomic system have distinct expressions in mystical experience. The Orthodox practices and experiences called "the gift of tears" and "warming of the heart" are subject to interpretation based on Fisher (Hausherr, 1982; Sinkewicz, 2003; Ware, 2005). Both involve variable and temporally extended patterns of autonomic arousal (Bradford, 2008).

Limbic Arousal

The presentation of the neurotheological explanation of limbic arousal and mystical emotion calls for prefatory remarks about the associated physiological changes. The explanation turns on the reciprocal activity of the lateral and the ventromedial nuclei of the hypothalamus, the "head ganglion" of the autonomic system. In general terms, the lateral nucleus engages emotional arousal and regulates the sympathetic division of the autonomic system; the medial nucleus dampens intense emotional and motivational states and regulates the parasympathetic division (Joseph, 1996). In neurotheology, the former dominates when mystical experience involves a sustained period of ecstatic emotion, and the latter when the experience culminates in profound quiescence.

The neurotheological explanation begins with efferent "impulses arising from the totally deafferentated right and left orientation association areas" (d'Aquili & Newberg, 1999, p. 113). The impulses "pass through fiber tracts primarily to the hippocampi but also to other limbic structures" and on this basis "determine the steady state of the limbic system during the period of AUB" (p. 113). The so-called "steady state," whose principle expression is ecstatic emotion, constitutes the base state, whose subsequent development leads to one of two emotional outcomes: In the first, the descending hypothalamic impulses "reinforce the initial ecstasy by ... reinforcing the arousal hypothalamic discharge" (p. 113). The ongoing ecstatic state, which signals awareness of AUB, is "interpreted (after the fact) personally, as an immediate experience of, or union with, God" (p. 113). In the second outcome, the impulses "switch [the] balance from ecstasy to a deep and profound quiescence by allowing the quiescent hypothalamic structures to regain dominance" (p. 113). This "experience of AUB is interpreted impersonally, as the peace and emptiness of the absolute ground of being.... [or] as a deep quiescent void or Nirvana" (p. 113).

The centrality of hypothalamic activity situates mystical emotion in "the most primitive, archaic, reflexive, and purely biological aspect of the psyche" (Joseph, 1996, p. 177). Here, neurotheology's neglect of asceticism weakens its interpretation. In ascetic life, the mental and behavioral expressions of this aspect of the psyche are brought to consciousness and dissected with the aim of mastering their effects on mind and body (Bradford, 2011a). The Christian ascetic calls the result *apatheia*, the Buddhist speaks of *viraga*. Both are translated "dispassion" and both anticipate mystical experience. Either asceticism raises the reptilian brain to the level of mystical aspiration or neurotheology overplays its hand in situating mystical emotion in the archaic, primitive, and reflexive aspect of the psyche.

God, nirvana, ground of being

The two outcomes call for closer analysis. In the first, ecstatic emotion is a means of personification through which AUB assumes characteristics of a divine agent. "God" indicates a second-order inference based on ecstatic emotion rather than a cognitive grasp of immediate circumstances. Ecstatic emotion is the core experience; a specifically divine manifestation is *post hoc* and epiphenomenal. The view errs in neglecting what James (1902/1953) called the "noetic" dimension of mystical experience.

The second outcome is identified as nirvana and the ground of being. This is a confusion of terms. The Christian roots of "ground of being" are assumed in neurotheology. In matching "ground of being" and "nirvana" the authors presumably relied on renditions of Buddhist sources that obscure religious ideas that are incompatible with classical theism and substantialist interpretations of ultimate reality. Historically, "nirvana" does not indicate only one idea or type of experience. In presenting Buddhist material, neurotheology consistently excludes interpretations that are incompatible with the Western worldview and the Judeo-Christian tradition. It does not accommodate essential features of the Buddha's enlightenment, such as freedom from future rebirth and insight into the law of karma (Hamilton, 2000).

Ecstatic emotion

Neurotheology's emphasis on limbic arousal and ecstatic emotion has a long history in the neuroscience of religious experience (Devinsky & Lai, 2008; Kelly & Grosso, 2006; McNamara, 2009; Schachter, 2006). Contrary to common opinion, not all mystical experiences are ecstatic and some are non-emotional in the ordinary sense of "emotion." An example is "true prayer," the ultimate contemplative state in the spirituality introduced by Evagrius Ponticus, possibly the most influential ascetico-mystical theologian of the Christian tradition (Konstantinovsky, 2009; Sinkewicz, 2003; Stewart, 2001). Another example is "stillness" (*hesychia*), a major teaching in Orthodox spirituality (Bradford, 2008; Moore 1978; Spidlik, 2005).

UNIFIED UNDIFFERENTIATED ONENESS

Spatial Perception

The "total deafferentation [of the right orientation association area] can only result in an absolute subjective sensation of pure space.... [which is] experienced as absolute unity or wholeness" (d'Aquili & Newberg, 1999, p. 112). Unity, wholeness, and oneness are attributes of AUB. Granted the deafferentation of the right orientation association area, the body image that grounds personal experience ceases to function. Deafferentation of the left orientation association area has already erased the sense of personal identity. Phenomenological enquiry is needed at this point but not provided.

Consider the following questions, all concerned with the space that conveys unity and wholeness:

1. Is the shape of the space spherical or disk-like, or does it have some other topography? Previc's (1998) outline of the "action extrapersonal system" is relevant. This is one of four neurobehavioral systems responsible for operations in 3-D space. It orients spatially in terms of the horizon; the radial extent of its operative zone is 360°. These features suggest its role in mediating extracampine hallucination and the perception of a possibly vast expanse of ambient space. The space that conveys unity and wholeness is probably disk-shaped, analogous to the visual space rimmed by the horizon that can be seen at sea, or while turning and gazing along the horizon in a vacant desert.
2. Is the space dense or ethereal and thinly composed? Brown (1988, 2002) discussed the seeming denseness or thickness of the limbic-governed space of dream and hallucination. Granted the intense emotion and limbic arousal associated with the spatial perception, Brown's analysis implies that the space is dense rather than ethereal and thinly composed.
3. Is the space clotted with regions of varying denseness or homogeneous and uniform in composition? It is perceived as undifferentiated, which implies its homogeneity.

4. The space is pure rather than populated with objects. "There is no perception of discrete objects" (Newberg, 2010, p. 258). Is the purity a direct awareness or a second-order inference based on the absence of local objects? If memories of populated spaces constrain and mediate the perception, then the purity is a second-order inference. If memory has little or no influence, then the purity is a direct awareness.
5. Does the space have a discernible margin or is it infinitely extensive? A pure, infinitely extensive space could not be perceived, because the absence of points of contrast (either internal or external to the space) would prevent its entering awareness. The perceptual circumstance would be analogous to "white noise" and "whiteout." Recall that the body image and the sense of personal identity, having been rendered quiescent, are not present to stand in contrast with the spatial field. But "something" must stand against the field in order to establish sufficient contrast to promote its entering awareness. It is fair to assume that the space has a discernible margin and that "something" apart from the space stands in contrast, allowing it to enter awareness. This does not preclude the possibility that the space is *felt* as infinitely extensive due to the surpassing emotional plenitude of the experience. I assume that the spatial field has a discernible margin *and* is felt to be infinitely extensive. The nature of the "something" is hardly clear. Deity is one possibility, incipient unconsciousness is another.

These esoteric matters have empirical meaning in the practice and the neuropsychology of mysticism. Their significance in the present context is based on the neurotheological claim that awareness of the ultimate reality of AUB rests on the spatial perception that mediates the realization of unified undifferentiated oneness.

Circumambient Space in the Buddhist Tradition

Extraordinary forms of spatial perception have been investigated for centuries in Indian traditions. An example in Buddhism is the third of the so-called "formless meditations" (Govinda, 1974; Guenther, 1976; Harvey, 1995). The meditations are not conceived as conveying the one ultimate truth. In the third, mere space becomes the "object" of perception as mental forms are voluntarily and systematically relinquished. The spatial field fills and literally expands awareness and reaches its limit (*anca*) during a subsequent formless meditation. The monk Sariputta provides the following description in "Samyutta Nikaya":

> Here, friend, with the complete transcending of perceptions of forms, with the passing away of perception of sensory impingement, with nonattention to perceptions of diversity, aware that "space is infinite," I entered and dwelled in the base of the infinity of space. Yet, friend, it did not occur to me, "I am attaining the base of the infinity of space..." (Bodhi, 2005, p. 297)

Similar descriptions are attributed to the Buddha (e.g., Bodhi, 2000, p. 672; cf. Shaw, 2006).

The "base of the infinity of space" is an encompassing spatial field (p. 297). When "sensory impingement" ceases, an unbroken spatial field substitutes for "perceptions of diversity" (p. 297). This is consistent with a dissociation of visual and spatial representations such that space alone is the object of awareness, meanwhile visual representations are inhibited (Farah, Hammond, Levine, & Calvanio, 1988; Luzzatti, Vecchi, Agazzi, Cesa-Bianchi, & Vergani, 1998). The accomplishment can be interpreted as a shift in spatial frames in which the allocentric frame supersedes mundane phenomena modeled within the spatially-delimited frame of egocentric space (Jagaroo, 1999; Stein, 1991). The result is awareness of circumambient space, unmediated by discrete perceptual objects (Bradford, 2005).

Research on visuospatial perception in clinical cases and normal subjects provides guidance in understanding the neuropsychology of the formless meditation. I have italicized terms in the following formulations whose respective meanings highlight features of circumambient space:

1. Attneave and Farrar (1977) determined that memories and perceptual objects "coexist in a common, more or less *continuous representational space* that is presumably homomorphic with physical space" (p. 549). They concluded that "the invisible sector of space behind the head seems phenomenally continuous with the sector encompassed by the visual field in front" (p. 550). "The mind's eye has a cycloramic, 360° field" (p. 561).
2. The microgenetic analysis of visuospatial impairments discloses a "*unitary preobject space* ... [from which] the half fields of visual space differentiate" (Brown, 1988, p. 161). Each hemisphere has "access to a unitary visual field at a preliminary stage, certainly at upper brainstem, probably at even higher levels" (p. 167). A related characterization identifies "a deep level, unitary space ... [whose elaboration] occurs through the retino-tectal system" (pp. 167f.). Support for these inferences was drawn from the callosal syndrome and from "cases with midbrain or limbic hallucination [which] may not show a hemianopic tendency. The visual field is replaced by a scenic ... at times even cycloramic hallucination" (p. 167).
3. A neurologist and practitioner of *zazen* described "*circumspatial awareness*" as "a polysensory, integrated registration of space which we access in our usual everyday activities" (Austin, 1998, p. 496). When "highly energized ... [due to] physiological events [that] have surged through several levels from midbrain on up," circumspatial awareness is constituted by "vast, unbounded space" (pp. 496f). This expansive form of spatial awareness was attributed to norepinephrine-mediated activity within hippocampal "place" cells and networks of polysensory cells spanning midbrain colliculi, pulvinar, and temporal and parietal cortices.
4. As mentioned, the operative zone of the action extrapersonal system is 360°, which implies its capacity to mediate circumambient spatial awareness (Pre-

vic, 1998). The system's visual anatomy is composed of the ventromedial system; other aspects include posterior cingulate, superior colliculus, anterior thalamus, the ventromedial frontal area, and the superior- and medial-temporal areas. Previc (2006) attributed religious experience to the emotional potentials and upper-field spatial bias of this system.

The formulations highlight deeply situated structures and systems: midbrain, pulvinar, colliculus, anterior thalamus, upper brainstem. It is fair to assume that the meditation engages structures inferior to the temporolimbic area, whose mediation of circumambient spatial awareness is subliminal under normal conditions and further obscured by attentional focus on discrete objects rather than the spatial ground of their appearances. The cortical visual system detects and determines the position of particular objects. Circumambient space is the usually unnoticed field of perceptual appearances, like the proscenium that frames the stage but disappears in darkness when the spotlights are trained on actors going through their motions.

Neurotheology isolates a particular form of spatial perception and assigns it ultimate importance. In Buddhist sources, the experience is specific to one of a series of meditations, none of which bears ultimate significance. A comparable judgment occurs in Evagrius, whose writings on "first contemplation" refer to circumambient space as a "sky"-like "spacious region" (Bradford, in press; Dysinger, 1990). First contemplation is preliminary to true prayer; it is not an ultimate state of mystical awareness. In this respect, Evagrius's position on the spatial experience is like the Buddhist's, and both are contrary to the neurotheological claim about the ultimacy of the spatially-mediated experience of AUB. This indicates an inaccuracy in neurotheology and invalidates its primary religious claim.

Vedantic Variation on Circumambient Space

The spatially-mediated experience of AUB has parallels in the mysticism of the *upanisads* and Vedantic philosophy (Bowes, 1994; Raju, 1985; Zimmer, 1971). In this system of thought and practice, the self or *atman* is equated with *brahman*, the absolute reality that both transcends and pervades "this whole world" (Olivelle, 1996, p. 123). The mystical goal is to realize that one's self is the same as *brahman*. Certain texts suggest that spatial perception is integral to the realization. Here is an example from "Chandogya Upanisad":

> And take what people call '*brahman*' — clearly, it is nothing but this space here outside a person. And this space here outside a person — clearly this is the same as this space here within a person. And this space here within a person — clearly, it is the same space as this space within the heart" (p. 122).

"Heart" is both an anatomical and a psychological reference. Passages like the following make this clear: "This self (*atman*) of mine lies deep within my heart — it is made of mind" (pp. 123). In realizing the space within the heart, one knows

the self as *brahman*. The space "outside" a person is extracorporeal, the space "within" is intracorporeal, and the two are seamlessly joined during awareness of the pristine field of circumambient space (p. 122). Such is awareness of *brahman*. Similarities with the experience of AUB are evident.

Another parallel between AUB and *brahman* is the role of consciousness in the respective experiences. AUB is characterized as "pure consciousness" (e.g., d'Aquili & Newberg, 1999, p. 193). The Vedantic tradition addresses the conscious nature of mystical realization through identifying one of *brahman's* attributes as consciousness. *Brahman* is fully self-aware without need for an external vantage point, and the mystic participates in its consciousness through mystical awareness.

This is not to equate the neurotheological and the Vedantic views of mystical awareness. Neurotheology's supernaturalistic conception of AUB does not allow for the panentheistic aspect of the experience of *brahman*. The neurotheology of mystical experience would acquire a measure of validity if it narrowed its primary religious claim and defined its conception of AUB as a Westernized, neuropsychological interpretation of certain aspects of the experience of *brahman*. Neurotheology is not a comprehensive theory of mystical experience.

CONCLUSION

One characteristic of neurotheology's religious claims is overinclusiveness. This is obvious in the case of AUB. One reads in neurotheological publications that "God," "Christ," "Jesus," "Truth," "Absolute Reality," "nothingness," "rapture," "ecstasy," "pure consciousness," "absolute ground of being," "absolute union," "One Mind," "ultimate oneness," "*unio mystica*," "the ultimate trance state," "the primary epistemic/ontological state," "Buddhist void consciousness," "*sunyata*," "nirvana," "*brahman-atman*," not to mention the "Tao" — all refer to AUB (d'Aquili & Newberg 1999; Newberg et al., 2001). Similarly, AUB is the single outcome of diverse meditative and intellectual routines conducive to mystical experience. The kabbalist's *gematria*, the Sufi's *'fana*, the Christian's *via negativa* and *via positiva* — all result in the experience of AUB. With one stroke, religious pluralism is made to disappear and irreconcilable types of mystical experience are conflated. Neurotheology promotes the "monotheism" of Absolute Unitary Being, a golden calf of scientific overreach.

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