

LIMITATIONS ON THE NEUROSCIENTIFIC STUDY OF MYSTICAL EXPERIENCES

by Richard H. Jones

Abstract. Neuroscientific scanning of meditators is taken as providing data on mystical experiences. However, problems concerning how the brain and consciousness are related cast doubts on whether any understanding of the content of meditative experiences is gained through the study of the brain. Whether neuroscience can study the subjective aspects of meditative experiences in general is also discussed. So too, whether current neuroscience can establish that there are “pure consciousness events” in mysticism is open to question. The discussion points to limitations on neuroscience’s capability to add to our understanding of the phenomenological content of mystical experiences.

Keywords: constructivism; meditation; mindfulness; multiple realization; mystical experiences; neuroscience; pure consciousness event; science of consciousness

With advances in noninvasive brain imaging technology, the last few decades have seen a marked increase in studies of the effects of meditation and other spiritual exercises (e.g., fasting, contemplative prayer, and liturgical practices) on brain activity and on other parts of the body. In particular, “mindfulness neuroscience,” which examines the neural mechanisms and systems supporting mindfulness meditation, has become a “hot topic” (Tang and Posner 2013, 1).¹ Neuroscientific scanning of subjects’ brains during meditation has become an important part of the budding field of cognitive neuroscience. The experiences apparently have reproducible and measurable biological effects (Lutz et al. 2007, 257). The effect of meditation on various physiological functions can be studied (e.g., changes in heart rate, skin resistance, breathing, or a general reduction of metabolic activity), as can changes in the autonomic nervous system and neurochemical activity in the brain. Meditation’s effect on such mental activity

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as attention, memory, perceptual sensitivity and processing, responses to stimuli, a sense of “self,” and the regulation of emotional states can also be studied. Meditative practices may also induce short- and long-term neural changes (Lutz et al. 2004; Lutz et al. 2015). Brain imaging technology is beginning to identify the areas of the brain affected by meditation. Different structures (e.g., the left amygdala and right hippocampus) are also drawing attention.²

The results of these examinations have garnered enthusiasm by both the religious who believe the results prove that mystical experiences are cognitive (e.g., Bearegard and O’Leary 2007) and materialists who believe that the results prove mystical experiences are only brain events and refute religious claims (e.g., Persinger 1987).³ Even a critic of “neurotheology” claims that “[t]he cognitive neurosciences have extremely rich potential for the study of consciousness, mental states, and senses of the self” (Geertz 2009, 319).⁴ There are, however, problems with current neuroscience that suggest limitations on what neuroscientists today can reveal about the nature of mystical experiences. Two of these problems are revealed by discussing one set of experiments (the Newberg–d’Aquili experiments) and one issue in the study of mystical experiences (constructivism).⁵

However, before addressing these problems, three preliminary points must be made. First, it is hard to doubt that there must be a biological basis enabling mystical experiences to occur. These experiences, like all our experiences, are firmly embodied—these experiences are not disembodied transcendent events. Theists may argue that introvertive theistic mystical experiences involve a unique input from God alone. Nevertheless, there must be some basis in the human anatomy that permits God to enter our mind. The Dalai Lama suggests that there may be no neural basis for a transcendent “pure consciousness” (Gyatso and Goleman 2003, 42), but even if such consciousness exists independently of the brain there still must be some basis in human beings permitting its appearance in us. That is, even if mystics realize a transcendent reality, there still must be some basis in the brain for this to occur, and so mystical states of consciousness must somehow be mediated by the neurological processes in the brain. Like all experiences, mystical experiences apparently have neural substrates and a biochemical basis in our brain—some brain activity will be occurring when a mystical experience occurs. Mystical experiences do not differ from any other experience in this regard. As professor of behavioral medicine Richard Sloan says, “there is nothing at all remarkable about reporting that ecstatic religious experiences are associated with a neurological substrate” since “all human conscious activity, religious or otherwise, has an underlying counterpart in the brain” (2006, 247, 249). Nor is there any reason to doubt that, like other experiences, scientists can study the brain as these experiences occur and that they may be able to identify their neural and

other biological bases. Thus, pointing out neurological bases in no way begs the question against mystical cognitivity: even if these experiences produce an insight, they need a biological basis to appear. For this reason, merely locating the neural basis for mystical experiences does not by itself establish grounds for reducing those experiences to mere subjective events generated by the brain alone—all that the sciences can establish is that certain altered brain states are associated with these experiences (see Jones 2016, chap. 4).

Second, whether mystical experiences are delusory or involve a genuine insight into the nature of reality, today it is increasingly becoming accepted that they are connected to observable neurological events: mystical experiences are “real” and are distinct from other types of mental phenomena and are not merely products of imagination (Newberg et al. 2001, 7, 143). Much mental activity involves more than one area of the brain, and mystical experiences may too, but there is evidence of distinctive configurations of brain events uniquely connected to mystical experiences. According to Andrew Newberg, experiences of enlightenment “cause long-term changes that affect the emotional and cognitive centers of the brain” and “are real in that they are related to specific neurological events that can permanently change the structure and functioning of the brain” (Newberg and Waldman 2016, 42, 25). The experiencers are neurologically transformed. However, by “real,” the neuroscientists mean only that mystical experiences are *genuine neurological events that can be observed and measured*, rather than merely wishful thinking or only ordinary experiences interpreted as mystical.⁶ Experiencers often believe that what they experienced was as real or more real than everyday reality and that this affects them emotionally, and that feeling often persists long after the mystical experiences are over, unlike with dreams. However, scientists are remaining neutral on whether these experiences are authentic encounters with a transcendent reality or are delusions (e.g., Newberg et al. 2001, 143, 178–79). Thus, two senses of “genuine” must be distinguished in these studies: establishing that mystical experiences are unique, genuine experiences distinct from other experiences, and establishing that the experiences convey a genuine insight. Neuroscience can do the former but not the latter. In sum, “[p]eople may or may not actually be connecting to God or the supernatural, but ultimately there is something very powerful going on *inside* the brain” (Newberg and Waldman 2016, 25).⁷

Third, meditation has effects on the body. Calming the mind during meditation at a minimum will probably calm and stabilize some biological functions. There is no reason to deny that such effects may be measurable in different ways. Nor is there any reason to doubt that neuroscientists will eventually identify the exact parts of the brain that become more active or less active in such experiences as indicated by electrical activity measured in electroencephalograms (EEG), by the magnetic fields produced by

electrical currents occurring in the brain during meditation measured in magnetoencephalograms (MEG), and by blood flow measured by the newer functional magnetic resonance imaging (fMRI), positron emission tomography (PET), and single photon emission computed tomography (SPECT). EEG and MEG currently remain more fine-grained than the other procedures. Establishing a one-to-one correlation of conscious states with physical states of the brain would permit the stimulation of the mechanisms at work in the brain during mystical experiences, thereby enabling an experience. For a true correlation, there must be a one-to-one relation of changes in states of consciousness with changes in bodily states. All the phenomenological content of the experiences also must be accounted for. Different neural and physiological bases and explanations are currently being proposed (see Lutz et al. 2007; Schjoedt 2009; Yaden et al. 2017 for overviews). Meta-analyses of the models to date show that they are contradictory—even the collected data is not totally consistent (Lazar et al. 2000; Ospina et al. 2007; Sedlmeier et al. 2012; Clausen et al. 2014)—but this does not rule out advances in the future and eventual consensus.

The religious may object that testing for mystical experiences may be “putting God to the test,” but neuroscientific studies of meditators does not reduce religion to something other than what it is or trivialize the transcendent aspects of religion: merely looking at the measurable physiological effects of mystical experiences does not make the effects a substitute for religion or otherwise reduce religion to something it is not. So too, letting themselves be studied does not reduce meditators to objects or otherwise dehumanize them or alter what they are doing. Meditators also can acknowledge the biological effects while still maintaining that their objective in their practice is quite different than anything scientists measure, just as they can agree that mystical experiences last a certain measurable amount of time even though they seem timeless to them. Meditation for classical mystics is part of an encompassing way of life with a spiritual goal: mystics are not meditating to make their alertness per se better or to explore various states of consciousness in an open-minded scientific manner as ends in themselves—they are not disinterestedly formulating and testing theories but trying to see “reality as it truly is” (as defined by their religious tradition) in order to align their lives with how things really are in order, for example, to end suffering or to attune their will to God’s will. The popularity of meditation today may be because of its psycho-physical effects, but these are at best secondary to the spiritual goals of mystics. Nor are classical mystics interested in relaxation rather than greater alertness in their awareness of true reality. Nor are they interested in subjective experiences themselves—meditation is to stabilize their attention and to empty their mind of extraneous content in order to see reality clearly.

THE NEWBERG–D'AQUILI EXPERIMENTS

In 1993, Andrew Newberg and Eugene d'Aquili (Newberg and d'Aquili 1999; Newberg et al. 2001) conducted experiments on experienced meditators—three Christian Franciscan nuns and eight Tibetan Buddhist monks—using single photon computed tomography neuro imaging technology to measure blood flow in different areas of the brain during meditative experiences. By observing the limbic system of the right temporal lobe, the thalamus, the prefrontal cortex, and the parietal lobes they found that certain “concentrative” meditative techniques (which focus attention upon one object) led to the hyperactivation of the limbic system through the overload of sensory and kinesthetic stimulation, while certain “emptying” meditative techniques (which lead to monitoring mental activity without trying to control it) also led the hyperactivation of the limbic system through sensory deprivation (Newberg and d'Aquili 1999, 110–16). The decrease in neural activity in the frontal and parietal lobes can be sudden and dramatic; the decrease of activity in the frontal lobe leads from a sense of being in control to a sense of surrender (Newberg and Waldman 2016, 86).⁸ The researchers hypothesize that both the overload of sensory and kinesthetic stimulation and deprivation of such stimulation lead to the partial or total elimination of neural signals to the orientation and association areas of the parietal lobes in the right and left hemispheres of the brain that are responsible for maintaining both a sense of a “self” separate from the rest of the universe, and that a sense of one’s body in space lead to mystical experiences—that is, a loss of any sense of an individual self that has any spatial boundaries at all (producing a sense of selflessness).⁹ The decrease of activity in the parietal lobes was accompanied by an increase of activity in the prefrontal cortex in the right hemisphere related to attention, focusing, and concentration.¹⁰ (It should be noted that, while scientists focus on specific areas of the brain during meditation, in any mental event the different areas of the brain still show a holistic coherence of activity.) When combined, these lead to a sense of being absorbed into an infinite spaceless and timeless void.¹¹

Newberg and d'Aquili's experiments have drawn criticism. Edward Kelly and Michael Grosso slam their work as bad science unpublished in peer-reviewed publications and their theological model of an “Absolute Unitary Being” as “little more than a neurological fairy tale” (2007, 537–38). Richard Sloan also concludes that Newberg and d'Aquili speculate too broadly based on two small SPECT studies with a total of eleven subjects and no control group (2006, 247). In fact, the diverse methodologies and the neuroscientific findings themselves in all studies of meditators have been questioned (e.g., Cahn and Polich 1999; Azari 2006; Ratcliffe 2006). Brian Lancaster (2005, 251) can reasonably ask if current neuroimaging technology shows only marginal changes in blood

flow, whether that is sufficient to claim that there is “strong support” for the existence of a pure consciousness (Newberg and d’Aquili 1999, 118). As Newberg and Bruce Lee admit (2005, 477), it is not clear what degree of change in blood flow should be considered a relevant change—10 percent? 20percent? Indeed, critics today dismiss the entire enterprise of trying to identify a locus in the brain of any behavior or complex mental event as “the new phrenology” (Uttal 2001).

The Newberg–d’Aquili experiments are, of course, also limited by their focus. There are two different classes of mystical experiences with different types of experiences within each: “introvertive” and “extrovertive” (Stace 1960, 62–22; see Jones 2016, 31–34 for a typology). And there is empirical evidence suggesting that the brain functions differently during these two different classes of experiences (Hood 1997; Dunn et al. 1999). Consistent differences in neurological readings between different types of extrovertive and introvertive mystical experiences would strongly suggest a difference in the states of consciousness involved. So too, neuroscientists can distinguish concentrative and mindfulness meditation (Valentine and Sweet 1999), and these may well generate substantively different neurological states because the former requires focusing the mind on an object (leading to “one-pointedness” of mind) while the latter requires the opposite (letting the mind observe whatever it observes, leading to an “expansive” state of mind). And within the basic concentrative and emptying meditative tracks, there is also a plethora of techniques (see Andresen 2000; Shear 2006) that may also generate different neurological states. The Newberg–d’Aquili experiments involved concentrative introvertive type of techniques, and the question here is whether there may be different neural states for those introvertive mystical experiences with differentiated content and those without such content. There are many different types of extrovertive and introvertive mystical experiences, and there is no reason in advance of research to believe that the physiological and neurological bases are the same in every case. (Scientists would also have to account for “spontaneous” mystical experiences, i.e., experiences that are not sought but occur totally unexpectedly to persons with no meditative or other spiritual preparation and without ingesting drugs. Scientists must explain what triggers such experiences and determine if the neural base is the same as experiences occurring in the lab.)¹² If so, different neurological explanations would be needed for each case. In a related matter, do different meditative techniques lead to the same states of the brain in all meditators? Or can the same techniques lead to different brain states in different meditators?

However, one aspect of their experiments has been overlooked: Newberg and d’Aquili got *similar neurological readings* for both groups, and yet the Christians and Buddhists claimed to have had *radically different experiences*—the Christians experienced being “united with God” and

Buddhists experienced being “endless and intimately interwoven without everyone and everything the mind senses” (Newberg et al. 2001, 6–7). The two groups had entirely different practices, but the unity experience affected the same areas in everyone’s brain (Newberg and Waldman 2016, 91). All subjects showed a slowing of activity in the posterior superior parietal lobes (Newberg et al. 2001, 4–5).¹³ Since scientists measure all brain activity, the possibility that current neuroscience is measuring the wrong aspects of the brain when it comes to mystical experiences can be ruled out. (SPECT does not scan the subcortical structures such as the thalamus.) Newberg and d’Aquili report only “*similar neurological readings*” from their experiments with Christian nuns and Buddhist monks. Perhaps their data could be reexamined to see if there are in fact subtle differences between the two groups. Perhaps differing periods of time spent on various practices produced different brain states. Most naturalists would assume that there must be unique neurological bases for each type of mystical experience, but current SPECT technology examining blood flow may not be finely grained enough to expose differences if there were any. If neuroscientists are currently measuring the correct neural basis, is the technology simply not yet fine-tuned enough to measure the neurological differences? More precision may be necessary to reveal if there are more subtle differences in the Christian and Buddhist meditators’ brain activity.

But let us assume that the Newberg–d’Aquili results are replicated by independent researchers, and that therefore there is objective evidence that nontheistic and theistic meditators produce the same brain activity during the two types of introvertive meditative experiences. This raises two important issues for the question of whether neuroscience provides any understanding of these experiences. First, did the nuns and monks have truly *different experiences*, or did they merely *interpret* (or misinterpret) the *same experiences* differently when they looked back on the experiences after they were over? If the former, this would support constructivism: the conceptual framework of the nuns and monks shaped their experiences, and they had precisely the type of experiences that their religious traditions dictated. If the latter, this would be strong evidence against the constructivist explanation of mystical experiences: the nuns and monks applied their conceptual framework after the fact to experiences that were themselves free of such structuring.¹⁴ This would present a problem for first-person reporting: scientists would have to dismiss these accounts as what William James called “overbeliefs” and try to confine their attention to only the experiencers’ more phenomenological descriptions of what the experience felt like. But the general reliability of the experiencers’ accounts would be called into question if doctrinal interpretations are inherent in their descriptions.

Second, if these nuns and monks had genuinely different experiences, does this mean that the same neurological bases were present for different

states of consciousness? Can the same brain states have different states of consciousness associated with them? If so, it would be the inverse of the “multiple realizability” question in philosophy of mind—that is, does each mental event or state have a unique set of brain conditions, or can the same mental events and states be realized by different neural configurations (see Jones 2013; Polger and Shapiro 2016, 38–39, 47–48)? Many different experiences may have to involve the same general neural activity, but even two similar sense perceptions would not have exactly the same neural states—each mental event would have a unique neural configuration unless it is multiply realizable. Here the problem is the inverse: can exactly the same set of neural events underlie two different mental events? Can we be certain that similar third-person data for different meditators means similar experiences (Schmidt and Walach 2014, 3)? Does statistical averaging hide the highly individual nature of brain patterns? That is, statistical analysis washes out the “uniqueness of individual patterns and single events” during meditative sessions (Hinterberger 2014, 96). For example, advanced meditators may have significantly different brain states than do novices in the same group since the former can activate the desired mental states with little activity while the latter require more work. There is no one simple “signature” of all meditative states even when the same meditative technique is involved.

If different experiences in fact did occur in the Newberg–d’Aquili experiments, it would mean that radically different experiences can occur with the same neural base since the Christians and Buddhists had radically different experiences—one with differentiated content and one without. Indeed, their entire altered states of consciousness might have been quite different, not merely different experiences within the same state of consciousness.¹⁵ This would wreak havoc with the idea that the brain and mind are identical or that the brain causes mental states: each unique configuration of brain events would not have only one unique mental event associated with it—each experience would still have a corresponding brain state but not a unique one. Thus, neural states could not determine, or be identical to, mental states. The meditative technique may have the same effect on the brain, so that the brain conditions are the same, and yet different mystical or other altered state of consciousness experiences occur. More exact neurological bases of these experiences may be found in the future that do establish one-to-one correlations of experiences and brain states—meditative mental states could not be associated with unique states of the brain. But without such a one-to-one correlation, a neuroscientific explanation of mystical experiences is not possible: all mystical experiences would be grounded in the body in some brain state, but simply identifying the brain state would not explain why a given experience was realized in that brain state. Nor would an explanation rule out that that experience might be realized with another brain state.

CAN MYSTICAL EXPERIENCES BE STUDIED SCIENTIFICALLY?

Thus, inverse multiple realization, if established, would eliminate the possibility that neuroscience under its current approach could inform us about the nature of mystical experiences—establishing the neural base of these experiences would not be able to tell us even what kind of experience is occurring. Even if we assume that solid scientific data has been established or will be in the future, it would still be hard to argue that neuroscience studies mystical experiences at all. It is not as if mystical experiences are observed by examining certain activity in the brain. Are neuroscientific findings simply irrelevant to questions of the nature of mystical experiences? Consider the well-known problem of a gap between brain conditions and consciousness (Chalmers 1995, 205; Jones 2013, 109–10): how do we get from the action of matter in the brain to something completely different, the felt experiences and other subjectivity of the mind? The gap is not just metaphysical but also methodological, explanatory, and conceptual in nature. No analysis of matter suggests the presence of phenomena of a radically different nature or why it should appear. Eliminationists in the field of cognitive science simply deny subjectivity altogether—for them, studying the brain is all that is possible or needed. Reductionists reduce all mental phenomena to brain activity, and so studying the brain *is* studying conscious experiences (see Jones 2013, 98–102). But for the rest of us there is an issue here: can *experiences* themselves be studied scientifically?¹⁶

If neuroscientists can study experiences, the scientific study of meditators and persons undergoing mystical experience potentially would add a new way to study mystical experiences, not merely the brain. But the gap problem presents a very real issue of whether the *subjectivity* inherent in any experience can be studied *scientifically* at all. Identifying what is going on in the brain when a mystical experience occurs is one thing; what meditators actually experience is quite another. To study the former events is not to study the “lived” experience itself—the felt sense of selflessness, unity, timelessness, or whatever.¹⁷ In consciousness studies, there is the problem of the felt aspects of such states as sense-experience and pains—qualia—versus the physical activity in the brain occurring during those experiences (see Jones 2013, 106–09, 122–24). Because qualia remain experientially other than brain mechanisms, they cannot be explained away by identifying the base in the brain permitting them to occur—the first-person sensation of seeing the greenness of grass is not reducible to the sum of the physical events occurring when we look at grass. For antireductionists, there is the same unbridgeable difference between the physical and subjectivity in general—all our first-person experiences of thoughts, emotions, and so forth. Subjectivity always has a private inner dimension that any corresponding neurological activity cannot have. Scientists may well be able to reduce some mental functions to the mechanical operation

of physiological states, but this subjectivity cannot be reduced. Indeed, subjectivity—what something seems like to an experiencer—cannot be studied at all by examining the electrochemical activity of the brain. No third-person account can capture first-person experiences. In sum, first-person experiences are an irreducible field of reality, and thus we cannot reduce the first-person ontology of consciousness to a third-person objective one. Thus, the reductionists' method of explaining any x in terms of non- x will not work here precisely because what is to be explained is not something with physical properties, and physical properties can only explain other physical properties.

In addition, meditation appears to be a case of the mind affecting matter: apparently it can rewire the brain. It can effect functional and structural changes and even increase the density of gray matter (Schwartz and Begley 2002; Lazar et al. 2005; Newberg and Waldman 2016, 41–63; Hölzel et al. 2011; Kang et al. 2013; Clausen et al. 2014; Newberg and Waldman 2016). On the molecular level, dopamine and melatonin increase, serotonin activity is modulated, and cortisol and norepinephrine decrease (Esch 2014). Meditation may affect genes—for example, stress-reducing practices may quiet genes that cause inflammation (Buric et al. 2017). In short, we can not only modify our mode of awareness but may be able to shape our mind to the extent that it is dependent upon the brain. If consciousness is a causal reality affecting the brain or other parts of the body, then neuroscience as practiced today is not merely incomplete but fundamentally misguided.¹⁸ Thus, research on meditation's effect on the brain may change science and thereby end up changing culture (Schmidt and Walach 2014, 5).

However, when scientists speak today of a “neuroscience of consciousness,” they are still referring to identifying the neural or other bodily basis of conscious events, not to studying the *subjective* side of these events such as the felt quality of qualia. There currently is no direct neuroscience of consciousness itself, and to speak of one is misleading: identifying the basis in the body of particular conscious events (e.g., identifying the areas of the brain that are more active when we sense colors or when we make moral judgments) is not getting into the conscious events themselves. Most importantly, the existing data to date cannot determine whether consciousness is identical to brain activity or is metaphysically different (Overgaard 2017, 3). Merely identifying the neural activity tells us nothing about what consciousness is or its nature or explains why it exists. Nor does it determine whether changes in the neural base cause changes in consciousness or vice versa, or why conscious events are correlated with material events at all—indeed, a correlation of phenomena is not an *explanation* of anything but only an additional item that needs an explanation itself. What Fritz Staal noted in the 1970s is true today: we do not know what the significance of a change in, say, a brain's alpha-wave frequency is (1975, 109).

Most basically, there does not appear to be any way to study the subjectivity of a person's consciousness itself by objective, third-person means. Religious practitioners with very similar backgrounds and amounts of meditative practice can produce very different EEG readings (Schmidt and Walach 2014, 3)—how can we utilize those readings to compare the practitioners' experiences? Moreover, no doubt scientists could conduct neuroimaging studies to demonstrate the differences in the activity of cerebral structures occurring while someone is listening to Beethoven or listening to white noise—but would this mean that this experience is explained by the activity of a specific brain region and that this is all there is to it (Sloan 2006, 253)? Would it tell us anything about the content of the different experiences? Subjectivity is not phenomenal, that is, it is not an object that can be presented for study. There simply is no way to present subjectivity itself for inspection or testing by others.¹⁹ Scientists can show that our conscious states are affected by changes in brain states, but this does not mean that studying those changes tells us anything about those states.

With their success in the study of brain activity, it is easy to see why neuroscientists may miss the philosophical issues and claim to be producing a “theory of consciousness.” But as things stand, neuroscientists are only studying something closely associated with the appearance of consciousness in us—its bodily underpinnings—and not consciousness itself. They study the state of the brain during an experience, not the experience itself or consciousness in general. In sum, as David Chalmers (1995) labeled the situation, neuroscientists study the relatively “easy problem” of identifying neural bases to types of mental activity (perception, memory, and so forth) and have not tackled the “hard problem” of consciousness itself—how and why conscious events accompany physical ones.²⁰ Even if consciousness is an illusion, how is such a phenomenon possible in a material system?

Any third-person experience of brains does not give us knowledge of anything but an object, and subjectivity cannot be made into an object: even if the mind and the brain are materially identical, there is an “inside” to experiences that cannot be studied from the “outside” by examining the brain. Neurological scanning can only show what the brain is doing or not doing during an experience but not the experience itself. Even the emerging technology that “reads minds” only reads brain states, not experiences. No scientific account of the mechanisms active during sense-experience or self-awareness can make us understand what it is like actually to experience those states. In sum, no accounts of phenomena in purely third-person terms would ever even suggest the existence of, much less explain, the subjective qualities that constitute the bulk of our conscious life (Shear and Jevning 1999, 189). Even some neuroscientists see limits on what neuroscanning can accomplish concerning consciousness (e.g., Shulman 2013).

This general inability of one person to witness what another one experiences applies equally to meditative experiences. Mystical experiences more generally also no doubt share the consciousness gap with other conscious phenomena—even mystical “knowledge by participation” does not bridge the gap between the subjective felt experience and the objective brain events underlying the experiences. Again, this means that scientists do not study mystical *experiences* at all when they study the biological basis of an experience (see also Jones 1986, 219–22). Even if previous experiences can be reproduced by the meditators themselves during scientific experiments, the inability of others to see what is going on will always limit any science of meditation. A “science of meditative experiences” would not be achieved by a science of a meditator’s brain. Even when a neuroscientist who had mystical experiences—Mario Beauregard—speaks of a “new scientific frame of reference” that goes beyond materialism, he still ends up speaking only of the scientific investigation of the neural, physiological, psychological, and social conditions favoring the occurrence of mystical experiences (Beauregard and O’Leary 2007, 294–95), not consciousness. So too, measuring the spiritual or religious significance that an experiencer sees in these experiences after the experiences are over is not in any way measuring the experiences themselves. And as of yet little is known about the neurobiological processes involved in meditation and about its possible long-term impact on the brain (Lutz et al. 2007, 500).²¹ The biological studies of meditation to date have not produced anything dramatic about what is occurring during meditation but only their effects on the brain and the body. The same holds today as Sloan said twelve years ago: scientific studies reveal the “entirely unremarkable findings” that during meditation the areas of the brain associated with concentration and attention show increased activity compared to other regions (2006, 247–49).

In addition, the inverse multiple realization problem must be mentioned again: apparently different states of the mind can have the same biological bases. Herbert Benson found that there is a great variety of “subjective” (i.e., experiential) responses—including no change of consciousness at all—accompanying the same physiological changes produced by his simple relaxation techniques (Benson and Klipper 2000, 130). Even if other meditators can duplicate the physiological state of the brain of an enlightened mystic, how can we know that the subjective state of consciousness is also being duplicated? The different experiences that the Christians and Buddhists had (if that is the case) in the Newberg–d’Aquili experiments show this. One’s beliefs and expectations apparently play a role in some experiences, but different states of mind apparently share the same bases in the brain. Thus, the explanation of the experiential level would still be missing from any neuroscientific account, as would why reality permits the higher level events to occur at all.

THE QUESTION OF “PURE CONSCIOUSNESS EVENTS”

Steven Katz (1978) introduced constructivism into the field of philosophy of mysticism—that is, the idea that all of our experiences are structured by cultural concepts from an experiencer’s cultural environment. As he put it,

[L]et me state the single epistemological assumption that has exercised my thinking and which has forced me to undertake the present investigation: *There are NO pure (i.e., unmediated) experiences.* [Neither] mystical experiences nor more ordinary forms of experience give any indication, or any grounds for believing, that they are unmediated. That is to say, *all* experience is processed through, organized by, and makes itself available to us in extremely complex epistemological ways. The notion of unmediated experience appears, if not self-contradictory, at best empty. This epistemological fact seems to me to be true because of the sort of beings we are, even with regard to experiences of those ultimate objects of concern with which mystics have intercourse, e.g., God, Being, *nirvana*, etc. (1978, 26, emphasis in the original)²²

He has modified his stance somewhat since then (Katz 2014), but the core belief that all mystical experiences must be mediated by religious and other cultural expectations has remained intact. Constructivists would employ the recent “predictive processing” model in neuroscience to explain how such cultural structuring could occur: the brain generates expectations and predictions based on prior experiences and then interprets any new input accordingly; the brain also constantly compares its predictions with the input and can alter its expectations when a mismatch with predictions leads to errors (see Griffiths et al. 2008; Clark 2013). “Nonconstructivists” can counter by raising the issue of whether meditation through a process of emptying the mind of all differentiated content can eliminate any basis or means for such expectations and predictions, leaving any input bare of cultural structuring.

Robert Forman (1990) argues for such a nonconstructivist alternative: at least some mystical experiences are not structured by any cultural beliefs (or any innate cross-cultural Kantian structuring)—that is, some mystical experiences are direct and unmediated “pure consciousness events.” That is, mystics in different traditions *interpret* experiences that are empty of all differentiated content differently in light of their cultural beliefs *after the experience is over*, but this does not mean that the actual phenomenality of their experiences must also be different in different cultures. There may be no description that involves no interpretation whatsoever to some degree (Stace 1960, 203), but such a description may not be active during the experience itself. As Ralph Hood puts it, “[e]xperience need not be socially constructed even though knowledge about it is (2002, 10).” Mystical knowledge is a “knowledge by participation” in which there is no distinction of the knower and the reality known, unlike ordinary “knowledge by acquaintance” in which construction by cultural phenomena is possible.

Something of the pure consciousness events is retained: after the experience is over, the experiencer realizes that he or she had the experience (even if during the experience itself there is no sense of a subject or of ownership) and that the experience took time (even if during the experience there is no sense of time passing or of “before” and “after” during the experience since there was no differentiated content that changes and thus is “timeless” or an “eternal now”). Realizing these things after the experience is over does not mean that those concepts must have been present during the experience. So also something of the experience’s content must be remembered—for example, a general sense of fundamental reality, nondualism, and profound importance—or there would be no grounds to advance a theory about what was experienced or to reject any other theory.

Katz presents no scientific evidence showing that all experiences are culturally constructed—he admits it is only a *philosophical assumption* based on what sort of beings he takes humans to be (1978, 26). He might try to ground his theory neurologically by invoking the plasticity of the brain: culture apparently can rewire the brain, and so mystics in different cultures bring different neurological states to their experiences that were shaped by their prior beliefs and training, and so their experiences must be different (Goldberg 2009, 329–30). Thus, no experience could be universal. However, nonconstructivists can reply that if there is no differentiated content in the experience of pure consciousness, it still remains true that there is nothing to be structured in the experience. Thus, whatever differences in the wiring of the brains that various mystics have in other regards, as long as they can have an experience that appears to them as empty of differentiated content, the experience must be the same for all experiencers and thus be universal. That is, the states of the brain would be invariant regardless of culture, and whether these states are either responsible for or permit a pure consciousness mystical experience, the experiences would be the same in all cultures.

Katz also believes that there is no “substantive evidence to suggest that there is any pure consciousness” achieved by meditative practices (1978, 57). Most naturalists believe that there can be no consciousness without an object being present: consciousness is inherently intentional—when there is no object, there is no consciousness. John Searle states, “Conscious states always have a content. One can never just be conscious, rather when one is conscious, there must be an answer to the question, ‘What is one conscious of?’ (1992, 84).”²³ But some neuroscientists and psychologists are quite conformable with accepting that such a “pure” experience can occur (e.g., Sullivan 1995; Peters 1998, 13–16; Newberg and d’Aquili 1999; Hood 2006). If so, some experiences are not experiences *of* anything and are not intentional. In addition, there is evidence that some cognitive content of experiences may not be very susceptible to cultural influence (Nisbett et al. 2001, 305–06) and thus would be culturally invariant. Some

mystical experiences may fall into that category. It must also be noted that the dogma in analytic philosophy that there is no nonconceptual content to perceptual states and knowledge is now being challenged (see Peacocke 1992, 2001; Van Cleve 2012; Bermúdez 2015).

Personal reports also contradict constructivism for some mystical experiences. For example, the psychiatrist Philip Sullivan (1995) reported his own experience of an empty awareness of “something that was not nothing.” It was an experience that was devoid of content, and yet he was not unconscious but aware—an awareness without any subject of awareness or sense of personal ownership and without any object of experience. Only the transitional states back to the ordinary baseline state of consciousness that were separate from the pure consciousness event had any informational content (Sullivan 1995, 53, 57). He relies on reports from the history of mysticism for corroboration (Sullivan 1995, 54–55). Constructivists might challenge that corroboration, but they are not in a position to challenge the phenomenality of Sullivan’s own experience except by a dogmatic assertion of what must be the case. Ralph Hood (2006) also rejects the constructivist view of mystical experience and relies on interviews with persons who had mystical experience as evidence. And it may be that religious beliefs can affect the brain in such a way that there is no typical self-reference (“I,” “me,” “mine”) pattern on the neural level (Han et al. 2008 [concerning Christians]; Wu et al. 2010 [concerning Buddhists]).

Neuroscience would strike a conclusive blow against any thoroughgoing cultural construction of mystical experiences if it can establish a “pure consciousness.” Conversely, neuroscanning may not be able to distinguish one set of conceptual structuring from another (if all conceptualizing produces the same brain state), but perhaps it could show that the area of the brain responsible for such structuring is still active in all the cases of mystical experiences that researchers studied. However, one can still ask whether there is currently empirical evidence in neuroscience that a “pure consciousness” event may be neurologically possible. If there is no differentiated activity occurring during certain mystical experiences, there would be no way cultural concepts could affect the content of the experience and nothing for culture to affect. But can neuroscience tell us whether cultural concepts penetrate experiences? Can it show that meditation completely stills the conceptualizing activity of the mind? That is, can it show us that the conceptual mind is inactive during certain mystical experiences? Or can it show that there is no differentiated content in certain states of consciousness? Do some types of meditation quiet the parts of the mind that process concepts and does neuroscience find the basis of this in the brain?²⁴

In sum, if mystical experiences do vary from religion to religion and culture to culture, could neuroscientists detect and measure those differences and how they correlate with cultural phenomena? On the other hand, if

neuroscientists could establish that the areas of the brain that ground conceptual activity are partially or completely inactive during certain mystical experiences, that would make the idea that cultural phenomena affect these experiences difficult to maintain. The temporal lobe seems to be the locus of language, conceptualizing, and abstract thought, and this area does appear to have decreased activity altogether during mystical experiences (Newberg et al. 2001, 24–25), but some neural activity will remain present, and it may be that the areas of the brain grounding linguistic activity overlap the areas exhibiting increased activity during mystical experiences. If so, whether or not the experiences are culturally constructed could not be established by neuroscientists because the areas will be active for the mystical experience in either case. Moreover, there may be structuring of mental states that is nonlinguistic—for example, dogs know their owners and babies in a prelinguistic state know their parents. No one suspects that animals and infants are in a “pure consciousness” state of mind free of all structuring simply because they have no linguistic ability. Experiences can be structured by symbols, images, or other nonlinguistic cultural influences. Indeed, Noam Chomsky (2006, 76) believes that it is obvious that we can *think* without language—the mind is still manipulating concepts before they are converted into linguistic terms.

Thus, neuroscience may not be able to reveal whether some mystical experiences are empty of all cultural structuring. However, nonconstructivists can still rightly ask why completely stilling the conceptual activity of the mind is not possible, and how any cultural structuring could be occurring in some mystical experiences when the experiences seem phenomenologically to be empty of all differentiated content—there would be no content for conceptual structuring to operate upon. Meditators may well be unaware of all the activity going on in their brain and may see their experiences differently after they reflect upon their meditative experiences while in a dualistic state of consciousness after the experiences. Nonphenomenal subconscious mental states may affect phenomenal states even if we are only aware of the latter. Neuroscientists may be able to detect subconscious or nonconscious processing occurring before or during alleged pure consciousness events, and the issue then is whether they can establish that these processes are actively shaping the phenomenality of the experiences themselves. Peter Binns (1995) suggests that perhaps preconscious information processing of differentiated material underlies this experience—thus even bare awareness may be structured by cultural phenomena. Brian Lancaster (2005, 250) also believes that the fact that people claim to experience a contentless consciousness is an inadequate basis for presuming the reality of pure consciousness and that preconscious processes in the brain offer a bridge between the mystical and neuroscientific spheres of knowledge. But how would any preconscious processing change the empty consciousness phenomenological character of the

experience itself? If so, this would eliminate neuroscience from informing us about the nature of mystical experiences on the issue of constructivism.

CONCLUSION

All of the above discussion leads to the conclusion that there are major limitations on the significance that neuroscience can have for understanding the nature of mystical experiences: beside the general problem of the subjectivity of experiences in general, the possibility that the same neural base may ground different altered states of consciousness in meditation further removes the possibility of a true “neuroscience of mystical consciousness,” and the discussion of constructivism illustrates the limited utility of neuroscience for philosophical issues connected to mysticism. Neuroscientists may be able to establish that mystical experiences occur for persons with healthy brains and that mystical experiences are corrected to unique configurations of neural activity, thereby suggesting that the experiences involve altered states of consciousness rather than merely being different interpretations of more ordinary dualistic states of consciousness. Events in the brain may have a direct effect on the content of mental events, and to that extent studying the neural substrate of mystical experiences will help to *explain* the presence of certain content of what is actually experienced, but the *phenomenal characteristics* of that content of the actual experience will remain distinct. Thus, what the brain does during mystical experiences is not irrelevant to those experiences—all experiences are embodied. But the brain is not the mind, and studying the neural base of events occurring in the mind will remain limited for our understanding of the felt sense of a mystical experience. How the brain influences the mind and vice versa may remain a “black box” for scientists—scientists can observe the input and output but may remain foreclosed from examining how exactly that output is produced. (There, of course, is a metaphysical caveat here: if reductionism or eliminationism is correct, then studying the brain is studying the only reality involved in experiences.)

The situation may change, but for the foreseeable future neuroscientists will remain answering questions related to how mystical experiences are mediated by the brain—they will not be addressing the *nature* of mystical experiences. Learning how meditation or other mystical pursuits affect the brain and the rest of the body is in the end irrelevant from a religious point of view. In particular, there is no way to tell if brain activity *causes* mystical experiences or if meditation only *sets up* the necessary base-conditions in the brain for receiving contact with a transcendent reality in some cases (see Fingelkurts and Fingelkurts 2009; Jones 2016, 151–59). At best, neuroscience may lead to new meditative techniques in light of findings on how meditation affects the brain. But neuroscience remains only about the workings of the brain—the nature of the bases grounding

mystical experiences in the brain—not about the nature of the experiences themselves.

However, to end on a more positive note, even if neuroscience is not studying mystical experiences, meditation and mystical experiences are potential sources of new data for neuroscientists on how the brain works. Perhaps, as many classical mystics claimed, there is a unique mental functioning in mystical experiences distinct from reasoning and other experiences—for example, the “intellect (*nous*)” of Neoplatonic mysticism or the “*buddhi*” of some Indian traditions. Meditation may aid in understanding consciousness itself by clearing away the noise in most conscious states, thereby leaving a “pure awareness,” free of other activity. It may show that we are capable of controlling what were thought to be involuntary bodily processes or that we can train our awareness or our sense of compassion by specifically using compassion as a meditative object. Just as high-energy physics caused physicists to rethink aspects of Newtonian theory, so too developing “high-energy states of consciousness” may open neuroscientists to the need for new explanations (Wallace 2007, 167). This may lead neuroscientists to rethink the current materialist framework adopted by most neuroscientists that consciousness is simply an activity of matter or at most its product. Or perhaps not: merely because meditation may, for example, lower stress levels in the body does not mean that the mind is necessarily not a product of matter. So, too, “pure consciousness” events may be explainable in a materialistic framework, even if this requires dismissing these experiences as malfunctions. Thus, mystical experiences are perhaps unusual but perfectly ordinary subjective events generated by the brain that mystics typically misinterpret. Mystical experiences in themselves do not require that the mind is unattached somehow to the brain—even if mystical experiences are cognitive, the mind may still simply be the product of (or identical to) the brain. Thus, reductionists and eliminationists may argue that no new theory is needed even for pure consciousness events since they involve either a malfunctioning brain or a powerful feedback effect occurring when all sensory and other differentiated content is removed while one remains conscious that experiencers understandably but mistakenly take to be profound.

Nevertheless, it may be that scientists cannot develop an adequate understanding of consciousness using only the “instrumental/analytical” functions of the mind and any nonanalytical functions currently recognized by scientists. Unless mystical experiences can be shown to be the result of mental malfunctioning, scientists cannot ignore mystical experiences but also must account for the “receptive/contemplative” modes of both the extrovertive and introvertive mystical tracks. If so, scientists would have to accept these experiences as new data on states of consciousness (but not necessarily accept that mystical experiences provide insights into the nature of reality). So too, classical mystical analyses of various mental states, as in

the Buddhist Abhidharma traditions, may also be helpful for devising new hypotheses about how the mind works (Lancaster 2005). If scientists revise their theories in light of mystical knowledge claims about consciousness or perception, this would be an instance of mysticism contributing to science (see Goleman and Thurman 1991; Austin 1998).

NOTES

1. Researchers tend to overuse the term “mindfulness”—practices concentrating one’s focus rather than simply being mindful of mental or bodily states are sometimes deemed “mindful.” However, focusing on one’s breathing is a way that both many concentrative and some mindfulness meditations start. Critics complain that no general definition of “meditation” is utilized in neuroscience and that this leads to grouping all research on different types of meditation together, and that this leads to inconsistent findings (Davanger 2013; Nash and Newberg 2013). So too, one may conclude that results from one meditative technique would be duplicated by other meditative techniques. But as long as the scientists specify the general features of whatever meditative techniques were involved in their experiment and do not presume that all techniques of meditation must be alike in their neurological effects, that is not a debilitating problem. But scientists should still be slow to speak of one generic “effect of meditation.” Different techniques may produce different effects, and that will be an issue when comparing data. So too, what members of a control group are doing during a brain scan would affect the baseline for recognizing differences that meditation may cause—for example, are the members of the control group engaged in some cognitive activity such as reading, or are they simply relaxing?

2. The left and right parietal lobes are responsible for maintaining both a sense of a “self” separate from the rest of the universe and a sense of one’s body in space. Decreased activity there is associated with loss of a sense of “sense” and for a sense of “unity” or “connectedness” with the rest of the universe. The thalamus processes sensory input, the communication between different parts of the brain and is important for alertness and consciousness in general. The limbic regions (including the amygdala) are related to processing emotions. (Mindfulness meditation decreases activity in these regions, while compassion meditation increases it.) The hippocampus in the limbic system relates to long-term memory and spatial orientation. The right insula and caudate are related to empathy and compassion. The frontal cortex relates to higher cognitive activity such as reasoning, analysis, and imagination; initial meditative reflection may lead to an increase in activity here leading to a sense of clarity; further meditation leads to decreasing activity here that permits deeper parts of the brain to become more active, and this may be connected to the sense of certainty in mystical experiences. (There are mystical training techniques that utilize reasoning, but these have not been the subject of scientific study. Whether scans of such activity would differ from nonmystics’ is an issue. The same situation may arise for meditative techniques involving visualizations.) Lesions in the frontal and temporal brain regions apparently also inhibit or disable mental executive functions and thereby enable mystical experiences to occur (Cristofori et al. 2016).

3. It should be noted that there is a great danger of bias in this field: many researchers are out either to discredit mystical claims or to validate them. Most researchers also meditate themselves (Schmidt and Walach 2014, 2).

4. Merely studying the neural bases of religious experiences does not transform neuroscience into a form of theology—“neurotheology.” Even if scientists invoke transcendent conceptions as part of an encompassing theory (as with Newberg and d’Aquili’s model of an “Absolute Unitary Being”), this still does not make the science a form of theology unless the religious theory is actually utilized to explain neural events in the brain.

5. The issue for this article is what science can reveal of the *nature of mystical experiences*, not *philosophical* issues for mysticism raised by neuroscience. Does dopamine explain away mystical bliss, or is the increase in production the product of mystical experience? The most basic philosophical question in this area is this: does neuroscience offer evidence for or against the claim that mystical experiences are veridical and thus cognitive? That is, can neuroscience show that mystical experiences reveal something about the nature of reality or are in fact no more than chemical events in the brain that generate only delusions? Does the decrease in mystical

experiences in neural signals to the orientation and association areas of the parietal lobes that maintain a sense of a “self” separate from the rest of the universe mean that mystical experiences are not actually cognitive, or that the self is unreal? On the philosophical issues, see Jones (2016, chap. 4). The science may have two effects on religion: by showing that forms of meditation that foster religious experiences or compassion have unique neural bases, it may be seen as supporting religion (although it cannot prove religious explanations of these experiences); on the other hand, it may lead in the long run to the reduction of meditation to merely its effects in improving well-being and happiness without reference to any religious framework at all.

6. Advocates of “attribution theory” such as Wayne Proudfoot (1985) and Ann Taves (2009) argue that mystical experiences are ordinary states of mind seen mystically—it is the *interpretation* of an experience alone that makes it mystical. If neuroscience can establish that unique configurations of brain activity underlie different types of mystical experiences and thus that mystical experiences are not merely ordinary mental events taken to be mystical, attribution theory would be hard to maintain: the significance of a theory for a mystical doctrine may only be seen after the experiences are over and the experiences would be open to different interpretations, but mystical experiences would be unique neurological events.

7. That many experiencers today understand their mystical experiences in nonreligious and sometimes explicitly atheistic ways should be noted (see, e.g., Newberg and Waldman 2016, 69–75).

8. Normally our brain activity does not change more than 5–10 percent during the day when we are awake. But when participants engage in mystical activities that change may be more than 20 percent (Newberg and Waldman 2016, 87).

9. Mindfulness meditation apparently can also dampen the activity in the brain that generates a “self-narrative” (Vago and Silbersweig 2012). The loss of a sense of an individual empirical ego is central to mystical experiences, and comparisons have been made to theories such as Daniel Dennett’s that the “self” is only an artifice generated by the brain (e.g., Lancaster 1993; Simpson 2014; Johnstone et al. 2016; Hood 2017). Two philosophical issues arising from this are whether the removal of the nonexistent artifice from our consciousness in mystical experiences gives a more insightful perception of the phenomenal world and whether it should also change our values and behavior.

10. Overall, all brain activity appears to be reduced in experienced meditators (Lazar et al. 2000). But this is distinct from drowsiness or simple relaxation: rhythmic alpha and theta waves decrease, but gamma waves (which are associated with awareness) grow stronger. (But the huge variation in participants’ gamma readings may make these readings unreliable measures of meditative proficiency—when it comes to gamma waves, the resting state seems to be highly individual [Hinterberger 2014, 112].) Gamma waves also appear to remain strong in long-term meditators outside of the meditations in laboratories (Schwartz and Begley 2002). The more one meditates the easier it is to make neurological changes.

11. Their study actually showed an initial increase in activity in the frontal regions followed by “significant decreases” in activity there as the “intensity” of the meditation increased (Newberg and Waldman 2016, 156). After a meditation session, activity increases once again in the frontal and parietal lobes, but some meditators can carry over the loss of a sense of self into their returning state of consciousness, and the “enlightened” can incorporate this sense of selflessness permanently, thereby altering their post-meditation state of consciousness in a more lasting fashion.

12. One recurring issue is whether mystical experiences occurring in a laboratory are the same as those occurring outside a lab. Does a laboratory setting affect the subjective side of the experience since “set and setting” matter for altered state consciousness? Even if some genuine mystical experiences do occur in the lab, is the full phenomenology of other mystical experiences duplicated? Might even the low electric current of an fMRI scan affect the subtle neural current in the brain?

13. Newberg and d’Aquili “suggest that scientific research supports the possibility that a mind can exist without ego, that awareness can exist without self” (Newberg et al. 2001, 126). Their explanatory theory is that pure consciousness is an “Absolute Unitary Being” that is anterior to either subject or object (Newberg and d’Aquili 1999, 188, 201). They postulate that this transcendent beingness is real, based on it seeming “vividly and convincingly real” and even more real than the world perceived through ordinary consciousness after the experience is over when the experiencer has returned to our “baseline” dualistic consciousness, and they

believe that they saw “evidence of a neurological process that has evolved to allow us humans to transcend material existence and acknowledge and connect with a deeper, more spiritual part of ourselves perceived of as an absolute, universal reality that connects us to all that is” (Newberg et al. 2001, 9), but they realize that *none of their patients claimed this* and that this is only their *theory* and is a separate claim from claiming that the experiences are genuine neurological events. And it must be noted that an empty pure consciousness event is open to different theoretical explanations—it may be an experience of a theistic god, a nontheistic transcendent absolute (such as Advaita Vedanta’s Brahman), an isolated transcendent self (as in the Samkhya tradition of Hinduism), the bare beingness of the universe, or only a naturally generated monitoring activity of our background consciousness or mind that precedes conceptualization and intention and does not divide the field of experience into subject and object. Or the mind may be malfunctioning by being “on” but having no input to work with. No such theory can be derived from, or justified by, the phenomenality of an empty consciousness alone. Neuroscience would be irrelevant to such understanding since it only involves the workings underlying or causing the mystical experiences themselves, but this does not mean that neuroscientists must deny such understanding.

14. An example of other problems comes from a study of Japanese Buddhist monks. The researchers found that the monks’ brain activity revealed by fMRI scans was different when chanting a *mantra* than when chanting a *text* (Shimomura et al. 2008). Thus, different activity is involved in merely repetition of a short phrase from chanting a fuller content, even if one is not focusing on the meaning of the text.

15. “Altered states of consciousness” involve, in Charles Tart’s words, a qualitative shift in the stabilized pattern of mental functioning from our baseline state (1969, 1). Common altered states are dreaming, daydreaming, and being drunk. There is no reason to suspect that there is only one altered state of consciousness for all mystical experiences, let alone all religious experiences. It may be that all altered states of consciousness result from activity in the same area of the brain (e.g., perhaps a decrease in prefrontal cortex activity) or have either some mystical attributes (e.g., sense of oneness with the phenomena around the experiencer or ego-dissolution) or some visionary attributes.

16. An underlying problem is that cognitive scientists today cannot decide what *consciousness* is—views run the gamut from consciousness being the primary (or indeed only) reality to it being an irreducible fundamental property to it not existing at all. In a conference on “Toward a Science of Consciousness” in Tucson, Arizona in 1994 (see Hameroff et al. 1996), attendees’ views on anomalous phenomena (which include mystical experiences) apparently were divided into three parts: one third thought that anomalous phenomena did not really occur, one third thought that they occurred but could be explained at least in principle in physical terms, and one third thought that not only did they occur but that consciousness was the primary reality (Barušs and Mossbridge 2016, 28). Those who want to reject both a dualism of mind and body and that consciousness can be explained in physical terms as an emergent phenomenon see the only logical alternative to be a panpsychism in which all matter has conscious or protoconscious properties. Nor is dualism dead today: phenomena such as near-death experiences and periods of lucidity near death in Alzheimer patients with degenerative brain conditions lead some in the field to conclude that the brain does not generate consciousness but is a filter or even an inhibitor of a transcendent consciousness.

17. Even whether there are specific neural correlates and markers of *consciousness* and if there are where they are located is proving controversial at present (see Koch et al. 2016; Boly et al. 2017). There may not be any simple one-to-one matches between consciousness and neural correlates (Noë and Thompson 2004). A newer neuroscientific approach is not to look at correlates but to identify the overall brain functioning during conscious events—for example, how the brain goes from receiving sensory input to producing structured perceptions (see Griffiths et al. 2008; Clark 2013).

18. The apparent “downward” causation of the mind in such neuroplasticity presents a mind–body problem for materialists. Purely materialist explanations of mystical experiences will necessarily be faulty unless materialists can account for both functional and structural changes in the brain in terms of the brain rewiring itself internally without reference to experiences.

19. Complications of this for any “first-person science” (see Varela and Shear 1999; Shear 2014), “altered state sciences” (see Tart 1972, 1998), or “neurophenomenology” (see Varela 1996; Peters 2000; Petitmengin 2011) will not be discussed here. Such first-person introspection may

help neuroscientists find a better map of the brain or how the brain works, but the limitations just discussed do suggest that incorporating it into neuroscience would not add to our understanding of the nature of mystical experiences. Rather, at most such an internal empiricism would only be relevant to the issues of how experiences relate to brain states. Whether it helps philosophical problems is also another matter. Antoine Lutz and Evan Thompson realized in 2003 that neurophenomenology has not yet bridged the gap between the material brain and immaterial consciousness (2003, 47) and the situation has not changed since.

20. For the prospects of an actual “science of *consciousness*,” see Hameroff et al. 1996; Chalmers 2004.

21. Whether all states of “enlightenment”—that is, enduring states of consciousness, rather than sporadic experiences of selflessness, in which all sense of a phenomenal “self” has evaporated—are neurologically the same would be an issue. Experienced meditators carry their changes in neural activity from mystical experiences into their waking life outside of meditation in the lab, and the changes can become enduring traits in an enlightened life. But one problem with determining long-term effects of meditation is that most subjects who are studied by neuroscientists are self-selected participants who are members of particular religious traditions, and thus it is difficult to determine if any changes in values or ways of living are the results of meditation or of their religious beliefs and their prior or continuing nonmystical training—do the lasting effects result from new brain-conditioning or merely from a memory of the mystical experience and the mystic’s cultural beliefs?

22. In denying here that any experiences are “unmediated,” Katz is not discussing whether mystical experiences are *biologically mediated* through brain activity but only that *cultural forces* shape any experience. So too, all mystical experiences are still pure *experiences* even if they are culturally mediated, not partially material, but the pure consciousness events are allegedly bald experiences free of any cultural elements.

23. If the experienter of a depth-mystical experience retained nothing, he or she would have to be said to be *unconscious*. But the experience may have content that can only be seen as such and discussed once the experienter returned to a dualistic state of consciousness. The experience then would not be literally “empty” but would have some type of content. Nevertheless, if the depth-mystical experience is in fact empty of any differentiated content and mystical knowledge participates in what is experienced, the experience would not have an object distinct from the experienter or any other differentiated content in the mind, and thus not all human experiences would have intentional objects.

24. Whether there have been scans of pure consciousness events while they are happening is open to question. If a participant signals the researcher when he or she is having a “pure consciousness event,” then he or she is not having one: there is still a dualism of experienter and experience and still differentiated content in the participant’s mind. Some scans are only of participants *remembering* their experiences (e.g., Beaugard and O’Leary 2007).

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