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Neurophenomenology and Neuroepistemology Approaches to Integrating Constructivist, Perennialist, and Universalist Perspectives on Mystical Experiences

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Differences among constructivist, perennialist, and universalist perspectives on mystical experiences are bridged with neurophenomenology and neuroepistemology perspectives that illustrate constructivist and deconditioning processes and universal innate experiences. These approaches show that phenomenal similarities and differences in the features of meditative experiences are related to specific brain functions and processes. This illustrates that recurrent forms of mystical consciousness involve the activation or suspension of specific brain functions and their forms of knowing. Meditators' deliberate modifications of brain processes engage constructivist and deconditioning processes that provide access to intrinsic states understood as mystical experiences. Deconditioning of habitual cognitive processes through meditation changes habitual attention and cognition, permitting access to preconceptual awareness and normally unconscious intrinsic mental processes. Different mystical experiences involve changes in specific neurologically mediated forms of self that provide the basis for universal forms of mystical experience. Neuroepistemological perspectives on qualia of meditative states and their relations to mental processes and brain features provide a framework for understanding recurrent forms of mystical experiences as natural brain states.

Are Mystical Experiences Universal or Constructed? Competing Paradigms

A central debate in understanding the nature and bases of mystical and meditative experiences involves whether they are universal or culturally specific (Ferrer 2000; Forman 1990, 1999; Jones 2020, 2021; Katz 1978a; Laughlin and Rock 2020; Rose 2016; Sparby 2019; Taylor 2016, 2017). The perennialist and universalist versus constructivist perspectives on mystical experiences offer what appear as irreconcilable views, with conflicting theoretical, epistemological, and methodological perspectives. This article proposes that these competing claims regarding mystical experiences can be assessed and integrated through interdisciplinary methodologies. Neurophenomenology (Khachouf, Poletti, and Pagnoni 2013; Thompson 2007; Olivares 2015) and neuroepistemology (Laughlin and Rock 2020; Laughlin, McManus, and d'Aquili 1990) help understanding of mystical universals as involving constructive and deconditioning processes that provide access to the innate aspects of the mind. Neurophenomenology is a research approach that endeavors to integrate third-person neurophysiological data with first-person phenomenological qualitative data, allowing "first-person accounts and neurophysiological data [to] mutually inform one another" (Fingelkurts, Fingelkurts, and Kallio-Tamminen 2021, 1). These kinds of relationships allow for the establishment of the physiological mechanisms involved in producing mystical experiences.

As Charles Laughlin and Adam Rock note, cross-cultural similarities in meditation experiences indicate that the human brain is "wired" for specific features of mystical experiences. The recurrent homologous features of mystical experiences across traditions require the examination of how their phenomenology is related to neurognosis—our innate neurological cognitive functions. Comparative approaches and neurological evidence can help integrate these differing positions, as brain studies of meditators illustrate both tradition-specific constructivist processes and common effects across meditation practices. Meditative construction of consciousness is attested to in the widespread differences in techniques used (i.e., focused attention, mindfulness, mantras, loving compassion), while universals are illustrated in common efforts to develop control over habitual attention and mental processes. Changes in habitual attention involve narrowing the perceptual field to specific thought processes and altering or suspending habitual mind operations, permitting the emergence of new awareness. Enhanced awareness freed from habitual construction processes provides access to normally unconscious mental processes and experiences that are reported as universals because they reflect intrinsic operations of the brain-mind. This combination of constructivism and the deconditioning of habits as sequential and complementary processes provides a basis for explaining both the differences in various mystical experiences and their cross-cultural similarities.

Perennialist, Universalist, and Essentialist Perspectives

Perennialist approaches (i.e., Smith 1976, Schuon 1975) propose a primordial, transcultural, esoteric, mystical wisdom, a privileged perception revealing an unchanging, culturally invariant universal truth that nonetheless may be obscured by specifics of the traditions. The perennial approach supported by the influential work of Walter Stace (1960, 1961) points to similarities in mystical experiences such as unity with the universe; a sense of timelessness and spacelessness; feelings of joy and bliss; a connection with the sacred; and an awareness of an ultimate reality.

Perennialist approaches do not necessarily propose a universality to any specific mystical experience or allege that cross-cultural features are characteristic of all mystical experiences. The perennialist position is about an ultimate truth, a knowledge that is not accessible to the senses or rational mind or even manifested in the reported experiences of mystics. Rather, this perennial knowledge is only accessible through a "metaphysics" or "divine science," which requires an alteration of consciousness, producing the mystical experience necessary to perceive such truths (Jones 2021). The perennialist perspective is that an ultimate truth is perceived in such experiences, even if mystics make different claims about such experiences due to the beliefs of their traditions.

Richard Jones (2020, 2021) distinguishes this perennial philosophy position about universal truth from an essentialism that proposes the universality of certain types of mystical experiences that share common phenomenological features. This essentialism is reflected in "perennial psychology," in contrast to the "perennial philosophy," which focuses on true beliefs. While Kenneth Rose (2016), Steve Taylor (2016, 2017), and Robert Forman (1998, 1999) are often considered to present perennialist perspectives, Jones identifies them as "essentialists" in that they propose a cross-cultural distribution of various forms of mystical experiences. These essentialist perspectives propose that while most mystical experiences are structured by cultural concepts, some exist outside of cultural conceptualization, unmediated aspects of experience that occur when the mind operates free of all conceptual input.

Universalist perspectives also propose a diversity among mystical experiences, i.e., the distinction between transcendental and immanent experiences. Transcendent mystical experiences involve an awareness of a personal and benevolent divine power transcending the material world, the source of all the universe. Immanent mysticism involves a loss of sense of personal self, which disappears in an experience of merging with all existence. Nonetheless, both transcendent and immanent mystical experiences (extrovertive and introvertive, respectively) share features of bliss, spiritual love, and access to infinite knowledge. Universalist perspectives are supported by commonalities across mystical traditions, as illustrated in Rose's (2016) and Donald Rothberg's (1990) comparative analyses. Contemplative universals identified by Rose

are convergence of the mind on a meditative object; simplification of the mind processes; stilling of the mind's processes; and, finally, transcendence of the processes of the mind. Steve Taylor (2016, 2017) proposed that shared phenomenological features of mystical experiences include enhanced awareness, increased empathy, and experiences of union. Other similarities across traditions include specific stages of progressively unfolding mystical experiences and the perceptions of an increasingly differentiated, stratified, multifaceted metaphysical reality (Laughlin and Rock 2020; Wilber 1977, 1986).

Constructivism

The opposing position to perennialism is constructivism, which asserts that all mystical experiences are determined at their core by the beliefs of their tradition. The primary historical opposition to the perennialist perspective was Steven Katz's (1978a) statement in the chapter "Language, Epistemology, and Mysticism" of his edited book *Mysticism and Philosophical Analysis* (Katz 1978b). The central thesis is not merely that mystical experiences are constructed by the beliefs of their respective disciplines. Rather, it is the extreme position that there are no pure or unmediated experiences, mystical or otherwise. Katz's position is based on the "epistemological fact [that] as a result of his process of intellectual acculturation in its broadest sense, the mystic brings to his experience a world of concepts, images, symbols, and values which shape as well as colour the experience he eventually and actually has" (Katz, 1978a, 46, cited in Jones 2020, 6). The central assumption of constructivism is that the experiential reality of mystical experiences is necessarily and inevitably merely a product of the conceptual structuring provided by the cultural and linguistic systems, making mystical experiences totally determined by prior patterning of thought and belief. This goes beyond the Kantian position that direct and unmediated knowledge of noumena is impossible to further assert that the cognitive content perceived in mystical experiences is nothing more than a projection of the mystic's cultural formation.

The core justification of the constructivist approach is the impossibility of unmediated experience, an absolute dismissal of the central claims of many mystical traditions that their practices decondition the habitual reactions of the mind and enable the meditator to empty the mind of all content. The constructivist approach emphasizes contextualism, which argues that understanding mystical experiences and doctrines requires that they be placed in their respective cultural settings. But contextualism does not require the strong constructivist position that cultural structuring creates all mystical experiences.

Constructivist Shortcomings

Jones points out that although the constructivists assert that mystical experiences are constructions, how they are allegedly constructed has not been explained by Katz or other constructivists. Katz's central and blanket rejection of the

principal mystical claims regarding unmediated experiences also negates the principal foundations of many mystical traditions. Katz fails to justify rejecting *a priori* what mystics claim to be their experiences in favor of a philosophical dogma that all human experience is necessarily based on prior experiences (Jones 2020). A fundamental weakness of Katz's approach is that it denies the evidence of the mystics' experiences and the perception of some direct and unmediated experiences of reality claimed by many mystical traditions (see Rothberg's (1990) analysis of Upanishadic, Buddhist, Sufi, and Christian traditions). In direct contradiction to Katz's rejection of the possibility of unmediated experience are the reports of many mystical traditions that it is through the annihilation of the ego and discursive intellect that they achieve a direct and unmediated experience of reality. As Jones notes, there is no legitimacy to the constructivist claim that philosophers can know better than the meditator the phenomenology of the meditator's experience.

A scientific approach to mystical experiences must start with the mystics' reports of their experiences, even though such reports will necessarily reflect influences from the beliefs of their traditions. It is the phenomenological cross-cultural patterns of these reports illustrating common forms of mystical experience that must be explained. A basic tenet of science is that experience, especially interpersonally validated, intersubjectively shared experiences, provides the primary data from which valid information is obtained. While science is typically characterized as focused on external sensory experience, it is personal experience that provides data. Harald Walach (2014) elaborates this point in discussing Francis Bacon, a founder of modern science, who emphasized that personal experience comes in two forms: external and internal. Reports of what is experienced are basic data regarding the nature of reality, physical as well as spiritual. The common forms of mystical experience reported cross-culturally are intersubjective facts independent of the interpretations imposed.

Mystics cross-culturally report perceiving a reality without concepts, an intersubjectively confirmed experience reported across cultures and mystical traditions that attests to innate human perceptions. A scientific approach must attempt to explain the patterns in reported experiences, not deny that the experiences exist. The presence of the same experiential phenomenology across diverse traditions indicates its production by a common underlying neurology is what explains the widespread distribution of similar experiences and the phenomenal qualities they manifest. Jones notes that while contextual approaches are needed to understand mystical experiences, this does not mean acceptance that all aspects of mystical experiences must be understood as culturally constructed. As John Hick's (1993) analysis of mystical experience shows, the mystical experience is both of a metaphysical entity (and necessarily mediated by neurological processes of the brain) as well as something that is interpreted through the mystic's religious beliefs (and therefore known and

shared through its construction). This implies that the mystical experience is of something that exists independent of and different from the metaphysical framework used to interpret it. Repeated reports of such experiences by mystics from diverse traditions mean that the possibility must be accepted of a unmediated perception of a transcendent reality distinct from the postexperiential interpretations that necessarily involve a constructed system of knowledge (Jones 2021).

Perennialist, Universalist, and Essentialist Shortcomings

Jones (2020, 2021) also shows that the perennial philosophy claims of a single underlying set of esoteric beliefs across mystical traditions are not substantiated in that mystical traditions generally do not espouse perennialism beliefs. Mystical traditions have different beliefs, practices, and goals, and often substantial disagreements regarding human nature, consciousness, and transcendent reality, rejecting others' claims (Jones 2021, paraphrase 1). Extreme differences among mystical explanations mean that the meditators from different traditions have different experiences and are making genuinely different mystical claims.

Jones (2020) characterizes the perennialist perspective as a "religious theory" and metaphysic that imposes its interpretative framework onto accounts of mystical traditions. Jones notes that such perennialist and universalist arguments need rigorous evidence, but that what would be the most direct evidence—clear agreements across mystical traditions—is not the case. How can one argue that the perennial philosophy is correct if the variety of mystical traditions do not attest to the common perception of a single common truth, and traditions vehemently disagree with one another regarding experiences and their explanations?

But could there be a perennial philosophy, truths about transcendental realms, even if it is not a metaphysical position subscribed to by the traditions themselves? The findings of phenomenologically similar mystical experiences and the beliefs about them found across cultures and traditions suggest a common foundation among traditions, evidence of an implicit set of universals. "Our common neurology may enable an experience that is independent of cultural conditioning and thus is the same in all cultures and eras even if different forms of mysticism are unique to each religion or each subtradition within each religion. That is, all human beings may have the same neurology when it comes to the depth-mystical experience" (Jones 2020, 35).

Edward Dale (2009, 2011, 2013, 2014) proposes an alternative to extreme constructivist and universalist perspectives in recognizing the effects of discipline-specific practices in constructing particular forms of meditative experiences within a universalist perspective that recognizes significant similarities in experiences across traditions. Variations and similarities across mystical traditions illustrate that both constructed and neurognostic aspects are foundational to mystical experiences.

If there are universal mystical experiences, these should have clear epistemological characteristics, especially neuroepistemological features that reflect their intrinsic relations to the brain and its informational and self-referencing functions. Homologous relationships of brain dynamics to meditation experiences—for instance, a slowing of brain activity associated with a sense of calmness—illustrate the source of the phenomenal qualities of mystical experiences and provide neurophenomenological explanations for these qualities. Support for universalist perspectives comes from features of mystical experiences that are directly related to specific innate brain dynamics. These brain dynamics involve the operation or deafferentation (disabling) of specific brain mechanisms, for instance, those related to managing information from the environment and about the self.

Neurophenomenological Methods for Assessing Mystical Experiences[1]

Neurophenomenological perspectives that connect brain dynamics to the experiential phenomena of mysticism can help sort through competing truth claims by basing considerations in the functional capacities and processes of the brain. Neuroepistemological approaches explain experiences with reference to brain systems that engage or suspend intrinsic forms of knowing. Studies reviewed here show that meditators' selective engagement and disengagement of specific brain systems are directly related to the phenomenology of their experiences.

Neuroepistemological approaches establish that anti-essentialist, constructivist perspectives cannot be defended considering neuroscientific knowledge regarding homologous brain functions across people and cultures (Laughlin and Rock 2020). Common patterns of information processing and responses manifested in newborns and meditators indicate innate neural models of perception (Laughlin, McManus, and d'Aquili 1992). This supports neuroepistemological explanation of recurrent mystical features as reflecting neurognosis, i.e., inherent biological structures of knowing.

The brain's information processing capacities and their phenomenological manifestations in experience provide models to substantiate transcendent aspects of consciousness as reflecting innate cognitive processes. These innate processes can provide evidence for perennialist and universalist claims and assertions of unmediated experiences in evidence of the brain's ability to deafferentiate (block or suspend) sensory, cognitive, self-processing, and interpretative frameworks to permit the operation of functional brain systems and their innate information management capabilities as unmediated forms of knowledge.

Laughlin and Rock (2020; cf. Laughlin 2020) propose that neuroepistemological approaches can account for specific qualities of mystical experience such as flow, bliss, and numinosity in terms of features of human biology. Laughlin (2020; Laughlin, McManus, and d'Aquili 1992; also see Fischer 1992) attributes

differences in the phenomenology of meditative experiences to variation between low to high states of arousal in the autonomic nervous system (ANS) and internal versus external focus of attention. Charles Laughlin, John McManus, and Eugene d'Aquili propose that these factors reflect opposing dynamics of the ANS: the ergotrophic and trophotropic divisions, which include the activating sympathetic system and relaxing parasympathetic system, respectively. An extreme activation or deactivation of either ANS division can produce mystical experiences. An extreme ergotropic activation can produce an ecstatic state with experiences of endless energy and a "flow experience" as manifested in long-distance running. An extreme trophotropic activation results in extreme relaxation and produces calm, peacefulness, and "oceanic tranquility" (i.e., Buddhist concepts of *zazen* and *samadhi*).[2] Laughlin, McManus, and d'Aquili's neurophenomenological model illustrates direct relationships between ANS activation and the phenomenology of mystical experience.

Neurophenomenological Dynamics of Meditative Experiences

Neuroscience studies illustrate the neurophenomenological dynamics of meditation by showing that meditative practices engage brain areas controlling attentional, emotional, and cognitive processes (Lancaster 2013; Fox et al. 2016. Intentional meditation effects on brain regions controlling the different attention systems of the body include higher-order executive control of attention; the alerting system for vigilance for external stimuli; and the orienting system that selectively attends to specific stimuli (Gay and Kreiselmaier 2017). Meditation traditions emphasize specific procedures that modify mental habits of attention, a training to increase awareness and control of mental processes. Techniques may involve fixed attention on an object, an open receptivity to the emergence of material into consciousness, or a focus on loving compassion. Increased attention produces mindfulness, a present-centered awareness that eventually provides access to innate primary forms of consciousness as a result of freeing attention from habitual patterns (deconditioning).

Although different attentional dynamics are produced by specific meditation techniques (i.e., focused attention, mindfulness, recitation of mantras, walking, or feelings of compassion and loving kindness; see Fox et al. 2016), there nonetheless are physiological similarities across meditation practices resulting from an internal focus of attention and quiescence. Meditation traditions that still the body and mind—restricted movement, stable posture, eyes closed, an internal focus of attention, and prolonged concentration—induce the relaxation response and activation of the parasympathetic nervous system. Evidence of this physical relaxation is manifested in reduced breathing, oxygen consumption, heart rate, muscle activity, cortical arousal, muscle tension and skin conductance, and occasional respiratory suspension (Wahbeh et al. 2017).

Decades of studies of meditators' EEG patterns (see MacDonald, Walsh, and Shapiro 2013) for review) report similarities involving increases in alpha

and theta brain wave power and coherence and improved functional brain connectivity. A systematic review of EEG meditation studies (Wahbeh et al. 2017, 19) found meditation-induced increases in alpha power and coherence, alpha-theta power/amplitude and coherence, and functional neural connectivity. Meditation decreases brain wave frequency to alpha and theta ranges with amplitude increases in frontal and central brain regions (Takahashi et al. 2005; Cahn and Polich 2006). Alpha waves have relatively slower frequencies (7.5 to 12.5 cycles per second) than the beta waves characteristic of waking states and are associated with calm and relaxation. The even slower theta waves (4 to 7 cycles per second) reflect activity associated with sensory-motor processing, memory formation, motionless alertness, and REM sleep; theta is also a typical EEG pattern of diverse alterations of consciousness (Winkelman 2011, 2017). Russel Hebert et al. (2005) characterize alpha waves as reflecting the integration of information; E. A. Solomon et al. (2017) similarly propose that theta is a sign of interregional integration in the brain. These slow, calmer brain wave dynamics are reflected in the phenomenology of meditative experiences.

One source of mystical experiences derives from the ability to place awareness on internal processes of the body that are normally habituated and ignored. The freed attention can provide novel experiences and new knowledge about the nature of existence, being, and self through access to innate and unconscious cognitive processes normally obscured by the habitualized attention of ordinary waking consciousness. Mystical experiences can emerge from enhanced awareness of normally subconscious and unconscious processes and structures; awareness of increasingly subtle levels of the mind and consciousness; altered awareness of ordinary processes, such as awareness during dreams; experiences of normally inaccessible structures and levels of consciousness and the universe; and awareness of higher levels of the mind.

Mystical Experiences as Deconditioning and Deconstructions of the Self

Central to meditative perspectives on consciousness is the role of various forms and levels of the self, the experiencer and interpreter (see Cornelissen 2004, 2011). Self-faculties are based in the integration of various lower-level processes, from sensory to emotional and cognitive, including the mind and intellect. Different forms of self and their roles in experience are key elements in the production of consciousness, including the ego, which experiences and acts; *chitta*, which functions as a storehouse of memories and aspects of the unconscious; and a deep self engaging pure consciousness. As these different forms of the knower engage or disengage, the experience of consciousness, self, and identity change.

Deconditioning leading to the suspension of habitual self-processes is fundamental to mystical experiences—a deconstruction of habitual perceptions

exemplified in Buddhist traditions that deny altogether the ultimate reality of the perceived self. Meditation practices also engage new senses of self through changes in the meditator's habitual attention and awareness, enabling engagement with subtle aspects of normally unconscious processes. Greater awareness of normally unrecognized aspects of one's totality allows for a disidentification with the ego, which can be superseded with the development of an identity with transcendent consciousness.

The deconditioning that occurs in meditation involves detachment of habitual unconscious programming that causes mental reactions. This detachment enables one to observe events without an emotional engagement with them, resulting in liberation because of only witnessing events, rather than emotionally or judgmentally engaging with them (Larson 2004). In only witnessing events, one is freed from the suffering that comes from identifications made by the personal self. This leads to a detachment of the ego or physical self (*jiva*), permitting development of another aspect of self that is referred to as true self (*purusha*) (Taimni 1968; Castillo 1991). This involves observations detached from the habitual labeling, judgment, and classification, functioning as an uninvolved witness to the activities of the physical self and the world.

Neurological Bases of Suspension of the Self

These different aspects of selfhood are not merely intellectual abstractions or cultural constructions but reflect the differing operations of neurological structures. Meditation-induced changes in experience of the self involve modifications in activity of the default mode network (DMN). The DMN mediates cognitive processes that provide self-consciousness and self-representation and engagement with memories of one's personal past or imagining possible future events in reference to oneself (Buckner et al. 2008; Raichle 2015). The DMN provides the structural and functional connections for self-related meta-cognitive processes involving introspection, daydreaming, and self-reflection. Several studies (Brewer et al. 2011; Panda et al. 2016; Scheibner et al. 2017) show that both internal and external meditative focus reduces DMN activity. Judson Brewer et al. (2011) found that experienced meditators from three mindfulness meditation practices (concentration, loving kindness, and choiceless awareness) all manifested relative deactivation in the main nodes of the DMN (medial prefrontal cortex and posterior cingulate cortex). This deactivation was complemented by enhanced functional connectivity and stronger coupling among other DMN areas (the posterior cingulate, dorsal anterior cingulate, and dorsolateral prefrontal cortices), regions that have roles in self-monitoring. Rajanikant Panda et al.'s (2016) EEG and fMRI study of expert Raja yoga meditators using mental concentration found they exhibited significant reductions in activity and connectivity of the DMN's posterior cingulate hub. Hannah Scheibner et al. (2017) similarly found that the meditative

practice of mindful attention produced significantly less neural activation in the primary DMN hubs, medial prefrontal cortex, and posterior cingulate cortex.

In a meta-analysis of many studies of meditation and brain functions, Kieran Fox et al. (2016) found that focused-attention meditation deactivates two major DMN hubs (posterior cingulate cortex and posterior inferior parietal lobule) that process self-related information. The suspension of these brain areas that support metacognition involving self-consciousness, reflective self-awareness, recall of the autobiographical past, self-representation, and future plans explains how meditative states such as witnessing reduce the role of self-reference in thought.

Altered States of Self

Evidence for the direct relationships between self-referential information and DMN networks in the alteration of consciousness is presented by Andrew Fingelkurts, Alexander Fingelkurts, and Tarja Kallio-Tamminen (2021), who used neurophenomenological methodologies to examine mystical experiences they called altered states of selfhood (ASoS) that spontaneously emerged in meditators. Using first-person reports and simultaneous EEG data to identify brain areas involved, Fingelkurts, Fingelkurts, and Kallio-Tamminen discovered that different forms of spontaneous ASoS were related to the activation and deactivation of specific neurophysiological subnetworks of the self-referential networks as measured by EEG operational synchrony. These subnetworks constitute functional or operational modules that form the brain's principal self-referential network, the DMN. EEG operational synchrony analyses differentiate three major modules that correspond to three phenomenal aspects of selfhood, which Fingelkurts, Fingelkurts, and Kallio-Tamminen characterize as first-person agency, embodiment, and reflection/narration. These correspond to self experiences called witnessing observer, representational-emotional agency, and reflective agency, respectively, which Fingelkurts, Fingelkurts, and Kallio-Tamminen (2021) also call "self," "me," and "I," respectively.

They propose that the spontaneous ASoS that emerge during meditation reflect the phenomena of self-consciousness's alteration in a "pure form" (i.e., not induced chemically or through volitional effort or external stimulation), and consequently reveal how the background neural mechanisms producing the features of the subjective experiences of selfhood are transiently altered. Alterations in the "self" and "me" self-referential networks were the prevalent features of ASoS, with "me" the most frequently altered state of self reported (75%), reflecting the role of the embodiment domain as a primordial form of self-consciousness.

The analysis of Fingelkurts, Fingelkurts, and Kallio-Tamminen (2021) demonstrates the presence of unique phenomenological profiles for different types of ASoS, with three major components of selfhood expressed consistently both phenomenologically and neurophysiologically in the activated and

deactivated self-referential networks. This illustrates that specific combinations of the "self"-"me"-"I" aspects of selfhood with different expressions of correspondent neurophysiological modules of the self-referential networks are associated with distinctive forms of experiential selfhood during mystical experiences.

The self-referential network "I" module is responsible for a language-based "reflective agency," an implicit first-person undergoing the experience that functions during thinking about oneself, self-reflection, and memories involved in self—that is, autobiographical storytelling. The self-referential network associated with the sense of "I" is localized in the left posterior module of the DMN, consisting of the left temporal, parietal, and occipital lobes. These networks are notably absent in these ASoS experiences, instead being activated during self-reflection, recall of self-related episodic and semantic memory, and autobiographical storytelling (paraphrase Fingelkurts, Fingelkurts, and Kallio-Tamminen 2021, 5).

The self-referential network that Fingelkurts, Fingelkurts, and Kallio-Tamminen (2021, 4) label the "self" (also the "witnessing observer") is an experience of the phenomenal first-person perspective and sense of agency. This "self" module is localized in the anterior part of the right DMN (left and right frontal lobes and the frontal midline area) that provides the "phenomenal non-conceptual core in the act of knowing itself"' (Fingelkurts, Fingelkurts, and Kallio-Tamminen 2021, 4). This experience of being a witnessing agent involves the enhancement of the functional integrity of the "self" module, accompanied by pronounced decreases in the functional integrity of the "me" and "I" modules.

The self-referential network module that Fingelkurts, Fingelkurts, and Kallio-Tamminen label as "me' involves experiences of an egocentric, spatiotemporal representation of the bodily self, emotional states, and autobiographical memories. This "me" module involves the right posterior part of the DMN (right temporal, parietal, and occipital lobes), which provides mechanisms for experiences localized through interoceptive and exteroceptive sensory processing and emotional states and memories (paraphrase Fingelkurts, Fingelkurts, and Kallio-Tamminen 2021, 4). The defining feature of the "me" module is its origin in body representation, a self-model referred to by others as a "minimal self," "proto-self," and "bodily self," reflecting functions "as a 'vehicle' that enables being a self in the world" (Fingelkurts, Fingelkurts, and Kallio-Tamminen 2021, 5). This aspect of selfhood is suspended in meditation to produce a loss of bodily perceptions, resulting in experiences of "self-boundaryless-ness" or "bodylessness," with body boundaries absent or distorted (Fingelkurts, Fingelkurts, and Kallio-Tamminen 2021, 10). This experience is associated with strong down-regulation of both the "me" and "I" modules and a loss of both embodiment and the thoughts of self-narration, consequently

producing the subjective feelings of disembodiment and loss of self-reflection (paraphrase Fingelkurts Fingelkurts, and Kallio-Tamminen 2021, 10).

These correspondences of different phenomenological ASoS with specific self-referential networks show that concepts of self are not arbitrary cultural conceptions. Instead, they represent functional operation modules of the brain. This grounds features of mystical experience in specific brain operations, with their functional and operational qualities providing the mechanisms that produce the phenomenal qualities of distinctive mystical experiences and the universality of specific forms of mystical experience.

Neurophenomenological Explanations of Contemplative Universals

Similar experiences across mystical traditions have been long noted, but their basis has not been fully explained. Such phenomenal experiences conceptualized as internal light, extinction of the self, identity with deity, unity with the universe, void, bliss, love, and others attested to across traditions should be the primary focus for scientific study of mystical states because the similarities across cultures indicate underlying biological dynamics are responsible. Neurophenomenological perspectives may explain the mechanisms producing these experiences in their association with stimulation or suspension of specific brain processes that have functions directly related to the effects reported in mystical experiences.

Mystical Experience as Suspension of Ordinary Biological Processes

The notion of mediating neurological structures in experience is reflected in Immanuel Kant's ([1781] 1933) proposal that the human mind imposes *a priori* forms such as time and space. These are not the imposition of cultural structures of interpretation as proposed by the constructivist perspectives but rather the functioning of biological adaptations humans use to make experience intelligible. Thus, mystical experiences of timelessness and spacelessness are not constructions but rather experiences resulting from the suspension of ordinary biologically based cognitive processes. This notion of the suspension of innate modular structures of thought underlies the epistemological perspective on mystical experiences proposed here. These suspensions are implicitly addressed in Forman's (1990) model of pure consciousness events (PCE), which he characterizes as a "mystical forgetting" wherein the adept gradually or suddenly enter a state in which the mind temporarily "comes to forget all of its cognitive processes (e.g., attention, awareness, cognitive maps, memory systems) culminating in the PCE" (Laughlin and Rock 2020, 44).

The suspension of normal human biological operations appears as a widespread characteristic of mystical experiences. The suspension of normal processes of evaluation and attachment is well recognized in Buddhist

traditions, where nonattachment to ordinary pleasures of life is viewed as key to attaining mystical states. Giving up ordinary desires—sex, pleasure, cravings, even happiness—is seen as necessary to achieve bliss and enlightenment. The suspension of desire for pleasurable emotions and experiences of the body enables deeper states of meditation, producing equanimity and a basis for further development into more advanced states of formless absorption that require the suspension of bodily sensations.

Procedures designed to deconstruct consciousness are illustrated by meditative practices that encourage the suspension of habitual tendencies to evaluate and judge experience through filters embodied in memory, language, and cultural conceptualizations. These suspensions and the curtailing of normal habitual mental activities free up awareness to engage mental levels that precede thought and language, the unconditioned aspects of perception before constructions imposed by the processes of the mind. Within Buddhist traditions, continued meditation can lead from this blissful state into a greater degree of absorption in which all thoughts and perceptions are eliminated, a state known as the fourth *jhana* and *samadhi*, characterized as being beyond pleasure and pain and manifesting a pure mind.

Meditative practices that seek unmediated and direct awareness use an internal attentional focus that reduces the transmission of information from sensory centers of the brain, a disconnection (deafferentation) of their input that interrupts the normal processes of consciousness construction. Enhanced internal consciousness requires eliminating sensory input so that the mind can focus on its operations, a deafferentation of ordinary input to focus on internal information and processes. Since concentration limits sensory data, it facilitates the emergence of the unconscious mind and experiences that result from the suspension of ordinary mental functions.

This deconstruction through meditation-induced alterations of consciousness results in increased awareness of normally unconscious mental processes (called *Ālaya* awareness or '*ālaya-vijñāna* in Buddhist traditions (Waldron 2011)) that are the foundation for ordinary perception, cognition, emotions, and identity. These unconscious mental processes involve a habitual conditioned background for consciousness, persisting dispositions from one's past experiences that constitute barriers to focused awareness. When the mind is freed from these constructed habits of consciousness, it has a greater capacity to access intrinsic forms of consciousness, which are interpreted as mystical experiences.

Light and Visionary Experiences as Innate Responses

A widely reported meditative experience of internal light occurs naturally when one closes off the senses, turning attention inward and experiencing one's consciousness. Experiences of light may appear as flickering points, veils of smoke, globes, stars, and jewels, or even full figures and scenes (Lindahl

et al. 2014). Sensory deprivation and perceptual isolation result in internal visual experiences, especially entoptic phenomena reflecting innate properties of the visual system. Jared Lindahl et al. (2014) report that such internal experiences described in Buddhist traditions reflect natural consequences of sensory deprivation and decreased stimulation. Concentrative practices that reduce sensory input result in spontaneous firing of neuronal circuits and visual hallucinations, a consequence of homeostatic mechanisms that increase neuronal excitability to compensate for the absence of sensory stimulation. Social deprivation and perceptual isolation, including kinesthetic deprivation caused by immobility during meditation, attenuate sensory input. Attention to details of internally generated images increases the capacity for visuospatial processing and working memory (Kozhevnikov et al. 2009).

Bliss and Joy

A widely reported mystical experience is characterized as ecstasy, bliss, and joy, often linked to love. Bliss is considered an essence of consciousness and a fundamental aspect of reality in the Vedāntic system (Cornelissen 2004, 5; cf. Laughlin and Takahashi 2020). Such experiences emerge naturally when control of attention allows meditators to escape patterns of thought that bring suffering. Increasing levels of tranquility leads to experiences of pleasure and equanimity. Experiences of pure bliss, calmness, and peace involve qualities intrinsic to pure consciousness (Cornelissen 2011).

Patricia Sharp (2014) proposes an explanation of meditation-induced bliss experiences as involving effects on dopamine and endogenous opiates, which have an interactive role in the reward and pleasure processes mediated by the nucleus accumbens. Sharp proposes that the accumbens, which is central to many different sources of pleasure, responds with a down-regulation of these pleasure-causing neurotransmitters because of habitual mental processes. Meditative practices that change habitual mental processes produce or liberate states of bliss and positive affect by terminating the down-regulation of the dopamine/opiate system. Meditation can disrupt the repetitive compulsive thought patterns that cause a decrease in responses of dopaminergic neurons, leading to disinhibition of dopaminergic networks and increases in pleasure.

Experiences of bliss produced by meditative practices are different from the pleasures evoked by "worldly" rewards in that meditative experiences do not appear to produce a down-regulation of the positive affective states. Sharp proposes that instead, the repeated practice of meditation leads to substantial increases in the nucleus accumbens dopamine levels by counter-conditioning the habitual synaptic patterns and producing a condition of positive affect.

The positive affect associated with meditative states involves increased levels of activity in the limbic system, the emotional center of the brain, which can produce ecstatic, rapturous emotional states. d'Aquili (1982, 374; d'Aquili and

Newberg 1993) links these experiences of positive affect to right-hemisphere and limbic processes and enhanced connections of the sensory association areas with the inferior parietal lobe.

Non-Dual Awareness

Epistemic suspensions are illustrated in the advanced level of meditative development referred to as non-dual awareness, a state experienced as lacking the opposing dualities of self and objects of perception. The dualistic fragmentation of experience is a normal condition of human life that obscures the underlying unified reality (Josipovic 2013). Non-dual awareness is considered a form of background awareness that exists prior to conceptualization, an experience that links perception and affect with cognition without fragmenting them into separate experiences.

People do not ordinarily experience non-dual awareness because their experiences are mediated by concepts and symbolic representations. Non-dual awareness is a reflexive awareness that is regarded as innate and unconstructed. In some meditative traditions, the non-dual experience is the final goal in the developments that unfold with the dedicated practice of meditation (Josipovic 2013).

Non-dualism involves a distortion or collapse of one's consciousness of time and space that results in a state of profound absorption characterized as a "now" state. Laughlin and Rock (2020, 40) review Edmund Husserl's ([1928] 1964) description of the cognitive processes underlying this "now" state in terms of the suspension of what he referred to as "retention" and "protention." The former involves influence on perception from "what has gone on before" while the latter is concerned with influences from "anticipation of what is about to occur" (Laughlin and Rock 2020, 40). The suspension of these two normal aspects of apprehension of the present produces a state sought in the absorption practices of Buddhist traditions called "formless" (*arūpajhāna).*

Thilo Hinterberger et al. (2014) sought to identify the brain activity that results from meditation practices that seek to reduce mental processes, specifically "thoughtless emptiness" or "thoughtless void." They characterized thoughtless states as involving a mindful presence reflecting an enhanced ability to down-regulate specific forms of mental processing. In comparison with "focused attention" and "open monitoring," thoughtless emptiness is characterized by reductions of both high-frequency and low-frequency brain waves—suggesting an overall reduction of brain processing—as well as decreased DMN activity. This experience of thoughtless emptiness involves a reduction in the conscious representations of mental contents, reduced self-referential activity, and a reduction in the activity of the attentional network. They characterize this as "non-duality" because of the cessation of perceptions, memories, emotions, thoughts, and associations (Hinterberger et al. 2014, 2); such cessation epitomizes the epistemological suspensions posited as the core of mystical experiences.

Absolute Unitary Being

d'Aquili and Newberg (1993, 1999) illustrate the role of selective suspension or deafferentation of input from brain systems in producing a mystical experience they call absolute unitary being, which involves the loss of "all boundaries of discrete being," an awareness unlimited by senses of self, time, or the environment (d'Aquili and Newberg 1999, 95). Experiences of absolute unitary being have either a positive affect, which is experienced as a benevolent god, or a neutral affect, experienced as void. Similar mystical experiences are routinely reported among contemporary ultrarunners, who after many hours of incessant running may spontaneously enter a state they report as a feeling of flow and boundless energy that produces an experience of "unitary connection" (see Winkelman 2010, 259–60 for discussion). One form of this mystical consciousness is referred to as void: the dissolution of any distinction between self and object. This experience of dissolution of boundaries between the ego and the universe is interpreted in distinct ways in different traditions and even plays different roles in the ultimate goals of practices (i.e., absorption constituting a hindrance to awakening versus the ultimate goal of meditation—a state of nirvana involving an intuitive knowing of the essence of mind). While the different traditions construe the experience differently, similar phenomenology is present.

d'Aquili (1982, 375) proposes that the neurophysiological mechanisms underlying the experience of absolute unity involve activity of the parietal lobe of the nondominant frontal hemisphere. d'Aquili and Newberg (1999) review studies that indicate such experiences result from interference with the brain's processing loops and the normal functions of tertiary association areas. Among the cortical regions affected are the posterior superior parietal lobe, which functions to analyze and integrate information, particularly somaesthetic (body), visual, and auditory information that defines the spatial location of the body and self-other differentiations; and the inferior parietal lobe and prefrontal cortex, association areas that integrate information from the other brain regions. This loss of information for self-awareness must be seen as a causal factor in producing these epistemological states.

Mystical Experiences in Neuroepistemological Perspective

Epistemological perspectives are central to contemplative traditions (e.g., Buddhist) that characterize consciousness as a construction created by the mental models used to produce experiences. Consciousness is explicitly equated with knowledge in many meditative traditions. Knowledge is a part of consciousness that emerges when one knows through entering contact with external objects through the faculties of the mind and the systems of the brain. As the faculties, brain systems, and interpretative frameworks change, so too do the experiences of consciousness and knowledge. There are many different types of knowledge that humans can have access to, each imparting an

inherent aspect of consciousness. Knowledge and experience require epistemic structures, assumptions about the nature of the knower and what is known. Assumptions construct information and simultaneously constrain knowledge since epistemic structures assimilate information into their own structures and principles (see Michael Winkelman (1997) for a review of this aspect of Jean Piaget's (1972) thought). This perspective allows for the characterization of mystical experiences as concerned with epistemology, the study of the origins of knowing and its nature. Examining forms of mystical knowing in relationship to the functions of the brain allows for an assessment of their epistemic nature.

The notion of mystical experiences as involving different capacities for knowledge is explicit in Sri Aurobindo's (1972) characterizations of forms or modes of knowledge as (see Cornelissen 2012, 2015):

- "separative and indirect knowledge" that underlies ordinary knowledge of the physical world in which one knows indirectly through the senses and with a sense of separation from what one observes;
- "knowledge by identity," which is inherent in all beings;
- "knowledge by intimate direct contact," a direct, pre-reflexive experiential awareness of one's thinking or feeling; and
- "separative direct knowledge," a surface awareness that provides indirect knowledge of the world that is not mediated by the senses and distant from what is observed, such as in introspection.

Beyond these naïve surface forms of knowledge exist expert modes of knowing that can be achieved through meditation and experiences of the higher layers of the mental plane that produce what are recognized as mystical experiences. Knowledge by identity in the expert mode provides true intuition, a plane of intrinsic truth, such as exemplified in psychic development. Knowledge by direct, intimate contact developed through meditation provides access to pure consciousness through connecting with one's consciousness and the consciousness of others. Separative direct knowledge in the expert mode of meditators emerges when consciousness is separated from mental processes and provides a basis for pure witness consciousness (*sakshi*) and pure consciousness (self-consciousness, *purusha*).

Stages of Mystical Experiences as Epistemic States

Similar experiences are reported across mystical traditions, but not all agree on the sequence of stages or a common final endpoint. Differences across traditions may reflect different practices, intentions, and epistemic assumptions. Some transpersonal psychology approaches characterize mystical development as a form of post-formal thought, a continuation of earlier cognitive development

stages of Piaget (1972). Dale (paraphrase 2013, 27) characterized meditation's post-formal features as autonomous moral convictions; an awareness of multiple realities; transcendence of space and time; and understanding inherent paradoxes and contradictions. Meditation stimulates the development of post-formal cognition by enhancing convergence with a fuller model of reality through knowing reality in different mediums or modalities simultaneously. Meditation engages the processes of "reality testing" that Piaget attributes to the child's process of construction of reality.

But Dale (2009) questions versions of universalism that propose invariant sequences of experiential stages in meditative development (e.g., Wilber 1977, 1980, 1986). Dale (2013) reviews evidence (Ferrer 2000, 2002; Rawinson 1997; Schlamm 2001) showing that meditative experiences do not unfold in a single universal series of stages. Dale (2009) notes, for instance, the general absence of visions or union with a personal god (*unio mystica*) in Buddhist meditators. Some traditions focus on achieving non-dual states directly without the intermediary stages considered essential in other traditions. Mystical traditions also vary in whether form or emptiness-related experiences develop first, or whether illuminative development occurs before or after non-dual experiences. Mystical experiences can even emerge spontaneously, without practice, as exemplified in children's accounts of mystical or transcendent experiences occurring during crises and trauma.

Dale (2011) proposes an alternative to hierarchical models of meditative development by considering the differences in the stages of meditative development found across traditions as resulting from different lines of development that emphasize the various innate cognitive modules or intelligences (i.e., visual, spatial, imitation) identified by Howard Gardner (1983, 2000). Different modular cognitive capacities develop at distinct rates, a heterochrony resulting from different environmental and social circumstances that evoke specific developmental responses. Extreme meditative practices produce stressful influences, with prolonged meditative postures and other ascetic practices altering the normal developmental trajectory and enhancing the development of specific innate cognitive capacities.

Dale (2011) proposes that meditative experiences engage the development of presentational cognitive capacities that emerge parallel to representational cognitive development. The concept of presentational cognition involves "felt meanings" and visual and corporeal modes of knowing expressed in imagery, music, dance, and performance and manifested in dreams (Dale 2013, 27; also see Winkelman 2010). Harry Hunt (1995) characterizes transpersonal development as involving the influences of Gardner's (1983, 2000) intrapersonal intelligence acting within introverted absorptive meditation practices that reveal experiences not ordinarily available to the rational mind.

Meditative Consciousness as Epistemological Suspensions

Winkelman (2010, chapter 4) proposes that stages of meditative development and universal forms of mystical experience involve different epistemological systems based on the selective engagement and disengagement of specific brain functions. Meditation experiences derive from deliberate suspensions of epistemological assumptions adopted during earlier stages of cognitive development, such as the separation of self and objects. The suspension of epistemic structures involving perception, social evaluation, affect, and self that are adopted at early stages of cognitive development releases pre-language modes of cognition in symbolic structures manifested in images and innate conceptual processes. This suspension of epistemic structures also enhances knowledge by removing limitations imposed by previous assumptions. Some models of mystical levels of consciousness (i.e., Wilber 1980) present features that involve suspension of epistemological assumptions made during early levels of development, suspending the conceptual structures assumed in Piaget's stages of sensorimotor through formal operations and leading to the recognition that ordinary consciousness is a construction. An initial meditative development involves the suspension of ethnocentric cultural assumptions, leading to realizations of cultural relativism and perceptions of universals through recognition of the culturally relative expressions of knowledge. At the psychic level, there is suspension of habituated perceptual habits through recognition of the constructed nature of ordinary perception. This involves suspension of the habitual personal and cultural programming embodied in the routine processing of sensory information that produces personal consciousness in the conditioned structures of attention and perception. The perennial psychology emerges after the de-automatization or suspension of the learned information processing habits, permitting the perception of innate psychology. At the subtle level, there is the suspension of emotional attachment and self-identity. The suspension of the participating self as the point of reference leads to the emergence of the "observing self," or witness. Vedic psychology attributes the resulting profound positive affect to derive from unification of self and the world, an unbounded or nonattached self that experiences bliss, love, and joy.

Recognition that known objects are the consequence of the separations, divisions, and distinctions produced by the imposition of assumptions upon the world can lead to a non-dual mode of knowing based on perception of the mutually interdependent interactions of the perceiver and the perceived. This epistemological realization results from suspension of the separation of the self from known objects, early developmental distinctions imposed on the world. Suspending learned assumptions leads to a non-dual mode of knowing and an experience of unity with all reality where subject and object are not experienced as separate.

The pure consciousness is considered the deepest level, where consciousness can directly perceive its nature. As meditation progresses from mindfulness to awareness, one becomes aware of one's awareness, an unfolding of inner awareness that manifests in experiences of humanity's archetypal dimensions, including access to a primordial dimension of timeless awareness referred to as "pure ground awareness," the realm of everything and all potentiality. This experience is the complete absence of sensations, of all senses and mental processes. "Ineffable," incapable of being expressed in words, is one concept often used to express this consciousness. This reflects the direct, intuitive unmediated nature of these experiences produced by the suspension of the functions of language and the intellect.

The suspension of conceptual thought and language descriptions, as well as innate knowledge structures, leads to experiences of contentless awareness and void. Void consciousness, an experience without any objects or thoughts, is achieved by concentrating awareness until it is completely cut off from the sensory world and mental structures so that nothing arises in consciousness. This void consciousness is generally considered to be beyond description and concepts, a perception of reality without personal, cultural, or linguistic conceptualizations, a perception free of conditioning and all conceptual distinction. Suspension of the imposition of concepts results in experiences of the undifferentiated nature of ultimate reality—a seamless universe of wholeness and connectedness without boundaries.

Conclusions: Mystical Experiences as Intrinsic Forms of Knowing

Neurognostic and biosocialization perspectives integrate universalist, constructivist, and perennialist approaches to mystical experience. Neurological functions and processes provide bases for universalist perspectives in neurophenomenological dynamics where experiences reflect innate neurognostic functions. Constructivist processes reflect recognition of the enculturation of these neurognostic functions into specific cultural models that contribute to the elicitation of innate dynamics, formation of their phenomenology, and interpretation of these innate potentials. Deconditioning processes reveal mystical similarities via the deconstruction of the enculturated mind, removing acquired habits of perception to allow for perception of the innate structures and processes of the brain-mind. Perennialist perspectives reflect these biological commonalities of consciousness and the unfolding of specific forms of mystical consciousness through different forms of self-structures and their operations on the contents of knowing. These self-structures have specific neurological foundations and functions that produce a natural neuroepistemology reflected in cross-cultural similarities in the forms of consciousness seen across mystical traditions.

When mystical states and forms of knowledge have homologies with basic brain states and functions, there is evidence of the bases of mystical forms of knowing. When activity in specific brain systems covaries with the intentions and experiences of meditators, this identifies the brain system or dynamics that play a role in constructing, producing, and mediating such experiences. This may not be the mechanism directly producing the subjective qualia, but it is a mechanism in the overall process generating the experience. These relations between neurological functions and phenomenal experience constitute a neurophenomenology of mystical experiences and support for the general idea of perennial psychology and universalist claims of cross-cultural similarities in the nature and characteristics of mystical experiences. Similarities in the features of mystical experiences across individuals, cultures, and time—such as those conceptualized as light, identity with deity or the universe, the extinction of the self, and void—are highly significant for the scientific study of meditation because these similarities across traditions and cultures indicate that innate biological dynamics are responsible.

Neurophenomenological perspectives on these experiences indicate that their bases should be sought in their association with the operation or suspension of specific brain processes. The validity of the neurophenomenological perspective is indicated by the relationships between the phenomenological contents of meditative consciousness and homologous brain operations, for instance, a slowing of brain activity associated with a sense of calmness. Neurophenomenological studies are essential for elucidating the source of the phenomenal qualities of mystical experiences and providing the basis for explanations of similarities across diverse meditation-induced alterations of consciousness (Newberg and Yaden 2018).

The substantial similarities in meditation experiences across cultures have explanation in terms of humans' innate psychology and how meditative practices alter the habitual constructions of perception and brain processes. There are nonetheless differences in how these experiences emerge that reflect the specific intentions of the practitioners and their activities that lead to the construction and deconditioning of their experiences. Neurological evidence for the role of the brain in producing specific types of mystical experiences counters the widely held constructivist view of these experiences as being strictly the result of expectations. The correspondence of specific meditative experiences with the activation or suspension of specific neurological circuits supports neurophenomenological accounts of mystical experiences, and consequently their universality. These findings also provide direct evidence for the top-down effects of consciousness on the brain, where the intention of meditators provokes specific kinds of biological and structural activations.

This dynamic places the longstanding position of constructivism in a different light. Meditative experiences support a constructivist view of ordinary

consciousness as a construction produced in the interaction of a person's habitual mental models and routines for the interpretation of experience. This understanding of the constructed nature of ordinary perception is derived from a deconditioning, a suspension of these habitual processes that permits the disinhibition and emergence of neurological-based forms of knowledge. Although the idea of unmediated experiences free of any personal or cultural programming is contrary to most contemporary psychological and anthropological theories, such experiences are central claims of many meditative traditions. One example is the notion of a condition of pure consciousness characterized by contentless consciousness. This and other meditative alterations of consciousness found in traditions around the world reflect innate aspects of the operation of the brain. These experiences emerge naturally when practices engaged by meditators lead to the suspension of habitual learned patterns of interpretation, and even suspension of input from sensory and perceptual systems of the brain. Such claims are amenable to verification by studies of the modifications that occur in the brain during meditative alterations of consciousness. Such studies can enhance understanding of the relationship of consciousness to the brain's innate functions and the roles of mystical experiences as special forms of knowing. When phenomenologically similar forms of mystical gnosis are reported across traditions, and their features involve concomitant brain functions and/or their deafferentations, this provides evidence for the universalist postulate of mystical experiences as based in our innate psychology. Aurobindo (1972) proposed that universal aspects of mystical experience result from engagement with seven major planes of consciousness, beginning with the levels of the physical, vital, and mind and continuing with the supermind (truth consciousness), *ananda* (bliss), *chit* (pure consciousness and will), and *sat* (absolute existence). These levels of the mind engaged by meditators of these traditions should be amenable to neuroscientific verification in specific patterns and loci of neural activity corresponding to engagement with these different cognitive planes.

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Notes

[1] The overall perspectives on the phenomenology of meditative and mystical experiences presented here derives from the perspectives of the Samkhyayoga and Vendanta traditions and Matthijs Cornelissen's (2005, 2011) synthesis of Sri Aurobindo's views, considered the most sophisticated and well-developed of India's meditation practices and the basis of Hindu, Jaina and Buddhist traditions (Mukhopadhyay 2003).

[2] The etymology of *zazen* is "seated meditation," referring to the posture adopted in Japanese Zen Buddhism (Leighton and Okumura 1996), although the practitioner may engage in different mental practices (e.g., attention to breathing or open awareness). Contemporary use of the term refers to a present-moment focus in meditation (Fischer-Schreiber, Ehrhard, and Diener 1991). The term *samādhi* is derived from ancient Sanskrit (Pali), and its etymological meanings include "to bring together" and "convergence," referring to the rising into consciousness of the latent structures of the mind (Lusthaus 2006). *Samādhi* is widely used to refer to specific form consciousness in meditative and yogic traditions that engages practices for the attainment of spiritual liberation, referring to the near final stages of practices.

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