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Shamanic Cosmology as an Evolutionary Neurocognitive Epistemology

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The biological foundation for a shamanic epistemology is indicated by the cross-cultural distribution of a shamanic cosmology derived from knowledge obtained during altered consciousness. These special forms of consciousness involve integrative brain conditions that access ancient ways of knowing, expressive systems which have evolutionary roots in the communicative and social processes involved in animal displays or rituals. These were augmented over the course of hominid evolution into expressive and mimetic activities that provided a basis for significant epistemological expansions of consciousness exemplified in shamanic out-of-body (OBE) experiences. These manifestations of consciousness involved new modes of self and processes of knowing, reflecting selection for expanded symbolic brain processes that enhanced psychological, cognitive integration and extra-personal cognition. Shamanic alterations of consciousness also contributed to experiences of personal spirit essences and encounters with extrapersonal spirit presences that reflected activation of innate brain operators involving self-structures and psyche. The evolution of the hominid capacity for knowing involved new understandings of nature (animism), mind (spirits), self (power animals) and others (gods) that were elicited by shamanic practices and expressed though a shamanistic ideology. These phenomena reflect activation of innate aspects of consciousness, illustrating features of shamanism as a neuroepistemology.

Keywords: ***Shamanism, consciousness, neuroepistemology, evolutionary epistemology, entheogen***

Eliade (1964) characterized shamanism as a universally distributed practice involving use of ritual techniques to induce an alteration of consciousness (*ecstasy*) in order to enter into the spirit world. Long before his comparative research, there was a widespread recognition of strikingly similar practices of spiritual healers found cross-culturally and deep in human history (Flaherty, 1992). Cross-cultural research (Winkelman, 1986, 1992) verified this cross-cultural distribution of these and other shamanic features, which point to likely neuropsychological foundations. Basic features of shamanism still found universally in shamanistic healers include a ritual alteration of consciousness to interact with spirit beings and powers that provide information and resources, especially healing. These ritually induced modifications of consciousness involved the shaman experiencing a bodiless spirit travel or soul journey that contemporary psychologists and philosophers see as embodying fundamental properties of the self.

These cross-cultural patterns of behavior and belief characteristic of shamanism in the pre-modern world provide an ethnological analogy (Winkelman, 2000, 2002, 2010a, 2010b; Winkelman & Baker, 2008) for inferring shamanism's presence even deeper in the human past. Ethnological analogies indicate that shamanic activities were central features of the dawn of culturally modern humans during the Upper/Middle Paleolithic revolution at least 40,000 years ago and even deeper in the evolution of the Homo genus. The centrality of shamanic practice to modern cognitive evolution is indicated in its correspondences to central features of Middle/Upper Paleolithic cave art (Clottes & Lewis-Williams, 1998; Lewis-Williams, 2002; Lewis-Williams & Pearce, 2005; Whitley, 2009; Winkelman, 2002, 2010a).

Basic features of shamanism point to significant epistemological factors, beginning with the alterations of consciousness conceptualized as special forms of knowing embodied in the shaman's visionary and out-of-body (OBE) experiences. These epistemological systems of consciousness have deeper roots in forms of knowing related to the body and embodied in ritual, and apparently provided collective dimensions of consciousness as conscience—"knowing with others." These social foundations of shamanic knowing were expanded as a

hallmark of all religions. Witness the animistic systems of belief in spirits that populate the universe with human-like entities. Spirits provide significant epistemological expansions, embodied in the divinatory knowledge from significant others (spirits, gods) and symbolic representations of systems of meaning (cosmologies).

This paper characterizes shamanism's epistemology within a neurophenomenological approach to consciousness. This illustrates shamanism's epistemological models involve forms of consciousness mediated by ancient brain structures. A particular feature of shamanic consciousness involves integration across brain systems by slow (theta), highly coherent brain waves driven by interactions between the paleomammalian brain and R-complex, which are imposed on the frontal cortex producing interhemispheric integration. These integrative physical features are responsible for many features of shamanic experiences (wholeness, Oneness, comprehension, integration). Shamanic consciousness also emphasizes internal images manifested in body-referenced perceptual images (i.e., visions and OBE experiences) and development of the self with respect to the social "others," including those provided by animals and spirits understood within mythological systems of interpretation (animal powers, spirit possession).

Shamanic Epistemology and Consciousness

Shamanic epistemological systems engage a special order of consciousness, a mythic consciousness focused on altering consciousness and experiencing spirit persons. This intersection of myth and mystical consciousness in ethnoepistemological systems appears to place them in great divergence from scientific epistemology. Can they be reconciled; can post-modern philosophy of knowledge find a common ground with ethnoepistemologies?

This paper proposes a rapprochement between scientific epistemology and ethnoepistemologies through neurophenomenological perspectives that explain shamanic universals by linking them to homologies with functions of structural systems and functions of the brain. The neurophenomenological approaches, and by extension neuroepistemological perspectives, look for explanations of common cross-cultural principles of ethnoepistemologies in human psychobiology. This biological grounding of traditional epistemologies provides a basis for construing them as an objective natural epistemology that symbolically portrays the structures of consciousness and knowing rather than as arbitrary cultural constructions.

The evolutionary foundations of shamanic natural epistemology have biological roots in three principal characteristics of shamans—alterations of consciousness, community rituals, and spirit concepts. These reflect specific aspects of epistemology or knowing related to visual representation, community reference (i.e., conscience), and abstract symbols, respectively. These universal aspects of shamanistic ideology are derived from intrinsic brain processes, which provide a foundation for a shamanic neurophenomenology and neuroepistemology. Central behavioral elements of shamanic rituals—singing and chanting, dancing, and imitation of desired goals—have biological origins in the structures underlying animal rituals as systems of group coordination and communication. These primate enactive and vocal emotive expressive systems and their communicative and integrative functions were expanded in the evolution of shamanism, using mimesis as a system for the expression of intentions and the production of a shared culture. These ritual activities produced alterations of consciousness and new forms of the experience of self and other. These experiences of self derived from the integration of innate cognitive modules or operators, providing processes for producing personal and social identities based on animals (animal powers and totems) and new forms of consciousness.

Visionary Experiences in Epistemological Perspective

Alterations of consciousness and their forms of knowing must be at the core of the appraisal of ethnoepistemological systems for several reasons. Consciousness and epistemology are inescapably intertwined concepts. Epistemology is concerned with the nature of knowing and the processes that produce knowing. Etymological analysis (Winkelman, 2004) illustrates that consciousness is, in essence, concerned with the nature of knowing (e.g., knowing by making distinctions, knowing with). There are many different forms of consciousness and knowing. Epistemological perspectives characterize consciousness as produced by systems of structures and relations mediating interaction between the various capacities of a knower and that which is known (Winkelman, 1996). Consciousness and epistemology are both fundamentally concerned with the nature of knowing and how assumptions—mediating systems—are fundamental to the nature of both.

The origin of shamanic knowing was conceptualized in many cultures as a *vision quest*, a prolonged

period of austerities and solitude in search of a visionary encounter with the spirit forces, generally personalized as animals. This visual experience of the supernatural was also a central aspect to professional activities, conceptualized as an OBE experience, a perspective of flying uninhibited by a material body. This visual encounter with worlds that at times appear fantastically different from ordinary reality is mirrored in ordinary experiences within dreams. Dream mediated encounters with the spiritual forces was explicitly sought in shamanism in dream incubation practices overnight performances, which involved periods of repose, and other practices used to incorporate the dream processes into cognition.

These capacities involve presentational symbolism, an imagistic and body-based system that is the foundation of the symbolic system, which underlies dreaming (Hunt, 1989, 1995) and many manifestations of altered consciousness. This presentational symbolism underlies shamanic visions, a complex synesthesia blending corporeal, visual, and auditory sensory modalities. These pre-linguistic presentational symbolic systems provided medium for representing basic forms of consciousness. Shamanic visions are an encounter with an ontological source of shamanic epistemologies. Shamanic visionary experiences can be accommodated with scientific epistemology by recognizing the latter's adherence to a representational symbolic framework, a meaning based system that is in contrast to presentational symbolism, where the foundation of knowing is in the visual—where, as the saying goes, a picture speaks a thousand words.

The neurognostic basis of shamanic images involve the Jungian concept of archetypes, which Laughlin and colleagues (see Laughlin, McManus, & d'Aquili, 1992; Laughlin, McManus, & Webber, 1985; Laughlin & Tiberia, 2012) conceptualized as involving neurophysiological structures that play a role in mediating action and cognition. Neurognosis originates in genetically predisposed forms for modeling the universe, and undergoes transformation in adaptation to environmental influences. Neurognosis is expressed through archetypes, a human inheritance reflecting stable structures that provide the fundamental organization of the psyche. These archetypes arise from the unconsciousness in symbolic experiences. These constellations of psychic material are manifested in primordial images, particularly in the context of dreams, myth, and art as well as the visionary experiences of shamans. These images are structure and context of the unconscious, a means by which the ego can become aware of material and organization in the unconscious. Archetypes provide a conceptual structure for understanding the shamanic world of spirits as reflecting the many structures of the personal and collective unconscious.

The Foundations of Knowing: Epistemology and Consciousness

Epistemology is essential to understanding consciousness since it is concerned with a concept fundamental to consciousness—knowing (Winkelman, 1996). This relationship is exemplified in Piaget's (1971, 1995) genetic epistemology approach to consciousness (Martí & Rodríguez, 2012). Piaget was concerned with the study of the nature, origin, evolution, and validation of knowing, which he considered to be the same as consciousness and thinking. To Piaget, cognition, knowledge, and consciousness had a common basis in the necessary epistemic structures that the subject constructs with the known. Piaget (1971) characterized the epistemic relationships as occurring through assumptions about self, representation capacities, the known, and the environment that contribute to the nature of that which is known.

This construction of consciousness and knowing through mediating epistemic structures illustrates that the spiritual assumptions of ethnoepistemologies must be considered as legitimate concerns independent of their concordance with scientific assumptions. Recognizing that human knowledge of both the physical world and internal experience has a common basis in constructed precepts mediated by epistemological assumptions enables consideration of the relationship between the classic dichotomies of objectivity and subjectivity, brain and mind, without creating an inseparable gap between the two. The neurophenomenological approach recognizes that all forms of consciousness, both of physical and mental worlds, are known and experienced through mediating epistemic constructs and assumptions.

Consciousness encompasses a broad semantic domain from biologically based potentials for awareness, experience, and learning, to culturally-derived emotional, personal, social, and mental awareness and activities, which create relationships with and understandings of the environment and self (Winkelman, 2004). Consciousness encompasses a variety of other capacities including: awareness, feelings, thoughts, capacity for complex intentional responses, self-awareness, internal and communal knowledge, social awareness, and other forms of knowledge. A communality underlying the diverse meanings of consciousness as involving knowing is explicit

in the etymological roots. Consciousness is fundamentally concerned with an informational relationship between an organism and its environment, an interaction between knower and known that makes epistemology—the study of the nature and processes of knowing—essential to understanding consciousness.

Consciousness can be understood from an epistemological perspective as involving a *knowing system*, entailing relationship between knower and known mediated by self-object relationships. The most fundamental characteristics of consciousness as a knowing system involve (Winkelman, 2004):

- Awareness, a capacity to process meaningful information;
- Relations with environment;
- Representations in perceptions, thoughts, and memories that provide a template for information;
- Reference to the minds and values of others; and
- Self—an organism's identity and awareness as knower.

Consciousness integrates biological and acquired structures that mediate the organism's relationship to the cognized and operational environments. Consciousness emerges in the process of relating incoming information to a conceptual framework, the epistemological system employed. Consciousness mediates the organism's adaptation to the environment through modulation of a range of capabilities, including attention, representation, memory, learning, desires, planning, and behavior. Variations in specific aspects of each of these components provide the basis for a variety of forms, levels, and types of consciousness that can be characterized in terms of the system used to know. These include different forms of attention, modes of representation (e.g., iconic, symbolic, social, language), systems of memory (instinctual, perceptual, motor, episodic, semantic), forms of motivations/emotions, and self-reference to various others (parental, social, mythological, religious), and dimensions of the self (e.g., somatic, social, mythical; adapted from Winkelman, 2010b).

This neurophenomenological perspective provides a framework for characterizing the significant features of shamanic altered consciousness as concerned with (Winkelman, 2010a):

- Awareness of internally derived information, a relationship with a symbolic internal environment, which is interpreted as a spiritual or transcendental world;
- Representations in visual presentational symbolism with
- Reference to mythological systems and the minds and values of spiritual others, and with respect to
- Self identities related to spirits, archetypal representations and animals;
- Activation of memories of central emotional significance to self, particularly repressed emotional desires, identities, and complexes;
- Evaluation and development of the self with respect to the social others provided by mythological systems of interpretation; and
- Ritual re-programming of neurognostic structures of the body and self with spirit information from mythological interpretative systems.

Consciousness and the Triune Brain

Understanding knowing and consciousness requires integration of biological and phenomenological perspectives, developing an epistemological perspective that integrates scientific findings regarding knowing and information with the philosophical assessments regarding evidence, justification, and explanation. The neurophenomenological approach provides a unifying perspective by deliberately integrating knowledge of the functional organization of the brain with phenomenal experiences, providing a basis for understanding the interaction of biological and mental mechanisms. A biogenetic structural perspective accepts both mind and brain as manifestations of the structures of the human organism, providing two different views of reality: "'Spiritual' awareness is one way of knowing the being; 'physical' awareness is another way of knowing the being" (Laughlin et al., 1992, p. 11). "Mind is how brain experiences its own functioning, and brain provides the structure of the mind" (Laughlin et al., p. 13).

The neurophenomenological approach follows Piaget's (1971) recommendations to understand consciousness by consideration of comparative (between species) mental anatomy and structures to determine the commonality in and diversity of mental structures. Laughlin et al. (1992) similarly proposed addressing three epistemic processes: (1) phylogenetic encephalization, how the brain changes through evolution; (2) invariant

patterns of ontogenetic neuropsychological development, the universal principles of growth; and (3) the sociogenetic, the societal conditioning of views of the operational environment.

A neurophenomenological foundation for consciousness reflecting cross-species commonalities and differences in the development of the information-processing functions of the brain is exemplified in MacLean's (1990, 1993) model of the triune brain. This model allows one to illustrate the production of consciousness within a neurophenomenological approach that directly relates phenomenal experiences to specific neurological structures and processes. These relations are epitomized in shamanic alterations of consciousness that involve stimulating ancient brain structures and the linkages across the evolutionary strata of the brain. MacLean proposed that the brain involves three anatomically distinct yet interconnected systems—the R-complex (reptilian brain), paleomammalian (limbic) brain, and neo-mammalian brain. These three brain systems provide the basis for behavioral, emotional, and informational functions that MacLean (1993) called "protomentation," "emotiomentation," and "ratiomentation," (p. 39) respectively. These forms of thought are essential for understanding the neurognostic bases of ethnoepistemologies.

MacLean's model has its limitations in slighting capacities of reptiles and their prototypic limbic system, (e.g., Freeman, 2000), but it is widely recognized as a useful framework for understanding the evolution of the brain, its continuity across species, and the sequential emergence of cognitive capacities (Rial et al., 2008). The implications for shamanic and other ethnoepistemologies are found in the processes of protomentation and emotiomentation, which are primarily based in the reptilian and the paleomammalian brains, respectively (MacLean, 1993, p. 35). These forms of communication use vocal, bodily, behavioral, and chemical mediums, have syntax (orderly sequences) and semantics (meaning), and are found in both animals and humans.

MacLean characterized the primary functions of the R-complex as social communication through the evocation of displays and ritualizations. The R-complex controls protomentation, the rudimentary cerebration involved in an animal's master routines, the patterns of daily activities, and the expression of the major behavioral displays used in social communication (MacLean, 1990, p. 12). The R-complex manages species-typical communicative behavior, particularly isopraxis (innate dispositions to engage in the same behavior as another member of your species). The R-complex integrates the totality of movements and reactions of the organism to communicate meanings isomorphically in physiological, behavioral, and social dynamics. The R-complex is responsible for the foundations of consciousness—wakefulness and attentional mechanisms. This provides simple awareness and the preconscious proto-self, enabling adaptation to the environment through reflexes, conditioned responses, and habituation, modified by instrumental learning. These foundations for waking consciousness and the sleep and wakefulness cycles are similar across animals, reflecting the basis for their common aspects across species.

Emotiomentation (emotional mentation) involves processes underlying affects, subjective information derived from feelings. These paleomammalian brain functions are "essential for a sense of personal identity and reality that have far-reaching implications for ontology and epistemology" (MacLean, 1990, p. 248). This level of brain evolution enhanced cooperation with members of one's own species through social and cognitive capacities that enabled better prediction of behavior. The paleomammalian brain produces more complex forms of consciousness by modeling of the external environment and qualities of consciousness enriched by others (society). This social focus made cognitive capacities such as "mind reading," inferring the thoughts of others, a key focus in evolution of humans. Key to consciousness is this communal dimension (e.g., conscience) involving relationships between individual and community. These include the ability to attribute meaning and intentionality to others and using others to model self.

MacLean (1990) proposed the paleomammalian brain plays a vital role in the basic social personality, in using feelings to guide self-preservation behaviors, and in eliciting emotional mentation and in transforming it into physiological effects (i.e., provoking physiological changes when the organism is threatened). MacLean noted the fundamental role of limbic structures in nonverbal, emotional, and analogical information processing.

MacLean's triune brain model of protomentation, emotiomentation, and ratiomentation helps to illustrate the cognitive processes of shamanic cognition and epistemology. The protomentation processes of the

reptilian brain engage the body, exemplified in ritual. The emotiomentation processes of the paleomammalian brain provide the emotional influences on thoughts and behavior that are characteristic of shamanic healing processes. Freeman (2000) indicated the limbic brain is primarily responsible for the higher-level integration of bodily senses, emotions, and affect.

Modes of Consciousness

Understanding the nature of consciousness engaged by ethnoepistemologies requires moving beyond the notions of (altered) states of consciousness. Tart (1972) conceptualized states of consciousness as conditions that differ qualitatively from others, differences that reflect *personal* significance in how people judge usual patterns of experience. This paradigm makes personal significance, rather than universal or cross-cultural patterns, as the defining criteria. Personal significance is less important than the biological dynamics that give similarity in structure and phenomenological dynamics to experiences of consciousness across people, cultures, and species.

The cross-species and cross-cultural approach proposed by Piaget (1971, 1995) allows a conceptualization of consciousness in relationship to several biologically based functional modes of operation that are shared with other organisms. Similarities in waking, deep sleep, and dreams across species, and of conditions of altered consciousness across cultures, reflect common underlying biological structures that produce modes of consciousness (Winkelman, 2010a). These biologically structured foundations of modes of consciousness reflect conditions of homeostatic balance among brain subsystems to meet global organismic needs. The biogenetic structural foundations for modes of consciousness are revealed by the similarities of humans and other animals that are manifested in the daily cycles of sleep, waking, and dreaming, as well as the commonalities in human experiences of altered consciousness, conceptualized here as the integrative mode of consciousness (Winkelman, 2010a, 2011).

The Integrative Mode of Consciousness as a Neuroepistemological Framework

Core to shamanic ethnoepistemology is a special order of knowledge conceptualized as ecstasy or altered consciousness. The role of alterations of consciousness in understanding knowledge and epistemology are particularly obvious when they occur as a result of biological manipulations such as drugs. Entheogens are central candidates for constructing a neurophenomenological approach to ethnoepistemologies, understanding how the biological basis contributes to producing a substrate for both ordinary experiences of consciousness as well as those called spiritual experiences. This neurophenomenological approach provides an understanding of shamanic epistemologies as involving psychointegration, the elevation and entrainment of brain wave patterns produced by the connections between the ancient strata of the brain (Winkelman, 2007).

The near-universality of institutionalized ritual practices to alter consciousness reflects this inherent basis in human biology. Alteration of consciousness by diverse means—stress, dehydration, fasting and starvation; physical and emotional shock of austerities, trauma, and disease; long-distance running and dancing; ingestion of a variety of natural substances; ritual procedures such as drumming, chanting, dancing, meditation, dream-incubation, and so forth; sleep loss, sensory overload, sensory deprivation, and a variety of psychophysiological imbalances or sensitivities—reflect a fundamental similarity of brain responses to varied activities, agents, and conditions (see Mandell, 1980; Winkelman, 2010a, 2013). I have called this common biological response the integrative mode of consciousness based on the associated dynamics of theta brain wave coherence. This model of the integrative mode of consciousness originated in the work of Mandell (1980) and has received support from research on the properties of hypnosis, dissociation, psychedelics, and meditation (see Winkelman, 2010a, for review).

The integrative mode of consciousness involves systematic brain discharges that originate in the serotonergic connections between the limbic system and the brain stem region that produce an entrainment of the frontal cortex by highly coherent and synchronized slow-wave discharges. These synchronous discharges of the hippocampal-septal-raphe circuits are manifested in high voltage slow-wave EEG activity (especially theta, 3-6 cycles per second). These discharges reflect linkages of the attentional mechanisms (reticular formation) and the emotional brain (the hippocampal-septal area) that synchronize these levels of the brain and the frontal cortex by projecting ascending discharges from ancient levels of the brain onto the frontal lobes.

A common mechanism underlying diverse procedures for altering consciousness involves mani-

pulation of the autonomic nervous system through extensive ergotropic (sympathetic) activation leading to a collapse into a trophotropic (parasympathetic) dominant state with a slowing of the brain wave discharges into a more synchronized and coherent pattern (see Winkelman, 2013, for review). Mandell (1980, p. 400) noted that many agents and procedures result in a loss of serotonin inhibition to the hippocampal cells, which produces an increase in slow-wave EEG activity that produces synchronous slow-wave pattern across the lobes. The loss of inhibitory regulation by serotonin results in a reduction or loss of the "gating" of emotional response and an enhancement of dopamine circuitry. This produces hypersynchronous discharges that link the R-complex and paleomammalian brain. The integration of information from evolutionarily earlier structures of the brain enhances access to pre- and unconscious processes. This integration of information from the preverbal brain structures with the frontal cortex is why alterations of consciousness are often characterized as providing understanding, enlightenment, a sense of unity and oneness with the universe, feelings of connection with others, and personal integration. This notion that alterations of consciousness involve a disruption of processes of the frontal cortex is elaborated by Dietrich (2003), who proposed a variety of conditions produce a temporary deregulation of the prefrontal cortex (PFC). Psychological and neurological studies on the effects of endurance running, dreaming, hypnosis, meditation, and drug induced states illustrate their commonality in the disruption of the higher order functions associated with the PFC.

Entheogens as Natural Epistemological Agents

Entheogens, especially psilocybin-containing mushrooms, are found at the core of shamanic practices worldwide. These substances provide information through: visions, interpreted as providing access to a spiritual world, the supernatural; experience of the separation of one's soul or spirit from the body and its travel to the supernatural world; and establishing relations to beings both within and outside of the person, interpreted as spirits. Spiritual and mystical experiences are intrinsic effects of these substances, as attested to in double blind studies showing their ability to induce mystical experiences (Griffiths, Richards, McCann, & Jesse, 2006), including: classic introvertive and extrovertive mystical experiences, internal and external unity, sacredness, intuitive knowledge, transcendence of time and space, ineffability, positive mood, and experiences of oceanic boundlessness. Entheogens were central in the evolution of human cognitive capacities, particularly symbolism, abstract thought and reasoning, and religious and spiritual capacities which characterize the human species.

Reality perceived is a function of the neurotransmitters employed in neurotransmission. Entheogens are central examples of a neurotransmitter-derived neuroepistemology derived from action on the serotonergic and dopaminergic nervous systems. Plants utilized in shamanism generally contain tryptamines (e.g., DMT, psilocin, psilocybin, and other LSD-like chemicals), which are similar in chemical structure to the neural transmitter serotonin. While there are many additional neurological effects of entheogens, the typical effects on serotonin receptors provide the basis for a general paradigm of psychedelics and shamanic alterations of consciousness. This neurophenomenological approach identifies these effects as involving psychointegration, reflecting production of high-voltage, slow-wave (theta) brain wave activity (Winkelman, 2007).

The neurognostic structuring produced by psychedelics reflects macro-level effects involving both the activation and selective deactivation of the serotonin system, which has multiple regulatory roles reflected in its special characterization as *neuromodulator* of many neurotransmitter systems and bodily processes. Psychointegration is derived from both stimulating the serotonergic system, as well as inhibitory effects on serotonin transmission (through resistance to reuptake), with consequences involving disinhibition or release of the dopaminergic system (Nichols, 2004; Passie, Halpern, Stichtenoth, Emrish, & Hintzen, 2008). Nichols concluded psychedelics amplify incoming stimuli, enhancing the sensitivity of the phylogenetic older brain structures and the excitability of limbic and cortical structures.

Psychointegrators' primary neurophenomenological effects reflect activation of synchronized hyperactivity in serotonin circuitry across the neuraxis, the main nerve bundle linking the structural levels of the brain from the brain stem to the frontal cortex. This hyperactivity produces theta brain wave synchronization across the levels of the brain (R-complex and paleomammalian brains) and ascending from there to the frontal cortex where the theta waves induce synchronization between the left and right frontal hemispheres. Mandell (1980) proposed this is the

basis of the cognitive properties of transcendent states, increasing the ascending flow of information, improving integration of information exchange between the two hemispheres and their specialized functions in cognition and affect, producing interhemispheric coherence and fusion that results in insight. These synchronizing effects in the brain contribute neurological causes of the integrative experiences of connection and oneness produced by these substances, and the rationale for the concept of psychointegrators.

Psychedelics and Cortico-Striato-Thalamo-Cortical Feedback Loops

This paradigm of psychointegration as a generic feature underlying entheogenic consciousness is illustrated by Vollenweider's (1998) research on the mechanisms of action of psychedelics on the major cortical loops. The frontal-subcortical circuits provide one of the principal organizational networks of the brain involving neuronal linkages and feedback loops of the cortical areas of the frontal brain with the thalamus of the brain stem region. These loops unite specific regions of the frontal cortex with lower brain regions, specifically the basal ganglia, substantia nigra, and the thalamus. These circuits are central to brain-behavioral relationships, mediating motor activity and eye movement, as well as social actions, motivations, and executive functions. Vollenweider attributed the consciousness-altering properties of psychedelics to their selective effects on the brain's cortico-striato-thalamo-cortical feedback loops that link the information gating systems of lower levels of the brain with the frontal cortex. These loops are regulated by the thalamus, which limits the ascending information to the frontal cortex from the environment and body. Psychedelics disable this disinhibition process; this increases access to the flow of information that is ordinarily inhibited, overwhelming the frontal cortex and leading to an alteration of experience of self, other, environment, and the internal world of psychological structures and projections.

The effects of psychedelics and the shamanic alterations of consciousness involve stimulating the linkages across the evolutionary strata of the brain. Psychointegrators elevate these communication systems of the ancient strata of the brain. In the reptilian brain, they release the activity of the raphe and reticular formations and thalamic structures of the brain stem area that normally restrict information received by the higher levels of the brain. Additionally, in the paleomammalian brain they stimulate limbic system functions that provide emotional information, a sense of personal relations, and bonding.

The development of the serotonergic system across phylogenetic evolution illustrates how psychedelics can have such a central role in these integrative processes. The effects of psychointegrators on the serotonergic system and dopamine relate to MacLean's model of the evolution of the brain, functioning as the most central and powerful system of integration and coordination among the three brain subsystems. In the reptilian part of the brain, serotonin functions as a regulator system within the R-complex. Serotonergic functions in the paleomammalian brain involve control over the R-complex, inhibiting limbic brain emotional functions, and distributing information through connections with the prefrontal and neocortex.

Global effects of psychointegrators on the serotonergic system enhance reptilian and paleo-mammalian brain activities. Psychointegrators produce systemic brain integration through liberating humans' ancient animal brains, imposing the reptilian brain's ritual systems of communication and the paleomammalian brain's visual and analogical processes and material of an emotional, social, and personal nature into the self-conscious processes of the frontal cortex.

Soul Journeys as Epistemologies of the Self and Extrapersonal Cognition

These shamanic experiences of extra-corporeal awareness—extrapersonal cognition—provided the basis for new forms of consciousness in expanded analogical thought processes. Variously referred to as soul journey, magical flight, OBE experience, and astral projection, shamanic experiences of extra-corporeal awareness share many similarities with near-death or clinical death experiences suggesting a common biological basis (see Winkelman, 2010a). The widespread spontaneous manifestations of a separation of self from body in various spiritual practices and medical conditions indicate that it reflects innate psycho-physiological structures that are hard-wired. The soul journey engages a visual symbolic capacity, a nonverbal symbolism with the capacity for self-reference much like that employed in dreaming. Hunt (1995) proposed that the OBE experience involves a synesthesia of visual images of the body with the social psychological capacity to take the role of the other. This latter capacity involves interactions in which one monitors others to construct

perceptions regarding one's self. The soul journey involves this capacity to take perspectives of others toward one's self through experiences in a visual-spatial modality.

The soul flight is similar to a broader class of anomalous body and self experiences that involve aspects of abnormal self-representation, specifically: the experience of a lack of unity to self, the location of the self-representation in a place different than the physical body, and perceiving the world from a perspective different than that of the body (Metzinger, 2009). Blanke's research (Blanke & Mohr, 2005; Blanke et al., 2005) implicated a functional disconnection between parietal and frontal areas of the brain, specifically an interference with integration of vestibular information in other parts of the brain. The loss of this integration of information enables the experience of body travel through space without the actual constraints of the physical body.

Metzinger (2009) proposed that phenomenological properties of these experiences reflect properties of the proto-concept of the mind and self. The visual representations of one's own body from a perspective that is removed from the body has adaptive and functional features involving the separation of cognitive capacities from the physical self-model. He proposed that the mental clarity typically associated with these experiences may be a result of transient functional modularization that enables the brain's information-processing systems to differentially distribute functions across different modules underlying the self. For example, when physical trauma results in a termination of somatosensory input, higher cognitive functions, such as attention, problem representation and solutions, and agency and volitional processes, are integrated by these alternate forms of the self. This is exemplified in the near-death experiences where certain higher cognitive processes continue to function in spite of the incapacity of the physical body.

Metzinger (2009) proposed that the OBEs are a basic paradigm for understanding the primordial nature of altered consciousness and the cognized models of the world that result. These experiences typically lead to dualists' perception of reality and the conclusion that consciousness exists apart from the physical body. These experiences of one's self as a soul-like entity are the basis of a neurophenomenological archetype, reflecting a neurological potential that is at the core of conceptions of altered consciousness. Soul flight experiences reflect fundamental characteristics of human consciousness involving a theoretical self-awareness and self-modeling that moves beyond the primitive bodily processes and transcends the present moment to both experience the past and predict the future. Arzy, Molnar-Szakacs, and Blanke (2008) proposed that this capacity for mental time travel primarily evolved for anticipating future events, reflecting selection for mental processing of future predictions and decision-making.

The extrapersonal functions of dopamine are key to understanding central aspects of the shamanic soul flight or OBE experience, which exemplifies the ability to have a context-independent consciousness of people and places far removed from the physical body (Previc, 2009). These self-cognitive functions of the soul flight apparently have a basis in the complementary functions of dopamine and serotonin: the right hemisphere and its serotonergic and noradrenergic systems inhibit the left hemisphere and dopamine. The serotonergic system normally inhibits dopamine, but an end effect of the neurotransmitter influences of psychedelics such as LSD and psilocybin is the disinhibition of dopamine, releasing its cognitive functions. Previc reviewed evidence that dopamine is key to the functions of advanced intelligence and cognition, including: programming and executing motor planning, working memory and capacity for parallel processing, spatial and temporal abstraction, cognitive flexibility/mental set shifting, temporal sequence processing, and creativity/generativity. A significant aspect of these higher cognitive functions is processing of information in distal space and time, the abilities for context independent cognition. Dopamine networks function to understand causal and temporal relationships, in delayed gratification and pursuit of goal directed responses, as well as in "off-line" thinking and strategizing (Previc, 2009, p. 30). Shamanic ritual activities lead to a separation of body and self-perspectives and reflect the ability of consciousness to operate apart from the body-basis from which it arose.

The Biogenetic Structural Foundations of Shamanism

The body-based reference of the shamanic alteration of consciousness reflects knowledge systems derived from prior adaptations involving communication systems found in ritual behavior. Ritual is integral to the vertebrate communication and social coordination, involving the use of actions to signal readiness or intention for social behaviors (Laughlin & d'Aquili, 1974). Animal displays have communication and social signaling functions, providing information for

other members of the group (d'Aquili, Laughlin, & McManus, 1979). These genetically based behaviors provide information that facilitates intra-species interactions, coordinating the behaviors of individuals, and contributing to cooperative behaviors by making internal dispositions publicly available. Animal rituals contribute to collective behaviors by facilitating the flow of information and synchronizing individual behaviors into socially coordinated patterns.

Drumming or other percussion, a universal aspect of shamanism, has deep evolutionary roots as a widespread mammalian communication mechanism for conveying information to kin. Drumming displays fitness in other species, manifesting vigilance, fitness, and a readiness to act. Rodent foot drumming is a ritualization of intentional movements—running—indicating to predators one's fitness and the readiness to flee. Drumming also communicates territory, competitive superiority, submission, readiness to mate, and the presence of predators (Randall, 2001).

The modal inter-beat intervals of chimpanzee drumming have been recorded as ranging from 3 to 6 beats per second (Arcadi, Robert, & Boesch, 1998), a frequency that is within the typical range of shamanic drumming as well as theta brain waves characteristic of the operation of the integrative mode of consciousness. The drumming and similar percussive activities of shamanism reflect a widespread mammalian signaling mechanism that was expanded in hominid evolution. Drumming has adaptive effects in warding off animal threats, producing fear reactions in many animals, apparently functioning as an innate signaling device, which through producing loud sensations provides an analogy to large powerful beasts. Drumming can generalize to the act of striking, as in the case with chimpanzees beating branches as a basic defensive response to predatory cats.

Chimps engage in foot stomping, circling ingroup rhythmic marches and more elaborate *rain dances* and in *chimpanzee carnivals* involving group chorusing, calls, and drumming (Reynolds & Reynolds, 1965; van Lawick-Goodall, 1968, 1971). Maximal displays of chimpanzees are manifested in a rhythmic stagger, swaying from foot to foot, hooting, and beating of branches while making aggressive bipedal charges. Chimpanzees protect their territory through similar group shouting, pant hooting vocalizations (loud calls), and aggressive bipedal displays with fast drumming produced by jumping up and down on a tree buttress (Arcadi, 1996; Arcadi et al., 1998). Drumming also provides a system of long distance communication during travel, allowing individuals to remain in contact with one another and provide support in confrontations with chimpanzees from other communities.

There are many homologies between shamanic practices and the common display features of the great apes, exemplified in the chimpanzee maximal display (Winkelman, 2009, 2010a). These homologies of shamanic ritual with chimpanzee displays include: a nighttime performance by the alpha male involving drumming, vocalizations, and bipedal displays that function to integrate the social group. These homologies indicate that the fundamentals of shamanic ritual are likely genetically-based behaviors of the hominoid lineage because these behaviors had important social functions in ancient hominid groups, the common ancestors of chimpanzee and human lines. The chimpanzee model suggests that humans have genetic dispositions to collective ritual behaviors with vocalizations, drumming and dancing, which serve a variety of communicative functions in integrating the social group.

Ritual, Consciousness, and Evolution

Rossano (2007) proposed that these ritual activities exercised selective influences on human evolution, with "shamanistic healing rituals constitut-[ing] an important and unique aspect of the human selective environment" (p. 47). Rituals exerted a *Baldwin effect* in which a genetic adaptation becomes subject to selection in order to follow a somatic or behavioral adaptation. The role of ritual as a selective environmental feature derived from the unprecedented increases in levels of social complexity that Upper Paleolithic Cro-Magnons experienced. This complexity demanded the creation of larger, more complex, social integrations that crosscut traditional group boundaries. These social integrations were enhanced by social rituals, particularly ritual behaviors that reduced innate aggression. Ritual facilitated social relationships by inhibiting defensive responses and aggressive behaviors in order to allow for social bonding to take effect (Rossano, 2009).

The evolution of shamanism is linked by Hayden (2003) to relations among resource stress, community relations, and intercommunity alliances that enabled shamanism to contribute to human survival. Severe droughts several million years ago exerted important selective influences on hominid populations that gave

rise to shamanistic practices. Among the changes were abilities to forge close emotional bonds that helped survival in inhospitable environments. Emotional bonds with other groups provided assistance, food, and physical protection and produced more secure alliances across time that helped assure survival. The adaptiveness of ritual lies in the creation of a sense of a common group bond and identity that helps to overcome the natural tendency toward maintaining in-group boundaries and excluding outsiders. Shamanic rituals provided adaptive potentials that were epistemological in several senses. One was the ability to forge group identity through symbols, exemplified in the concept of the clan totem. Another was a consequence of the ritual alteration of consciousness that produced experiences of ego-dissolution that contributed to a sense of unity with others.

Mimesis as Ritual Symbolism

Human ritual capacities involve a feature exceeding primate rituals, the ability to communicate through mimesis—the intentional use of behavior to convey meaning (Donald, 1991). Mimesis and its associated suite of communicative capacities such as music and dance constitute an ancient adaptation providing new systems of communication and consciousness. Mime and dancing, ritual enactments of struggles with the spirits combined with chanting, singing, and imitative vocalization are at the core of much shamanic activity. These imitative enactments engaged the mimetic modules producing a whole-body expressive mapping capacity with domain-general properties linking many different systems. This mimetic capability emerged from the capacity to focus attention on one's own body movements, producing a form of body-based awareness, a physical self-consciousness that enhanced the ability to visualize one's body in motion. Increased awareness of self-in-environment enhanced the capacity for imitative expression and culture though customs, rituals, gestures, and skills. These traditions provided a collective expressive system that produced a shared group consciousness and culture and a basis for metaphoric thinking.

The most fundamental schema for analogical transfer involves using the body's ability to act, an innate neurologically based body schema that provides a template for all knowing and a schema for cosmological constructions (Newton, 1996). The use of the body as a metaphoric system is exemplified in reference to the shamanic soul flight conceptualized as an out-of-*body* experience. The mimetic origins of shamanism and its body-based epistemology underlie the OBE experience, providing a special form of self-awareness experienced as apart from the body. This perspective is reflected in the etymology of the word ecstasy, from the Greek *ekstasis*, meaning "to stand outside of oneself."

The body image dynamics of soul flight reflect a natural symbol system, a neurognostic model that organizes both internal and external experiences (Laughlin, 1997). Body-based representational systems provide a symbolic system for all levels of organization from metabolic levels through self-representation and advanced conceptual functions. The body is a neurological basis for human experience and knowing and a principal aspect of metaphors used in analogical thinking. Body image combines memory, perception, affect, and cognition in presentational symbolism, utilizing the capacity for cross-modal translations that are at the foundation of symbolic thought.

The core of symbolism of the body involves behavior, with the ability to act being the most fundamental representational system. Mimesis, the body's ability to imitate and represent through action, is the common basis for representing both somatic and symbolic levels of reality. Body metaphors express meanings in their natural ability to mediate between the sensory domains of felt experience and the verbal domains of expression, employing analogical reasoning processes that use the body as a common template for integrating felt experiences and social reality. For example, she is the "heart" of the group, he is the "head" of the organization, and they are the "backbone" of this effort.

Mimesis involves a conscious behavioral production through imitation and gesture that involves enactment, or a mapping of actions on to perceptions of proposed change. These bodily movements, gestures, and facial expressions are an early form of symbolic communication and exemplified in expressive modalities found in rhythm, affective semantics, and melody that are typical of shamanic rituals (Donald, 1991, 2006). Rhythmic-affective semantics that express fundamental emotions emerged early in hominid evolution in order to produce group coordination and social bonding. Music was at the basis of the coordination of this mimetic capacity that Donald proposed as a significant expansion of the hominid communicative capacities. Music is a uniquely human capacity found at the core

of communal ritual worldwide, integrated within other expressive activities that facilitate affiliative intentions (Cross & Morley, 2009).

This advancement over the ancient ritual capacities provided the foundations for new forms of culture and consciousness. The uniquely human abilities of music, rhythm, and dance evolved as a suite of capacities that permitted a new level of meaning to bind communities with common identity and purpose. These intrinsic rhythmic capacities provide the evolutionary roots of musicality, which expanded the full body capacity related to the inherent rhythm of bipedal movement and the emotional dynamics of the body (Merker, 2000, 2009). Music is the vocal complement to the behavioral expression of mimesis, a vocal-cognitive shift that expanded the communicative power of behavior beyond the range of sight.

Music and dance enhanced the intrinsic capacity of animals' rituals—reduction of in-group conflict and enhancement of social cohesion (Malloch & Trevarthen, 2009). Music's effects in control of emotions provided a communicative social adaptation that addressed the needs of more complex human minds and societies (Rossano, 2009). Music expands the exchange of information through diverse modalities (behavior, facial and emotional expressions, vocalizations). Cross and Morley (2009) noted the unique power of music to enhance group cohesion through formation of group identity, synchronization of behavior, and cognition and group catharsis, the expression and release of emotions.

Dissanayake (2009) proposed that music enhances individual and group adaptation through more effective devices in the formation of emotional bonds among the members of a group. This includes the ability of music to enhance hormone release through effects on oxytocin, which enhances social bonds (see Malloch & Trevarthen, 2009; Panksepp & Trevarthen, 2009). The pulse that underlies rhythm creates an inclusive sense of meaning that expands our consciousness and connectedness with others, enhancing social functionality and cognitive fluidity.

> Musical or protomusical behavior has the potential to make use of several cognitive capacities at once, relying on the integration and control of biological, psychological, social and physical systems; it gives the opportunity to practice and develop these integrated skills in a context of limited risk. (Cross & Morley, 2009, p. 77)

Cross and Morley emphasized the role of music in "integrating important cognitive skills . . . [and] stimulation of fundamentally important human interactive capacities" (p. 77).

Music has been considered one of the most effective devices for group coordination, whether it involves coordination of movement, interpersonal entrainment, or the creation of a spirit of teamwork. The physical beat of music produces a synchronization that coordinates and organizes the group. Effects on the individual include the ability of music to enhance hormone release, with effects on oxytocin, which enhances social bonds (Panksepp & Trevarthen, 2009). This hormonal release has both individual and collective effects, coordinating and entraining the individual with the group and eliciting one of the most important communication systems of the body, the immune system.

Community Rituals as an Immune Regulatory Mechanism

The biological need for group ritual coordination expanded in hominid species as group size increased. Attachment bonds that evolved to maintain proximity between infants and caregivers were expanded, producing a neuropsychology and emotional life that depended on adaptation to the social world. Social identity and personhood became a necessity, a reflection of social interdependency that required a coordination of individual neurological, emotional, and psychological development in relation to social others. Social well-being of hominids involves an emotional attachment based on internalizations of social identities that begin in the mammalian attachment dynamics elicited in the symbiotic caregiver-child relations and bonding experiences; these mammalian bonding processes are extended to the broader society through communal rituals that communicate information crucial to well-being.

Communal rituals elicit attachment bonds and related physiological mechanisms that release endogenous opiates (opioids), producing psychobiological synchrony within the group. Rituals elicit attachment-based opioid release, enhancing community cohesion. Opioid release stimulates the immune system, producing a sense of euphoria, certainty and belongingness, enhancing coping

skills, maintenance of bodily homeostasis, and enhancing stress tolerance and environmental adaptation. Ritual is a form of socialization that links emotionally charged cultural symbols with associated physiological responses producing a cross-conditioning of the endocrine and immune systems with the mythological, somatic, and psychological spheres. Shamanistic rituals manipulate the symbols associated with social bonding to activate the opioid system. They also stimulate release of opioids through a variety of physical and behavioral mechanisms including: extensive drumming, dancing, and clapping; repetitive physical activity; temperature extremes (sweat lodges); stressors such as fasting, flagellation, and self-inflicted wounds; emotional manipulations (fear and positive expectations); and nighttime activities when endogenous opioids are naturally highest (see Winkelman, 2010a, Chapter 4).

Evolution of the capacity for shamanic ritual provided a mechanism for the coordination of human brains—behavioral, emotional, cognitive, and immune—through information provided by social relations. Ritual links social attachment processes and conditioned cultural symbols, a cross-conditioning of the endocrine and social systems that constitutes a neuroepiostemological system that evokes immune system—a "second brain," providing a self-regulating control of the body's responses to the environment.

The field of psychoneuroimmunology (PNI) emerged from recognition of the ability of symbols and meaning to have effects on immune system responses. The interactions involve the organism's adaptations through cognitive models that mediate interactions among the central nervous system (CNS), endocrine system, and immune system (Lyon, 1993, 2003). Immunological responses involve relationships between biological and social levels of being, based in human emotions, which are both biological and cognitive, and involve individually felt meanings and their somatic responses (Lyon, 1993, p. 85). The immune system is affected by the interactions among thought, feeling, and behavior, particularly, how symbols tune the relationship between the nervous and immune systems (Lyon, 1993, p. 77).

Lyon (1993) proposed that these communicative functions of the immune system produce an *immunosemiotics* that involves "biological meaning" based in immune system cognitive functions of discrimination, inference, and memory that provide the basis for an *immunological self*. The immune system can be conceptualized as a sensory system within which the white blood cells function as *messenger molecules* for communication among the CNS, immune, and endocrine systems. Peptides found in both the immune and neuroendocrine systems provide the basis for signaling the immune system in response to *noncognitive stimuli* of "not-self"—such as viruses and bacteria. CNS responses to emotional stimuli change hormone levels that affect the immune system as "information molecules," that in turn act on the immune system indirectly through hormones and directly through neurotransmitters.

The immune system functions as a level of the self, a system that has the function of distinguishing the not-self at the level of cellular recognition of foreign entities (Lyon, 2003; Wilce, 2003). The concept of the self is central to theories of PNI because the most basic response made by the immune system is a response to the presence of an outside entity, something that is foreign to the organism, something that is not-self. PNI approaches have traditionally assumed that immunological processes work through a precultural level of the self that involves the body and its emotions, a primordial aspect of personal identity that includes a sense of the body and its internal processes and its emotional relations to significant others. The immunological self is not the rational, language-based thinking mind, but rather, a much deeper embodied self of behavior, habits, nonverbal communication, and social and emotional dynamics that are the foundation of the person's participation in the social world. This behavioral level is a semiotic (meaning) system shared with other animals in our embodiment and expression of meaning and intention through behavior.

This body-based, preverbal system is the basis for a metalanguage of communication within the organism and across its verbal, behavioral, neural, and immune systems (Wilce, 2003). Wilce used the term *somatosocial*, "body-social," to expand on the bases of the concept of sociosomatic, where social relations affect the interaction between mind and body. Somatosocial describes the recognition that the body is prior to the conception of the social and is a metaphoric basis from which to understand social relations.

Wilce noted the central role of social relations on immunological functions. Social context is fundamental to the emotional processes of the self that integrate the effects of social life within bodily processes. PNI emerged

from recognition of the vital role of social relations in the functioning of the immune system. PNI theories consider the meaning of events to play a role in the regulation of the immune system. Cognitive, affective, behavioral, and social representations provide the bases for a variety of feedback loops between the psychosocial dynamics of life and the functioning of the immune system (Lyon, 2003). Emotions are the representations of how the body subjectively experiences the self and the social world through their interrelations in intimate social networks.

Symbolic processes and social relations are consequently fundamental to elicitation of emotions and in the production of emotional empathy, a process that transfers experiences from one body to another. Emotional contagion is based in imitative processes, including mimicry and other imitative behaviors that are the foundations of all ritual and function to place groups of animals in attunement and synchrony. Lyon (2003) proposed that the relationships of social life to the immune system are mediated through the habitual effects of conditioning on human behaviors, producing a mimetic enactment of personal and cultural patterns, which provide the basis for emotional contagion, the linkages between social life and bodily processes.

Cognitive Exaptations of Shamanism: Spirit Worlds As Epistemological Constructions

A key feature of shamanism is the spirit world, which involves epistemological assumptions about significant sources of knowledge. Many researchers have proposed that belief in spirits is based on exaptations of other cognitive systems, which were exploited for their adaptive advantages in responding to new environments. Shamanic thought exapts ordinary innate thought processes that evolved to manage particular kinds of information through domain-specific inference systems, innate operators, and modular thought processes (see Gardener, 1983, and Mithen, 1996, for discussion of their roles in human evolution), such as *animacy detection*, animal species recognition, self-recognition, and other-recognition. These involve the production of symbols through the integration of the separate specialized brain modules for processing information relevant to self, others, and the animal world, manifested in metaphoric thought systems exemplified in spirits, animal allies, and totemism.

The spirit world, a key epistemological feature of the shamanic cosmology, reflects the integration of such innate systems, the product of blending of a hyperactive agency detection system with the capacity for understanding the self and social others. Shamanic practices exapted the human natural history module, which involves an innate intelligence for understanding features of animal species as representations for personal and social identities, manifested in animal allies, guardian spirits, and totemism. Animal metaphors play central roles in representations of the spirit world (allies), aspects of the self (animal powers), and the social world (animal clans). A biological system designed to readily apprehend the differences about species and their unique characteristics was applied to understanding of self and social groups, enabling a metaphoric expansion of cognitive organization of intrapersonal and social domains.

These experiences provided a basis for a cosmology and belief system that enabled formation of new personal and social representations that facilitated adaptations to the ecological and social changes that increased the need for new social and resource alliances. Shamans combine their social intelligence as charismatic group leaders and inter-group mediators with the management of these self, social, and animal capacities exemplified by their transformation of identity into their animal familiars and guardian spirits. Universals of shamanism such as animism, animal spirits, and totemic animals can be understood as forms of metaphoric thought produced as a consequence of the integration of these innate cognitive modules (Winkelman, 2002, 2010a). Shamanism expanded innate human cognitive representational processes through fundamental metaphoric processes involving trophes, representing one thing with another. The basic metaphoric extensions of the operations of innate modules in shamanism employ these in body metaphors (i.e., OBE experiences) and animal species concepts.

The Spirit World: Psychological Projection of Self-Processes

The inference of spirits, or animism, and its assumptions involve activation of innate processing modules for animacy detection combined with those for self and other representation. Atran (2006) illustrated how the adaptive effects of being hyper-sensitive to the presence of an animate agent—animacy detection—has adaptive benefits. Humans' universal tendency for animism results from the adaptive consequences of attributing human mental, personal, and social qualities to the unknown and natural phenomena. Developmental psychology, attributional theory, and consciousness

studies illustrate how the projection of humans' self qualities to the unseen is an inevitable consequence of our psychological and social development, making spirits a natural epistemology (Winkelman, 2004). Animism is exemplified in anthropomorphism, attributing human-like characteristics to spirits and nonhuman entities, imposing order on the unknown through the projection of human models of the self that are inseparably embedded in humans' representational capacities. This involves projection of cognitive similarity, involving the inevitable use of the self as a model for understanding the unknown, producing an interpenetration of the qualities of the personal with the natural in the creation of the supernatural.

Shamanic cognition emphasizes the extension to the natural world those elements of meaning and intentionality derived from humans (Hubbard, 2002, 2003). Humans have an innate tendency to attribute the cause of an object's actions to its internal dispositional factors, assuming that unknown things operate as do humans as rational agents who have mental states, beliefs, and desires. This understanding of the unknown in terms of the dynamics of the qualities of humans is an adaptive attribution process given that humans are the most complex and dangerous agents in the environment. Attributing humans' self and social qualities is also adaptive because it reflects the normative social context that produces others' behavior, providing an interpretive framework that reflects the social realities humans encounter. The universality of spiritual beliefs reflects this adaptive tendency, which was expanded in the spirit world through the externalized models it provided for personal development and social integration.

An Epistemological Perspective on Spirits

Rock and Krippner (2011) characterized the epistemological core of shamanism as a deliberate attempt to achieve heightened states of awareness providing special forms of knowing involving perception of spirits. These experiences provide a signal system that is interpreted by the shaman to provide knowledge. They show that the shaman's ontological perspective of entering into spirit worlds and non-ordinary reality is consistent with philosophical assessments of realism, arguing that the shamans' experiences during journeying should be considered real and objective. Their reasoning involves the distinction between noumena and phenomena, the difference between the actual entity and the perception or outward appearance, respectively (i.e., operational versus cognized or operational environment). This allows them to maintain a realist interpretation of images of shamanic experiences and also consider them to be of non-physical worlds and independent of the percipient's mind-body.

A central quality of shamanic forms of consciousness is the images, exemplified in the visionary experiences of soul flight. Their characterization of shamanic visions as imagery does not determine the answer to the ultimate ontological question regarding their referents and whether the entities experienced exist independently of the percipient's body. The basis of the shamanic epistemology system is found in the internal experiences of dreams, visions, and intuitions, as well as in phenomena found in the natural and social world such as animals, which appear at opportune times and are used as sources of information and inspiration. They characterize shamanic work as involving the deciphering of images, which constitute signals, using the symbolic capacity to infer meaning from images, sensations, and perceptions. This is exemplified in the shamanic use of dreams, largely non-verbal experiences, imagistic wordless experiences that may be readily interpreted within a personal frame of reference.

Krippner and Rock (2011) proposed that the ritual examination of these basic innate image-schemata provided a new area for adaptation, an enhanced ability to make estimates of future conditions. Over the course of the evolution of *Homo sapiens sapiens*, the ability to make symbolic interpretations of signals was specialized by shamans, using this information to address some of the basic issues of survival, such as finding food and game animals, identifying medicinal plants, and inferring how to symbolically manipulate the consciousness of patients through ritual drama to heal.

Spirits as Symbolic Evolution

Deacon and Cashman (2009) linked human's spiritual predisposition to the evolution of human's unique symbolic abilities that provide distinctive cognitive and emotional predispositions. These predispositions involve: understanding the universe and personal identity in narrative terms, a conceptualization of the world as involving hidden meanings that involve a level of meaning more fundamental than mundane experience, and emergent, emotional experiences that provide the source of transcendent and spiritual experiences. Symbolic capacities produce a drive to create narratives and to look for hidden meanings. Human cultural universals postulating a hidden spiritual or

supernatural reality that underlies the phenomenal world of experience is a consequence of our irrepressible tendency to see things as symbols. Since symbolic references acquire their meanings from a system of relationships among signifiers, the source of meaning is in essence unseen, found within an invisible conceptual world of interdependent signifiers. But Deacon and Cashman rejected the dominant scientific theories regarding religious universals as epiphenomena, arguing that these approaches overlook the *emergent* character of these experiences and their personal and social value, the importance of ultimate meaning in the transformational experiences, and the psychological and social functions they fulfill.

These experiences are emergent in that they are not presaged in our evolved psychological mechanisms. Religious experiences involve an emergent character in which our symbolic capacities fundamentally reframe life experience by radically reorganizing cognitive processes and emotional experience in reference to spirit other. Religion contributes to production of transcendental experience and novel meanings and values by expanding humans' perspectives beyond those produced by biology, personal reference, and mundane experiences. Religious experiences are centrally emotional in character, and the emotional qualities are directly related to development of character and values. The emotional qualities associated with mystical and transcendent experiences such as awe, equanimity, and self-transcendence depend on symbolic representation and are emergent in that they are produced in the interaction among basic cognitive-emotional processes. Symbolic mediation generates new modes of experience that are different from the more basic component emotions, producing higher-order novelty that is discontinuous with and even in contradiction to the properties of the lower level components. Symbols can fuse ideas and emotions that fall outside the range of normal neurological processes, conceptual juxtapositions that are symbolic blends, self-transcending aspects that provide expanded cognitive integration exemplified in new forms of personal and social identity.

The Supernatural, Self, and Society

These projective processes underlying animism are reversed in the use of spiritual "persons" in development of personhood and identity. The assumptions regarding spirits and their nature function as an epistemological system within mythological systems that serve as frameworks for molding the self. These effects of spirits are reinforced by an innate capacity of humans to infer the mental states of others and to predict their behavior through an intuitive *theory of mind*, attributing mental states to others by modeling them with one's own mental states and feelings. The need for cooperation with other humans makes essential some knowledge of their mental states. This requires a theory of mind combining mental structures that detect animate agents, determines what they are looking at, inferring their intentions (goals), and ascertaining their belief systems (Boyer, 2001).

Supernatural agents expand human abilities at scenario building, engaging in mental thought processes without the actual circumstances. The social mind inference system is extended through spirit concepts. Actual people are limited in their access to social information about others, whereas spirits are presumed to have, or potentially have, full access to strategic information about other people's motivations and actions. The ability of the mental hardware programs (inference systems) to operate decoupled from environmental input allows them to operate independent of actual experience, functioning in a counterfactual mode that explores alternative scenarios through imaginary characters and inferring their mental states.

Spirits are also useful strategic information concepts in personal identity and social integration. Spirits have social psychology functions as fundamental representations of the structure of human psychology, a language of intra-psychic dynamics of the self and psychosocial relations with others (Winkelman, 2004). Spirit beliefs also provide a system to reflect the cultural dynamics of social and interpersonal relations. Manipulation of these complexes through ritual practices can heal by re-structuring and integrating the unconscious personality dynamics with social models, uniting unconscious and conscious mind as exemplified in the guardian spirit complex, power animals, possessing spirits, and so forth.

The Guardian Spirit Complex

Shamanic practices of soul recovery, animal allies, and guardian spirits reflect aspects of self-representation that involve "sacred others," the intersection of the spiritual and social worlds in cultural processes that produce personal identity and enhance personal power (Pandian, 1997). Shamanistic relations with spirits engage humans' capacity to incorporate others' perceptions and internalize those others into our own self-identity. Spirit relations engage self-

development by using symbolic representations derived from the natural history module, exemplified in animal spirit powers and allies. Animal powers engage a specialized innate capacity for organizing knowledge about animal species and recognizing "species essence." Animal species provide a universal analogical system for creation of meaning, particularly representations of self and social identification.

Animal powers as aspects of the self are exemplified in the guardian spirit complex where self-development involves incorporation of animal properties within identity and personal powers. These allies and guardians empower people in adult role development by guiding personal and social choices. Animal spirits' characteristics provide ideals that structure individual psychodynamics and model social behavior through the natural symbols provided by animal attributes. Spirit allies also provide alternate forms of self-representation that facilitate social and personal differentiation. The animals as aspects of self provide diverse self-representations that can mediate conflict among the different acquired selves and instinctive agents. This enables the operation of the person with respect to a hierarchy of goals, using spirit concepts to mediate hierarchies of personal and social goals.

The use of spirits to model aspects of the self enables ritual to produce social-psychological transformations and therapeutic change through cathartic transformations of personal and social psychodynamics. Personal spirits and sacred others provide protection from stress and anxiety through the management of emotions and attachments and the incorporation of spirit other to produce identity. Animism, totemism, and guardian spirits as well as soul flight are natural symbolic systems for self-representation within which the self is internally differentiated and manipulated in relationships to others.

Conclusion

Shamanism's primordial, cross-cultural, and empirically derived status gives it a central role in the development of ethnoepistemologies. The biogenetic structuralist approach illustrates that the natural epistemology of human consciousness is founded on principles intrinsic to shamanism. Key biological contributions to shamanic ecopsychology are the effects of substances called psychedelics, or from an ethnoepistemological perspective, entheogens, which act to provoke the manifestations of the divine within oneself. Entheogens have key effects on the worldview and principles of shamanic consciousness and ecopsychology because their effects on neural transmission produce a neuroepistemology and worldview that reflects neurophenomenological principles related to integration, connection, identity, and unity with nature.

Human evolution produced a fragmentation of consciousness due to the modular structure of the brain, the diversification of personal and social identities, and the automatization of brain processes. This produced a need for integrative brain processes, what Laughlin et al. (1992) called the *holistic imperative* or the drive towards expansion and integration of consciousness at higher levels. Shamanistic activities produce psychological, social, and cognitive integration, managing relationships among behavioral, emotional, and cognitive processes, and between physiological and mental levels of the organism. Shamanistic activities induce modifications of consciousness that elicit natural processes of integration of the major brain strata, producing a global coherence of the operations of various brain systems and their functions expressed and experienced in visual symbols. This shamanic integration involves linkages across the evolutionary strata of the brain, integrating behavioral, emotional, and cognitive informational functions. These interactions across levels of the brain are mediated primarily through non-verbal forms of mentation that utilize presentational (visual symbolic) information. In mammalian rituals, the aggressive archaic emotions of the R-complex are suppressed and sublimated, with aggressive tendencies reduced in recognition of a social order and hierarchy. Shamanic rituals give these aggressive tendencies a controlled expression in dramatic rituals that release and then subordinate these reptilian and mammalian tendencies.

Relationships among innate drives, social attachment, and cultural demands create many different kinds of health problems including chronic anxiety and fears, behavioral disorders, conflicts, excessive emotionality or desires, obsessions and compulsions, dissociations, and repression. The paleomammalian brain mediates many of these processes to promote an integration of the self within the community. The paleomammalian brain's emotion-mentation processes provide a major basis for shamanic healing, providing

mechanisms for integrating new subjective influences and self reference, moderating the instinctual responses of the reptilian and mammalian brains with ritually charged symbols derived from integrative cognitive processes programmed in the neo-mammalian brain.

Deacon and Cashman (2009) linked humans' spiritual predisposition to the evolution of human cognitive and emotional predispositions, proposing that transcendent and mystical experiences involve the capacities of symbols to produce uniquely human emotions through the interaction among basic cognitive-emotional processes. Shamanic traditions produced an integration of consciousness through community bonding rituals that stimulate physiologically-based psychological and synesthetic integration in visual-metaphoric symbolic integrations in visions. The ascending theta wave coherence creates the integrative mode of consciousness through the imposition of the paleomammalian brain's analogical processes and material of an emotional, social, and personal nature into the self-conscious processes of the frontal cortex. This activation of the paleomammalian brain also underlies many shamanic therapies that transform health through eliciting physiological responses and social support and enhancing symbolically-mediated placebo and other psychosomatic effects. Shamanic ritual evolved as a system for managing the relationships among innate drives and needs, social bonding processes, and cultural representational systems. Shamanic ritual management of behavior, emotions, and reason is mediated physiologically and symbolically within the paleomammalian brain.

Collective shamanic rituals provide integrative functions for the group consciousness, synchronizing group and individual cognition through use of the analogical cognitive processes embodied in ritual, mimesis, and symbols. These symbolic enactments provide cultural programming of neuronal structures, an adaptive tool that has been called *the theater of the mind* (Laughlin et al., 1992). Since rituals involve socialization processes linking individual and collective identities, it might also be called *the theater of the social self*. The integration of information from the lower levels of the brain into the processing capacity of the frontal cortex, particularly integrating information from the emotional and behavioral preverbal brain structures, also plays a role in emotional integration and release. In this sense, shamanic healing can be characterized as a social-emotional epistemology, providing integration of information that has therapeutic effects.

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Note

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