Exploring Psychedelic Trance and Electronic Dance Music in Modern Culture

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Chapter 1
Biogenetic Structural Perspectives on Shamanism and Raves: The Origins of Collective Ritual Dance

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ABSTRACT

The worldwide development of raves and similar collective rituals characterized by all night communal rituals involving dance, drumming, music, and often the use of psychedelic substances can be understood as a modern manifestation of the same biological principles underlying shamanism. The shamanic ritual was a nighttime ceremony which engaged all of the community in a powerful interaction with the spirit world as the shaman beat drums or rattled while singing, chanting and dancing. The common underlying biogenetic structures of shamanism and raves involve: the social functions of ritual; the effects of dance and music as systems for social bonding and emotional communication; and the effects on consciousness that produce alterations of emotions, identity and consciousness and personal healing.

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INTRODUCTION

In recent decades societies worldwide experienced a rapid growth of phenomena of raves, trance parties and electronic dance music. Why are youth drawn to an emotional participation in these practices involving overnight gatherings characterized by drumming, driving music, dancing and other technologies for altering consciousness such as psychoactive substances?

Rave practices can be seen as a social phenomenon with cultural bases. But St. John (2004) notes that in spite of the heterogeneity of global rave phenomena, it manifests considerable homogeneity. A number of investigators (e.g., Hutson, 2000; St. John, 2004; Tramacchi, 2004; Rill, 2010) have noted that the cross-cultural similarities in raves have substantial parallels with the ancient practices of shamanism. Ravers also have conceptualized their practices as a form of "technoshamanism," with the DJ functioning as a "harmonic navigator" who manages the group mood and mind (Hutson, 2000).

In comparing raves with a selected group of shamanistic entheogenic practices, Tramacchi points to their commonalities, including: ritual preparation; the overnight character of the practices; the centrality of dance and music; pharmacologically-induced alterations of consciousness; and the formation of social relations that enhance communitas, characterized by intensified group identification. The enhanced communitas involves a broader trend of 'retribalization' of modern society and an effort to reconnect with the matrix of ritual (Takahashi, 2004).

This effort after a reconnection with ritual reflects a human longing and need for connection with something basic to our human nature. These aspects of human nature can be best appreciated by understanding the nature and origins of shamanism. Correspondences of rave practices with the cross-cultural characteristics of shamanism reflect similar adaptations to something basic to human nature. This paper proposes an explanation of the appeal of raves and similar practices can be found in the biogenetic bases of shamanism. Shamanistic practices are characterized by all night communal rituals involving dance, drumming, music, and often the use of psychedelic substances. Interdisciplinary research indicates that all of these practices have deep evolutionary roots that help to explain why such similar phenomenon was found in pre-modern cultures around the world.

This paper leaves the description of the new manifestations of these technologies of consciousness, community and self to other articles here and instead focuses on providing a biogenetic explanation for the forms and functions of these practices. This biogenetic approach is comparative, beginning with an examination of the similarity of the rave practices to shamanic and animal rituals to show how these post-modern rave phenomena reflect adaptations to ancient biological facets of human nature. These involve dispositions for activities involving nighttime ritual, dancing, drumming and musical vocalization.

This paper proposes that the attraction of contemporary psychedelic trance parties and raves have biological foundations in the effects of ritual, dance, music and psychedelics on social relations, consciousness and well-being. These underlying biogenetic structures of shamanism and raves have bases in: the social functions of ritual in group integration; the effects of dance and music as systems for social bonding and emotional communication; and the effects of alterations of consciousness in producing alterations of emotions, identity and consciousness and personal healing. Modern techniques of inducing "ecstasy" provide tools for enhancing social bonding, a connection with ancient impulses from deep-seated human needs. Rituals elicit attachment related opioids, reinforcing community cohesion and psychobiological synchrony of the group. Key to raves is musical forms that facilitate dance and alterations of consciousness (i.e., trance music, techno, drumming and bass). Furthermore, these musical events are infamous for the use of MDMA (3,4-methylenedioxy-N-methylamphetamine, or colloquially "ecstasy") as well as other psychedelics, primarily LSD (Lysergic acid diethylamide) and psilocybin mushrooms that alter consciousness. Understanding the biological bases of these impulses allow us to better appreciate their roles in the post-modern world and why raves integrate ritual, dance, music and psychedelic drugs in ways similar to ancient shamanic practices.

SHAMANISM IN CROSS-CULTURAL PERSPECTIVE

Long before the modern comparative research of Eliade (1951/1964), who popularized the term shaman in his now classic *Shamanism Archaic Techniques of Ecstasy*, there was widespread recognition of strikingly similarity of spiritual healers in cultures in the pre-modern world and deep in human history and prehistory (Flaherty, 1992; Narby & Huxley, 2004). The shamanic ritual was a nighttime ceremony which engaged all of the community in a powerful interaction with the spirit world as the shaman beat drums or rattled while singing, chanting and dancing. The drama of the shaman enacted struggles with animals, spirits and the forces of nature, producing a ritual charged with fear, awe, and other powerful emotions. The shaman's ritual was typically focused as a curing ceremony, but was also the context within which the relationship with the cosmos was produced. Eliade noted that shamanic ritual was the most significant social activity of these societies, a "spectacle unequaled in the world of daily experience" (1964, p. 511). This performance was the context for expression of the basic cosmological, ecological and communal relations of society, as well as spiritual and healing activities. Shamanic rituals were fundamental aspects of the psychological security of the group; shamans fought spirits and disease and defended "life, health, fertility, the world of light, against death, diseases, sterility,

disaster, and the world of darkness" (Eliade, 1964 p. 509). Following hours of singing, dancing and drumming, the shaman collapsed exhausted or reclined on the ground and was covered with blankets. Apparently unconscious, the shaman engaged in a soul journey or magical flight, entering into the spirit world to communicate with the spirits and to obtain their cooperation. Eliade characterized the shaman's alteration of consciousness as ecstasy "a trance during which his soul is believed to leave his body and ascend to the sky or descend to the underworld" (Eliade 1964, p. 5).

Eliade's contentions of a cross-cultural distribution of these practices followed an established trend of using shaman as a comparative term to refer to similar spiritual healing practices found in foraging and other small-scale societies around the world. The modern academic use of the word shaman has its origins in contacts of Europeans with peoples in other societies, in particular the groups of Siberia (Flaherty, 1992). The origins of shaman in European languages in typically attributed to borrowing of the Tungusic term šaman, which means "one who shakes", referring to the shaman's agitated dance used to enter into an "ecstatic" state of consciousness (but see Winkelman, 2010a, Chapter 2 for Indo-European cognates and etymology).

The use of the term shaman for the spiritual practitioners of other cultures was driven by recognition of a remarkable similarity of the indigenous ritual practices in many societies worldwide. The validity of the cross-cultural application of the term shamanism is supported by cross-cultural research (Winkelman, 1992) which shows worldwide similarities in shamans. These cross-cultural similarities indicate that there is some biological disposition for these activities and the forms that they take (Winkelman, 2010a, 2002). The necessity for developing a biological model of shamanic practices in indicated by: 1) formal cross-cultural research (Winkelman, 1992) that provides empirical evidence of the uniformity of shamanic ritual practices across cultures; and 2) the homologies of shamanic ritual with ritual activities of primates, especially the hominids (Winkelman, 2010a, Chapter 6; 2010b&c).

This research shows that cross-culturally, foraging societies had a professional figure of the shaman, the most prominent figure of the community, and a charismatic leader who demanded respect and even fear. The shamanic ritual was typically a nocturnal event which was attended by all of the local community. The ritual activity focused on dance, chanting and drumming, typified by the shaman dancing, drumming and rattling for hours. These activities may also be engaged in by the community, who may join the shaman in singing and clapping. A central part of the shamanic ritual is an enactment through the dance of a struggle with the spirits, often impersonating the typical behaviors of the animal powers that the shaman summoned. The primary ritual activities were healing, providing protecting from spirits and malevolent shamans; and divination, acquiring information about the causes of illness and a myriad of other circumstances of relevance to the community—where to hunt, when to move, the plans of enemies and the location of group members.

The pre-modern practices of shamanism also emphasized the shaman's ability to enter into an alteration of consciousness caused by the drumming, singing, chanting, dancing, as well as other practices (e.g., fasting, sexual abstinence, extreme exertion, painful austerities, dream incubation and psychotropic drugs). Similar practices were used during the training of the neophyte shaman, who was typically selected based on the content of the experiences that occurred during these vision quests that were part of adult formation. During this training period, the shaman initiate typically underwent an experience of death and rebirth, a wounded healer who now had the power to heal. This power came from special relations with animals, which gave the shaman the ability to control animals and even to allegedly transform into an animal. There were also beliefs the shaman can harm and kill magically, as well as control weather, to physically fly, and to have immunity to fire (Winkelman, 1992).

The empirically-derived cross-cultural characteristics of shamanism provide a basis for the inference of such practices in the past. These common patterns of behavior and belief provide the basis for an ethnological analogy (Winkelman & Baker, 2008, Winkelman, 2010b) an empirical set of features, practices and structures for inferring its presence in other cultures deep in the human past. This shamanic paradigm provides an interpretative paradigm that reveals the presence of shamanic activities at the dawn of culturally modern humans during the Upper/Middle Paleolithic revolution at least 40,000 years ago (Clottes & Lewis-Williams, 1998; Winkelman, 2002, 2009). Ethnological analogies also provide models for inferring a central role of shamanic ritual potentials in hominid and human evolution.

Hayden (2003) links the evolution of shamanism to relations among resource stress, community relations, and intercommunity alliances. Severe droughts several million years ago exerted important selective influences on hominin populations for the abilities to forge close emotional bonds that facilitated survival. Emotional bonds with others help in access to resources through the roles of emotional bonding in facilitating alliances. 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 ethnocentrism and maintenance of in-group boundaries that excludes outsiders. Shamanic rituals helped forge commonality through forging group and the ritual alteration of consciousness that produced a sense of unity with others. Rosano (2007, 47) proposed that ritual exercised selective influences on human evolution. The role of ritual as a selective environmental feature derived from the demand for the creation of larger and more complex groups based on social integrations that cross-cut traditional group boundaries. These social integrations were enhanced by social rituals that reduced innate aggression. Ritual contributed to building social relationships by inhibiting defensive and aggressive behaviors, thereby enhancing social-bonding mechanisms (Rosano, 2009).

Contemporary raves have also been characterized as providing this kind of social integration, instilling a unifying energy that seems to binds participants together in a collective experience: "One thing that makes this experience unique among dance expressions is the profound sense of connection and unity" (Rill, 2010, p. 145). Rill emphasizes that the experiences of raves replaces thinking with feeling and the egocentric self and the "I" with a sense of "We." This communal sentiment is supported by what has been called a common ideology of America raves, expressed as PLUR--Peace, Love, Unity, & Respect. While these generalizations have been critiqued, it is apparent to many rave observers that these ideals contribute to a dissipation of social distinctions, a dissolution of the interpersonal boundaries typically experienced because of differences created by gender, class, ethnicity and other social identities (St. John). This acceptance of these ideals provide a guiding set of principles for social relations at the raves, uniting people from many different orientations—class, professional, religious, ethnicity, cultures, gender, sexual orientation, etc., and even age. This paper proposes that these effects of raves are physiological, specifically neuropenomenological in the sense that they result from effects of raves activities that alter neurotransmitter activity and consequently phenomenological experience. The nature of altered consciousness in raves is a produced by both exogenous sources of neurotransmitters (psychedelics, marijuana) and behavioral activities (dance) that stimulate the serotonin, dopamine and endocannabinoid neural circuitry.

The power of raves to integrate disparate people can also be understood in light of the significance of social ritual in human evolution, social functions and identity formation. The origins of the psychosocial functions of human ritual are elucidated by an understanding of the roles of ritual in general in the animal world. This shows how we retain our animal needs for group integration in overnight dancing and musical ceremonies. The evolutionary bases of shamanic ritual behaviors are revealed in the homologous ritual behaviors were share with great apes. Comparisons of shamanic rituals with the ritual activities of our nearest relatives, the chimpanzees, we discover the immediate evolutionary roots of shamanic ritual as well as the differences in our evolved psychology.

The worldwide distribution of shamanism in the pre-modern world as well as the persistence of their basic features in shamanistic healers worldwide today reflects a basis in human's innate psychology (Winkelman, 2002, 2009, 2010a). These involve the biogenetic structural principles of vertebrate communication manifested in ritual, and the extensions of this expressive capacity in the communicative systems of dance and music. Group ritual is the basis of a communication and social coordination system that is expanded in the central behavioral elements of shamanic rituals —singing, chanting, dancing, and imitation of desired goals. These behaviors have biological origins in the same structures that underlie animal displays and their functions as systems of group coordination and social communication. These primate enactive

and vocal emotive expressive systems and their communicative and integrative functions were expanded in the evolution of shamanism through mimesis, a body-based system for the expression of intentions. Human rituals involve features lacking in primate rituals, the ability to communicate through the intentional use of behavior to convey meaning. Mimesis and its associated suite of communicative capacities such as music and dance constitute an ancient source of shamanic practices, where these technologies of dance and music contributed to emotional and cognitive communication and enhanced bonding with others. These communicative systems of dance and music provide for the expression of ancient aspects of the personal and social self, as well as providing technologies for the alteration of consciousness, identity transformation and healing. An examination of the origins and functions of ritual in general, and the characteristics of chimpanzee ritual in particular, help to elucidate the biological foundations of ritual and provide a basis for understanding the compelling nature of similar contemporary activities.

BIOGENETIC STRUCTURAL FOUNDATIONS OF RITUAL FUNCTIONS

While popular conceptions of ritual often imply some kind of formalized traditional behavior that is meaningless or mindless, the study of ritualized behavior in the animal world leads to very different conclusions. The concept of ritual among non-human species is generally labeled as displays. Rather than some kind of arbitrary activity, these ritualized behaviors are integral to the social life of vertebrates, providing a basic system of social communication and coordination (Laughlin & d'Aquili, 1974; d'Aquili, Laughlin & McManus, 1979). Animals' displays have communication and social signaling functions, using behaviors to signal readiness for social behaviors. These communications are generally based on the deliberate use of genetically based behaviors to signal information to other members of the species. Ritual then is an exaptation which involves the use of prior adaptations to meet a new adaptive function. In animal displays, these exaptations involve communication and signaling functions that are based on partial behavioral enactments that express an animal's intents (i.e., baring the teeth to indicate a threat of biting). Rituals provide information that allow for coordination of the behaviors of individuals, and consequently contributes to cooperative behaviors by making an animal's internal dispositions available to other members of the group. Animal rituals function to produce cooperative behaviors, synchronizing individual behaviors into socially coordinated patterns through facilitating the flow of information. In this sense, ritual is a behavioral communication system that still has relevance for understanding human interaction.

A widespread aspect of animal ritualizations involves drumming in various forms. Analyses of drumming behaviors across mammalian species (Randall, 2001) indicate that drumming is more than merely signaling but is also a manifestation of vigilance, fitness, competitiveness and a readiness to act. Drumming is a widespread mammalian communication mechanism for conveying information about predators. Furthermore, drumming functions in interspecies communication as a conspicuous display, enabling prey animals to communicate to predators that they are aware of their presence. Drumming is often produced by beating the feet on the ground, a kind of running in place. These kinds of displays are called conspicuous displays because they call increased attention to the individual performing them while simultaneously warning and enhancing survival of kin. Rodent foot drumming is a ritualization of intentional movements, a readiness for running that displays an excessive fitness. Drumming indicates to predators one's fitness and readiness to flee. Drumming both prepares for action and reduces the need for action, because predators will then look for less aware prey, reducing the individual's need for more costly action.

Chimpanzees' Ritualized Displays

Chimpanzees engage in collective drumming and dancing displays, accompanied with complex vocalizations that ethnologists call choruses and carnivals. Reynolds and Reynolds (1965) noted the power of these "chimpanzee carnivals" of group chorusing, calling and drumming that might last all night on moonlight nights, leaving humans in awe and trembling. These collective vocalization and drumming routines are widely distributed in chimpanzee behavioral routines (Goodall 1986, p.134, p. 491; 1971) including more elaborate "rain dances" that include beating of branches and aggressive bipedal charges. This maximal display involving vocalization, drumming, bipedal displays and charges is a basic mechanism for reintegrating the dispersed group (De Waal, 1997). The loud vocalizations provide an auditory beacon to call members of the group while the displays are the mechanism by which the dominant male solicits submissive recognition by others in order to enter peacefully into the group. These aggressive displays continue as darkness falls, intimidating predators. Chimpanzees similarly protect their territory through aggressive displays with fast drumming produced by jumping and beating on tree buttress at the edges of their territory (Arcadi, 1996; Arcadi, Robert, and Boesch, 1998).

Such displays provide a variety of functional adaptations (summarized from Winkelman, 2010a):

- Creating an auditory beacon, facilitating the re-integration of the group at a common location;

- Establishing the group hierarchy, protecting the group through reduction of physical harm;
- Releasing frustration and tension and producing emotional synchrony within the group;
- Expressing a group identity, exemplified in the shaping of vocalizations to mimic alpha males.

Aggressive displays involving bipedal charges and shaking of branches, drumming and emotional vocalization are widespread among the great apes (Lawick-Goodall, 1968; Geissmann, 2000). This is typified in the gorilla behaviors that incorporate chest-beating. These homologies across the great apes indicate that similar behaviors were also characteristic in their common ancestors with the humans, the hominids, where such behaviors must have also fulfilled similar functions of enhancing group cohesion and unity (Hauser, 2000; Merkur, 2000). Their structural and behavioral similarities indicate that these primate vocalizations are the communicative precursors of human singing and musical abilities (Molino, 2000). While chimpanzees most typically drum by striking the hands and feet against tree buttresses, they may also use sticks (Arcadi, 1996; Arcadi, Robert & Boesch, 1998). Their hand and foot drumming provides a system of long distance communication audible at up to one kilometer. The average inter-beat intervals associated with chimpanzee drumming range from 3 to 6 beats per second (Arcadi, Roberts & Boesch, 1998); this frequency matches the typical range of shamanic drumming, as well as corresponds to the frequency of the brain waves (theta, 3-6 cycles per second) that is characteristic of the shamanistic alterations of consciousness (Winkelman 2010a).These expressive activities reflect our ancient and innately disposed tendencies to engage in overnight collective musical manifestations.

Similarities of Chimpanzee Displays, Shamanic Ritual and Raves

Basic features of chimpanzee displays have homologies with shamanic ritual and modern rave phenomena. Among these shared features are:

- A dramatic ritual which integrates the community
- Night-time performances, sometime overnight activities
- Drumming
- Emotional vocalizations and group chorusing
- Alpha male displays
- Bipedal displays—"Dancing"
- Group emotional bonding

These kinds of displays constitute a communication system that promotes social integration and enhances group cohesion and unity. The chimpanzee ritualizations indicate that humans have genetic dispositions to engage in collective ritual behaviors with vocalizations, drumming and dancing displays that serve a variety of communicative functions in integrating the social group. This suite of activities of our hominid past that constituted pre-adaptations for shamanism reflect basic neuropsychological structures and social psychological functions of hominids. The use of music and song in shamanic activities reflects an expansion of the pre-adaptations involved in primate vocalization systems which have structural and behavioral similarities with human singing and musical abilities, providing information about internal emotional states (Brown, 2000). These forms of rhythmic-affective semantics that express fundamental emotions emerged early in hominid evolution in order to facilitate group coordination. Ritualized synchronous group vocalizations at the core of primate and shamanic rituals are an expressive system that communicates emotions and enhances group integration. These behavioral foundations were expanded in human evolution in the forms of dance, mimesis, singing and music.

Shamanic rituals practices enhanced integration of the society, using the dramatic dominance ritual of dance on one hand, and through grooming rituals on the other. Alliances in primate societies are formed through grooming, generally involving a careful attention to the hair and skin of another member of the group, picking through it for parasites, scabs and intrusions, as well as to cleanse wounds. This grooming begins in the mother-infant care and relationships and is generalized to others in primate society, especially through appeasing dominant others and forming close bounding in alliances. Lawick-Goodall noted that chimpanzees learn that grooming has a calming effect on others and use it with the intent to manipulate others. Subordinate animals seek reassurance from dominant animals through extending the hand to seek contact with the aggressor or to initiate grooming, which may be responded with touching, patting, contact with the body, embraces, and kissing. Grooming reduces the physical and emotional distance between individuals and inhibits arousal that could trigger aggression. Primates communicate intimacy and closeness through the touch involved in grooming activities, which is extended in other forms of body contact such as embraces, cuddling, kissing and cradling. Chimpanzees may spend years cultivating the friendships that will help them improve their status by strategic alliances that are established and maintained through mutual grooming,

With grooming we see a significant chimp-human "gap," with the extensive physical grooming characteristic of most primates indicating a loss of his functional activity in humans. But the shamans' healing practices maintain aspects of groom-

ing. Grooming-like activities are manifested in the shaman's diagnostic activities where they may prod, rub and massage as they carefully inspect the body. Shamanic healing practices may include cleaning abscess through a variety of procedures homologous with grooming activities of primates. Shamanic treatments also involve physical manipulations of the body, including massage, brushing with feathers, laying-on-of-hands and similar practices that have been shown to produce relaxation and enhance functioning of the opioid system in humans (Kunz & Krieger, 2004).

The intensive social grooming fundamental to primate societies has important of biological, personal, health and social functions. Grooming constitutes a basic mechanism for eliciting relaxation responses from the parasympathetic division of the autonomic nervous system. The ability of grooming to reduce stress is generalized from mother-infant contact and the affiliative relationship that is established through grooming and subsequently generalized in grooming relations with others. Dunbar (2004) reviews evidence that grooming releases endorphins that have pharmacological effects which enhance commitment to others and increase cooperation. Ritual interactions in general involve social relations that potentially induce the release of endogenous opiates (see Frecska & Kulcsar, 1989). The endogenous opioid system provides neurochemical mediation of social bonding, producing psychobiological synchrony within a group. The brain areas central to affiliative interactions and social bonding are also the areas with the highest density of opioid receptors (orbital frontal cortex, the temporal lobe, and the amygdala). When cultural symbols are cross-conditioned with ritual activities through temporal contiguity, the physiological, emotional, and cognitive associations of these cultural symbols acquire the capacity to evoke endocrine and immunological responses (Wilce, 2003). Shamanic practices also involve several procedures for socially and ritually eliciting opioid responses (see Winkelman, 2013). These activities include prolonged rhythmic and high-intensity exhaustive exercise such as dance, nighttime activities, as well as the stressful procedures used to induce visions.

Shamanistic healing rituals and modern raves share the practices of using these collective rituals to enhance social attachments through the evocation of endogenous opioid mechanisms and, consequently, produce social and psychological synchronization among members of a group. Descriptions of raves often emphasize grooming and peace-making features. The physicality of raves is an often-noted feature, one that includes masses of participants crowding together in what have been called "puppy piles" in recognition of this frequent canine bonding phenomena among a litter. The verbal communication is difficult at raves because of sound levels, forcing an enhanced focus on communication through the body, including massage, touching and hugging, as well as the expressions through dance.

The Triune Brain as a Model for Ritual Functions

MacLean's (1990, 1993) model of the triune brain allows us to conceptualize these ritual behaviors and relations in terms of specific brain functions. MacLean proposed the brain involves three anatomically distinct yet interconnected systems-- the R-complex (reptilian brain), paleomammalian (limbic) brain, and neo-mammalian brain. These provide the basis for behavioral, emotional, and informational functions that MacLean (1993, p. 39) called "protomentation," "emotiomentation," and "ratiomentation," respectively.

The primary functions of the R-complex involve social communication through displays and ritualizations, with behavior constituting the medium of social communication. The R-complex integrates the totality of movements and reactions of the organism to communicate meanings isomorphically in behavior. One of the basic R-complex mechanisms for species-typical communicative behavior involves isopraxis, an innate disposition to engage in the same behavior as another member of your species.

Emotiomentation or emotional mentation provides processes underlying affects and feelings. These paleomammalian brain functions are the basis of a sense of personal identity and the level of the brain that provides for cooperation among members of a group. This involves cognitive capacities that underlie prediction of others' behavior, a process of "mind reading," inferring the thoughts of others. The paleomammalian brain plays a vital role in the basic social personality, using feelings to guide behaviors through nonverbal, emotional, and analogical information processing. MacLean (1990) noted that paleomammalian brain functions also play a vital role in manifestations of the basic social personality. Freeman (2000b) indicates the limbic brain activities are primarily responsible for the higher-level integration of bodily senses, emotions and affect. Interactions across levels of the brain are mediated through non-verbal communication forms that utilize behavioral (vocal and bodily), social, affective, and presentational (visual symbolic) information to communicate meaning.

Protomentation and emotiomentation are fundamental aspects of human interaction that also reflect forms of communication shared across species. These thought processes mediated by ancient levels of the brain are the language of ritual. The protomentation processes of the reptilian brain engage the body, exemplified in ritual acts. The emotiomentation processes of the paleomammalian brain engage the emotional influences on thoughts and behavior that are characteristic of shamanic healing processes and the powerful attraction of raves. The protomentation processes of the reptilian brain communicate through the basic actions of the body, while the limbic brain thinks through processes that provide the emotional influences on thoughts and behavior.

These nonverbal communicative behaviors and processes have not become obsolete in the evolution of humans, but are still manifested in art, music, theater, dance, and poetry, reflecting their continued importance in human communication. Ritual activities moderate feelings of attachment, emotional security, and identity and the development of a sense of self and personal well-being that is deeply intertwined with "communitas", a sense of social identity in which empathy with other humans provides the basis for self and security. The ritual discourse of this nonverbal communication is primarily about the self and its emotional states in relationships to others.

The modern brain operates through integration of instinctual protomentation responses of the reptilian brain, the emotional signals of the paleomammalian brain, and the symbolic cognitive processes of the neomammalian brain. Relationships across these communication systems are mediated primarily through nonverbal forms of mentation, especially the symbolic capacity embodied in behavior. Collective rituals mediated by the communicative processes of dance and music engage innate social signaling mechanisms that promote a sense of community and enhance cooperation—physically, socially, and mentally—in ways that are key to human psychosocial adaptation.

MIMESIS AS AN EXPRESSIVE SYSTEM

The capacities underlying ritual--behavioral enactment--underlie the further human evolution of expressive capacities in mimesis. Mimesis involves the ability to intentionally represent through imitation that provided a pre-language expressive system in early hominins (Donald, 1991, 2006). This symbolic communication is exemplified in bodily movements, gestures, facial expressions, rhythm, affective semantics, and melody and manifested in a variety of expressive forms such as play, drama, social ceremonies and shamanic ritual. Body metaphors express meanings through the ability to mediate between sensory domains and domains of meaning through analogical reasoning processes involving the body. Mimesis is a conscious behavioral production of metaphor through gesture and imitation, an enactment that involves a mapping of body actions onto an imagined context. The most fundamental schema for analogical transfer involves the body's ability to act, an innate neurologically based body schema that provides a template for all knowing, a common basis of both somatic and symbolic levels of reality (Newton, 1996; Laughlin, 1997).

Mimesis also enables the entrainment of the body with external rhythms and underlies the abilities of dance and music which evolved as an interrelated set of capacities that exploited the full body capacity related to the inherent rhythm of bipedal movement (Merker, 2000, 2009), the co-evolution of a single neurocognitive adaptation with multiple expressive capacities

Donald (2006). These dramatic expressive manifestations of dance, music and ritual involve processes of distributed cognition, exploiting the linkages across minds that provide a wealth of information from memory and experience. These human expressive capacities far exceed chimpanzee displays, providing an enactive capacity that permitted greater temporal and spatial complexity to behavior. Donald proposes that this capacity to represent through enactment allowed for the expression of an archaic level of culture based on gestures, dance, pantomime and imitation which shamanism exploited through the communicative capacities of ritual, mime and dancing and enactments combined with chanting, singing, and imitative vocalization.

The centrality of mimesis in the expressive modalities of raves was noted by Rill (2010) who found that rave participants describe their experiences as mediated by subtle forms of communication based in a body language: "It is 'all about being in your body and out of your head' . . . the direct, unmediated bodily experience in the world. It is a somatic experience that silences the inner language so prevalent in our waking consciousness, allowing the dancer to live quite literally ''in-the-moment.'' (p. 144). Landau (2004) perceptively characterized the heart of the ecstatic experiences of raves as involving an "ontology of the flesh" and the innate and subconscious processes of knowing of the body, an immediate experience of the phenomenal world.

Klein (2003) uses the ideas of Bourdieu (1998) to illustrate the notion of bodily action as a basis for explaining the compulsions of pop culture, and by extension the transformative power of raves. These impulses are derived from the body in action and performativity, the reality generating power produced by a body in movement. Performativity has a reality generating power derived from the body and habitus. To Bourdieu the body functions as a receptacle, a storage place for the history of one's experiences. These can be used as an instrument for action and the production of practical knowledge and beliefs through the body as a silent form of performativity (Butler 1997: 219). Klein (2003) proposes that this performative knowledge comes from the processes of adaptation and habitualization proposed by Bourdieu as underlying the processes of socialization by which the body is inscribed through mimesis. This process by which rules are embodied in context involves a theory of performativity that Klein (2003) presents as a process of active construction, a new creation through which mimesis is at the basis of a process of re-construction, an engagement with the inscription of habitus in the body to reproduce social norms.

Klein notes that the threefold function of mimesis-- imitation, representation and construction—is the basis for mediation between the impressions one experiences of the inner and exterior worlds and the construction of reality. This construction of the 'inner world' is a symbolic world which exists as a consequence of action, the doing of mimesis that produces symbolic constructions of reality. Klein notes that these mimetic processes are not the empirical world, but an interpretation that

involves a new structure of meaning. "[M]imetic identification does not imitate a given reality on the level of the body but produces a new reality. Mimetic identification does not only mean conventionalization in the form of a reproduction of a structure of norms but describes the performative process of new construction and contextualization" (Klein 2003, p. 47-48). Klein (2003) places emphasis on the social dimensions of mimesis and its combination with the aesthetic dimensions, with mimesis a necessary precondition of the social, and the aesthetic involving the conditions of construction. It is this bonding of the social and aesthetic dimensions that enable the power of mimesis, the underlying processes by which the cultural adaptation is realized in the body. Klein proposes that processes of adaptation involve a mimetic identification which is produced through mimetic embodiment of internal and external impressions, of the inner and external worlds, the body and the social. It is this identification that provides the ability to acquire an insight into reality through sensual representations.

Dance in Human Evolution and Spirituality

Dancing is considered to be the heart of the rave phenomena (St. John); he further proposes that such dance experiences are keys to the process of formation of new identities and sense of belonging (also see Landau). In rave culture, the dancing body is the locus for experimentation and communication. Freeman (1995) characterizes the last half million years of human evolution as involving adaptations for enhanced social communication, enhancing the representations produced within our own brain with information signals from other brains. Dopamine, endorphins, oxytocin, and serotonin are central to the neuromodulatory mechanisms underlying basic mammalian bonding processes and how such bonding was extended to larger groups (Freeman, 2000a). Music and dancing are "the biotechnology of group formation" (Freeman, 2000b, p.129), the quintessential technology that humans evolved in order to bridge the solipsistic gulf. The rhythmically repeated motions of dance constitute a basis for cooperation.

Movement and music provide a system of coordination by expression of intentions through observable body actions, a nonverbal communication mechanism for coordination and bonding within groups. Music contributed to the foundations of culture with an expressive system that produced a shared group consciousness and culture. Freeman (2000b, p. 134) notes that the capacities of "musical skills played a major role in the evolution of the human intellect" and in the development of group identity beyond the family. Rhythmic dancing, marching, clapping and chanting became central aspects of socialization processes, providing an engagement of the body with the motor and somatosensory systems in a way that links the individual with the group in coordinated community.

There is variability in the expression (increased replication) of the genes underlying humans' dance capacity that helps to identify their broader functions (Bachner-Melman et al., 2005). Gene polymorphisms of people engaged intensively with creative dance performance involves: a more effective serotonin uptake and transporter (SLC6A4); and an arginine vasopressin receptor (AVPR1a, an opioid) associated with social communication and affiliative behavior in primates. Human dancing is an extension of vertebrate neurochemical and genetic mechanisms underlying courtship and social behaviors. Bachner-Melman et al found a significant association of this dance genotype with measures of spirituality and altered states of consciousness (the Tellegren Absorption Scale), reflecting social communication and spiritual facets of the dancing phenotype. Dance also has the capacity to alter consciousness through a variety of mechanisms (such as stimulating the release of opioids, producing rhythmic stimulation and the brain, and inducing exhaustion and collapse; see Winkelman, 2013).

Dancing and Mystical Experience

These capacities for dance appear to have emerged as an evolutionary by-product of some of humanity's most unique features, bipedalism and long-distance running, including endurance running (Bramble and Lieberman, 2004, p. 345). This capacity also apparently contributed to the emergence of spiritual experiences, naturally derived from the capacity of endurance running, long-distance running, and ultrarunning to induce alterations of consciousness and mystical experiences (see Jones, 2005; Noakes, 1991). There are recognized in the "runner's high," which has features typical of mystical experiences (Dietrich, 2003), including:

- positive emotions such as happiness, joy and elation;
- a sense of inner peacefulness and harmony;
- a sense of timelessness and cosmic unity; and
- a connection of oneself with nature and the Universe.

Jones placed ultrarunning high in the context of the extreme activation of the autonomic nervous system. The processes by which mystical experiences are induced by running begin with the saturation of the sympathetic-ergotropic system. In addition to the activation produced in many body systems by the running, the prolonged activity forces a kind of meditative breathing in the regular methodic inhalation and exhalation. Physical stress activated by long-distance running provokes the release of the opioid, adrenaline, and noradrenaline neurotransmitters, and elevated body temperatures, oxygen depletion, and chemical and neuronal imbalances that can create unusual state of awareness. Relevant to understanding the special experi-

ences produced in raves are these and other physiological mechanisms underlying the "runner's high." In addition to the endogenous opioids released in response to exercise, there are the endocannabinoids (anandamide), a substance that produces psychoactive effects similar to the THC of marijuana, including euphoria, a sense of transcendence, and a sense of contact with the divine (Dietrich & McDaniel, 2004).

Extensive running leads to a saturation of the sympathetic nervous system and a "spillover" effect that leads to the simultaneous activation of the parasympathetic nervous system and associated structures. This simultaneous activation of what are usually separate functions and areas of the brain results in a saturation of the brain's processing capacities, an overload of both the sympathetic and parasympathetic nervous systems that leads to a cessation of normal processing, and comprehension. This cessation of normal processes produces a sense of ineffability, a disintegration of the self, and the shut-down of the normal processes of the mind, leading to these special experiences.

Sands and Sands (2009) proposed that the selection for long-distance running in *Homo* subsequently selected for a form of spirituality, a "horizontal awareness" or *biophilia* that operated through existing neurobiological reward systems. The "high" associated with long distance running situated our ancestors within a dynamic environment within which they felt an intimate connection with nature. Thus a side effect of the acquisition of the capacity for long distance running was a capacity for dance and a variety of mystical experiences and associated pleasurable sensations of enhanced opioid and cannabinoid system activation.

Music as Communication and Emotional Modulation

Music is the vocal expansion of mimesis, a vocal dimension that expanded communication beyond the range of sight. Music and similar vocalizations in primates reflect the outcome of selective pressures for long distance cooperative communication systems exemplified in rhythmic group chorusing (Merker, 2009). The evolution of human capacities for music and dance provided a basis for uniquely human ritual capacities that sharply distinguish us from other hominids (Malloch & Trevarthen, 2009). The rhythmic modules of the brain coevolved to enhance social bonding and communication of internal states, an affective semantics that emerged early in hominid evolution for enhanced group coordination. Music and dance expanded the intrinsic capacity of ritual for enhancement of social cohesion (Malloch & Trevarthen, 2009) and affiliative intentions (Cross & Morley, 2009). Music expands the exchange of information through diverse modalities (behavior, facial and emotional expressions, vocalizations). Music can play role in the modulation and control of emotions, providing a unique potential for affecting individual and collective wellbeing through synchronization of emotions, behavior and cognition, contributing to group catharsis through the expression and release of emotions.

Dissanayake (2009) proposed musicality derived from the expressive emotional modulation of the love bond between mother and infant. The dynamics of vocal exchange typified in the "motherese" of mother-infant interaction, involving body movements, facial dynamics, emotional expressions—are the same behaviors that are found in the affiliative and submissive ritualizations of other primates. This communicative rhythmic dynamic between mother and infant has musical and dance-like components that coordinate their communicative turn taking and the dynamic of emotional cooperation. This role of rhythmic interactions in facilitating sociality and communication reflects an adaptive basis of music.

An evolutionary account of music based on bonding explains why music is at the core of communal ritual worldwide. Music and dancing are central to humans' group rituals because they facilitate affiliative interactions. Music enhanced the interactive and communicative dynamics of mother-infant bonding for extension to larger social groups, extending the dynamics of love to enhance bonding. Music is "an evolutionary exaptation of social-emotional systems that became the medium by which our ancestors harmoniously coordinated not only intimate engagements, but also ambitious group activities . . . " (Panksepp & Trevarthen, 2009, p. 108).

Music which is at the core of shamanic and rave ceremonies provides mechanisms which enhances adaptation at individual and group levels. Music involves a rhythm which produces a synchronization of the group. Brown (2000) noted that music is one of the most effective mechanisms known for group coordination, providing a system for coordination of movement, interpersonal entrainment, and the creation of a sense of group integration and synchronized responses to the environment. This sense of unity and connectedness produced by music contributes to emotional bonding within a group as a result of effects on emotions. Music affects emotions, providing an intrinsic reward system that enhances social functionality. Music enhances hormone release (oxytocin), which enhances social bonding, coordinating and entraining the individual with the group (Panksepp & Trevarthen, 2009). Music provides a common sense of intentionality and an inclusive sense derived from the underlying pulse or rhythm.

Crowe (2004) shows that music manifests emergent properties in the expression of complex feelings that reflect a level of communication which exceeds the expression of basic emotions. Music coordinates diverse expressive aspects (behavior, emotions, sound), providing a medium for metaphoric expression and meaning. "[M]usic can be interpreted as facilitating the formation of conceptual-intentional complexes across multiple domains of experience, providing a synthetic medium that can bind together the experiences of disparate situations and concepts" (Cross & Morley, 2009, p. 70). The coordination of diverse modalities of information (behavior, visual emotional expressions, emotional vocalizations) through music

reflects our symbolic capacity. Music integrates biological, physical, psychological, cognitive and social systems in ways that are fundamental to human symbolic capacities (Cross & Morley, 2009).

DeNora (1999, 2004) shows how music still functions as a cultural resource that individuals use in a variety of processes of self and identity construction with specific impacts on emotions, attachments and memories. She notes how music is central to the process by which many people engage in the construction of the self, particularly in terms of the self as an aesthetic agent. Music provides models and templates for the self, especially in terms of providing semiotic elements for anchoring identity. Music is self-consciously used as a tool to facilitate self-interpretation and the articulation of one's self-image in ways that provide mechanisms for the adaptation of various aspects of personal and social emotional life, especially in social relations.

DeNora's research reveals the role of music as providing the building material of self-identity and personality. Music is a tool used in processes of selective enhancement of the self through a bricolage in which one can select from a variety of non-self representations found in music to augment one's sociocultural givens. Musical tone and elements provide a 'container' for emotions, shaping the quality of feelings and experiences, contributing to the nature of self-perceptions and the quality of social experiences and emotions. Music provides the material by which actors can elaborate themselves and others, constituting a mode of aesthetic agency that is central in the construction of subjectivity and the production of a self with specific feelings and identity.

DeNora refers to this as 'aesthetic reflexivity', an activity of self creation and self-maintenance, using music in everyday life to organize social life. She notes the power of music to order personal life, create meaning, enhance self concept and change or sustain cognitive and bodily states. The power of music operates through aestheticization to function as a strategy for identity maintenance, a mechanism for self-configuration as an agents characterized by specific modalities of feeling. Her studies show our intrinsic capacities to grasp how particular genres of music can be used to engage emotional needs and facilitate personal approaches to working through issues in order to improve emotional well-being. Music has a capacity to actively organize the self, facilitating the engagement with or dissipation of emotions, modifying one's mood and energy level, as well as focusing one's attention and ability to engage or disengage with others and the world.

Acord & Denora (2008) propose that the concept that aesthetic consciousness forms "the tacit and often embodied bases of action, cognition, and engagement with cultural forms" (p. 223). They propose that this aesthetic consciousness is embodied in popular art forms which provide communicative, expressive and meaning-making objects and processes that influence and structure human behavior. Their perspective

on "action" enhances our understanding of the operation of these forms by providing a vantage point or perspective on aesthetic experience in the relationship of the individual to the group through processes of "world building" (Acord & Denora 2008, p. 227). This is produced through the embodied engagement with artistic and aesthetic materials which provide "tacit models for more discursive forms of action, notably in a public context when humans are called to be more vocally expressive" (p. 227). "[I]t is through their access and use that they can be understood to enable forms of activity. It is through the intersection of a dancers' movements and the given choreography that an interpretation of the scene, and the ballet, is aroused" (Acord & Denora 2008, p. 228). They propose that musical and artistic forms are able to influence our bodies by providing specific input through structures and patterns which provide the parameters for the meanings to which bodies appear to be semiconsciously attached, resulting in the production of specific states of being.

This perspective reflects the standard cultural interpretations of meaning and art in which the essential qualities found within cultural context and tradition are enacted in the present moment. But the universality of these forms and structures, exemplified in dance and music, should give us reason to pause and ask about the factors underlying the universality of such uses.

Shamanistic Healing

While direct comparisons of raves with forms of shamanic healing appear lacking, Hutson and others have alleged that rave experiences provide spiritual healing because of what they perceive as their religious and spiritual features, as well as out-of-body experience and a sense of mental cleansing. Healing is also attributed to the effects of transcendence of individual identity produced by the alterations of consciousness, where these states of non-differentiated being and unity release fears and anxieties, provide inner peace and produce increases in self esteem. Other noted healing effects of raves are the experiences of personal transformation and healing conceptualized as psychological growth (St. John). Dance itself can exert therapeutic effects by aligning the body at physical, mental, and emotional levels (Hutson). Healing also can be provided by alterations of consciousness in that the integration of information from the emotional brain structures can plays a role in emotional integration and release.

Rill (2010) proposes that the activities of raves provide a context in which the alterations of consciousness provide participants with experiences that reshape their social identity and the nature of the self and personhood. Rill proposes that it is the dance which is the medium of this identity expression, the creation of identity engaged through choosing to express oneself through a selection from the vast range of styles exhibited in youth culture. St. John notes that the diverse studies of raves

demonstrate that "electronic dance music culture contextualizes and fuels identity formation, intercultural understanding, resistance and belonging" (2004, p. 13). Dance and style provides a creative context for reshaping of social identity.

Rill proposes that these changes in the experience of self and models of personhood involve what Damasio (1999) referred to as the proto-self and core consciousness involving "an awareness of one's body state in relation to the self" (Rill, p. 149). The interaction of the body with the world is through what Damasio (1999) calls the ''proto-self'," a non-conscious representation of the state of the body. This core consciousness involves a self awareness based in one's body, an 'in the moment' self that is derived from immediate experience. These experiences of the somatic self have a transformative power to reshape the broader experience of self in the world. Rill proposes that these somatic experiences are mapped into our neural structures and provide new ways of experiencing the self at the somatic level.

Dance and Music as Therapy

The presence of music and dance in shamanistic healing practices around the world reflects their intrinsic healing capacities. This use of music and dance reflects an inherent expressive dynamic of our species that engages a level of communication that provides access to a powerful innate healing dynamic. Therapeutic effects of music and dance are mechanisms through which raves may exert therapeutic effects on participants.

Studies in cultures around the world illustrate that there are diverse therapeutic functions of dance (Woods, 2009). The physical activities of dance are capable altering consciousness as well as eliciting other intrinsic therapeutic affects derived from the production of emotional states which facilitate catharsis and emotional release. Dance has an intrinsic ability to relieve tension and stress through cycles of exercise (sympathetic stimulation) and relaxation (parasympathetic collapse phase), as well as providing an energetic stimulation and revitalization from the effects of rapid movement of the body. Woods proposes that dance also engages processes similar to hypnotic induction which provoke a release of ego control which allows for the emergence of deeper expressive systems of the body. Woods noted the use of dance as a kind of group therapy in which movement provides an expressive modality for self-actualization. The alterations of consciousness experience through dance produce different experiences of the self, a personal expression that can liberate repressed emotions. Dance allows for the use of a nonverbal expressive medium that can facilitate the release of repressed emotions as well as the expression of unconscious desires. This expression is exemplified in the phenomena of possession, where participants may act out dissociated and repressed desires that are exhibited and attributed to possessing entities through the dance performances. These experiences of self contribute to a sense of personal renewal through emotional catharsis and abreaction (Woods, 2009).

Crowe (2004) notes that music has been used as a therapeutic process across cultures and time. She proposes that the therapeutic effects of music involve its intrinsic abilities to promote health and wellness through enhancement of natural balance and harmony in our emotional systems. The therapeutic effects of music derived from a range of physiological effects on the body and the multiple modalities through which it affects the body, brain, and access to unconscious information. The impacts of music on the brain begin with the direct auditory nerve connections into the reticular activating system and continue with effects on the sensory and neurological systems, the autonomic nervous system, involuntary muscular responses and reflexes and the glandular systems (Crowe, 2004). Music has physical effects on lower brain areas that control heart rate and respiration and areas mediating stress, enabling music to reduce tension and produce relaxation. By eliciting and expressing our feeling and desires, music can enhance health by elevation of unconscious memories and repressed conflicts that create emotional illness. Therapeutic functions of music involve their ability to integrate repressed feelings. In shamanistic practices, music is used to elicit the patient's unconscious psychodynamics and to provide reprogramming through expression of cultural themes.

Music enhances healing by engaging an innate primate capacity to express emotions through vocalizations. Tone and sound have a number of health effects through physical vibratory effects on the body, brain waves synchronization and the coordination of emotions, as well as an intrinsic ability to evoke repressed emotions and to stimulate expression of emotional states. Music has effects on emotions as a nonverbal communication system with a power to elicit experiences in others through eliciting and stimulating biologically determined neural responses with innate healing capacities (Crowe, 2004). Music can elicit the expression of repressed emotions, elevating them into consciousness where they may be managed by ritual.

There is a primordial connection of music with love; musical compositions around the world have a primary focus on love as opposed to other emotions (Brandt, 2009). Music has a special connection with the strongest electromagnetic fields of the body—those produced by the heart (Crowe, 2004). Effects of music include the modulation of emotional states that enhance and transform emotionality. Panksepp & Trevarthen (2009) noted music can relieve loneliness and negative emotions of sadness and loss, as well as enhance positive emotions such as love, happiness, satisfaction. Crowe reviewed research which illustrates the power of music therapy to elicit unconditional love, which may be the most beneficial of all healing states. This activation of the heart through music underlies another effect of music, its ability to induce empathy, the ability to understand and identify with the experiences of others. This ability of music to produce empathy involves its capacity to synchronize our experiences through dynamics such as rhythm, tone, melody and lyrics, which produce a common awareness.

Panksepp & Trevarthen (2009) propose that music's established power to evoke healing responses reflects its ability to elicit core brain mechanisms, specifically its capacity to elicit neurochemical responses from the opioid and dopamine systems. Through effects on the hypothalamus, music also enhances immune system functioning, manifested in decreases in cortisol and increases in secretion of immunoglobulin A. Music can counter stress responses, reducing blood pressure, cardiac rate, and other ANS stress markers. Crowe proposed that the capacity of musical sounds to produce resonant patterns in the body through vibratory frequencies give it the ability to change the resonant patterns of disease, replacing them with an energetic balance. Music affects energy fields of the body, ranging from the physical structure, through organs, body tissues, molecules, the brain waves, infusing this hierarchy of the body, brain, and mind with energetic vibratory patterns that transfer emotional energies from singer/healer to the patient and community.

ECSTASY: THE INTEGRATIVE MODE OF CONSCIOUSNESS

While the altered consciousness experienced at raves has been attributed to the effects of psychedelics, and MDMA in particular, these experiences involve something more general. Not all ravers use drugs, but nonetheless, "[e]veryone is in an altered state of consciousness, with or without the use of drugs" (Rill, 2010, p. 141; also see Sylvan, 2005). The non-drug alterations of consciousness of raves reflect the presence of a variety of other techniques used to alter consciousness. Rhythmic music and prolonged dancing are central aspects of raves that produce dramatic changes in both brain activity and experience. The flashing lights reinforce the repetitive percussion, both providing physiological mechanism for producing an alteration of consciousness through the well-recognized effects of auditory and visual driving in inducing changes in brain waves. Auditory and visual driving also can produce a variety of emotional and physiological experiences, including hallucinations, epileptic seizures and out-of-body experiences. These known auditory driving effects would be enhanced by typical features of techno music involving at least three complementary rhythms tracks (Hutson, 2000); psytrance music is further typified by beats falling in the three to four cycle per second range, the frequency of theta brain waves discussed below.

Rill points to general aspects of the alteration of consciousness experienced in raves as involving a sense of connectedness, an experience of timelessness and the loss of an ego-centered sense of self. Landau attests to the specific aspects of this alteration of consciousness in an experience of dissolution of the self/other boundary. Rill elaborates on other recognized themes of mystical states: "The ''I'' dissolves and becomes ''we,' . . . a collective sensual experience . . . aware that

they are part of the collective body" (p. 155). These features typical of mystical experiences can be understood as a product of the elicitation of a basic response of the brain by rave activities.

There is a near universality of institutionalized alterations of consciousness (Winkelman, 1992). This reflects a basis in human biology and the fundamental similarity of brain responses to a variety of activities and agents (Mandell, 1980; see Winkelman, 2010a, 2013 for review). Fasting and starvation, physical and emotional shock, austerities and trauma, ingestion of a variety of natural substances and ritual procedures such as drumming, chanting, and dancing all produce alterations of consciousness through eliciting a common biological response. I have called this the integrative mode of consciousness based on the effects of the associated of theta brain wave coherence (Winkelman, 2010a, 2013). 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, 2011 for review).

The common pattern of the integrative mode of consciousness derives from systematic brain discharges that originate in the serotonergic connections between the limbic system and brain stem, specifically the hippocampal-septal-reticular raphe circuits that are manifested in synchronized high voltage slow-wave EEG activity (especially theta, 3-6 cycles per second). These discharges reflect activation of serotonergic circuitry linking attentional mechanisms in the behavioral brain regions (reticular formation) with the emotional brain (the hippocampal-septal area); this produces ascending synchronous discharges from lower brain regions which are projected into the frontal lobes.

The induction of the integrative mode of consciousness and a range of specific associated mystical and spiritual experiences are elicited by specific kinds of changes in the operation of the principal neurotransmitter groups of the brain: serotonin, dopamine and endocannaboids. The shamanic use of exogenous sources of sacred plants (e.g., psychedelics) involves primary action on the serotonergic nervous system, with secondary effects eliciting the dopamine system. Physical activities of prolonged dance elicit the endocannaboid system. Raves are known for their use of exogenous sources of all of these neurotransmitters, particularly in the ingestion of LSD, psilocybin, MDMA, and marijuana.

Psychedelics as Psychointegrators

The effects of psychedelics derive from their action on the serotonergic and dopaminergic nervous systems. The major classes of indoleamines (tryptamines such as DMT, LSD, psilocin, and psilocybin) and phenylethylamines such as MDMA ['ecstacy'], mescaline and 2C-B exert similar influences on serotonergic neurons

and produce similar experiential effects (see Nichols, 2004; Passie et al., 2008). The effects of these substances on serotonin receptors are responsible for the overall changes in brain processes, which are reflected in high-voltage brain wave discharges of a slow wave frequency (typically theta, 3-6 cycles per second).

The primary physiological effects of psychedelics on serotonin involve both the activation and selective deactivation of the serotonin system, which has multiple regulatory roles reflected in its special characterization as neuromodulator. Psychedelics' effects result in disinhibition of serotonergic regulation of the thalamus and limbic areas which function as "gatekeepers" in the basic filtering of information from the environment and body. A primary effect of this disinhibition of serotonergic neurons is the consequent loss of their inhibitory effects on dopamine and the mesolimbic structures. This enhances the activity of lower brain structures, particularly the thalamic areas that gate information ascending from the peripheral nervous system. Psychointegrators disinhibit the midbrain structures (mesolimbic temporal lobe), reversing the habitual effect of serotonin in depressing the action of target neurons in the forebrain. Nichols (2004) concluded psychedelics amplify incoming stimuli, enhancing the sensitivity of the phylogenetic older brain structures and the excitability of limbic and cortical structures.

Psychointegrators' primary effects are reflected in 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 manifested in theta (3-6 cycles per second) brain waves produces synchronization across the levels of the brain and between the frontal hemispheres (Mandell, 1980). The theta effects begin in the midbrain hippocampal region which activate serotonin circuitry in the lower levels of the brain (locus corelus and thalamus), which in turn stimulate the limbic structures and frontal cortex, especially the right hemisphere. Mandell proposes this is the basis 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 typical effects on serotonin receptors provide the basis for a neurophenomenological paradigm of psychointegration, whereby psychedelics and shamanic activities alter consciousness by producing an enhanced integration of lower brain processes into the frontal cortex (Winkelman, 2007). 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. This model of psychointegration is confirmed by research of Vollenweider & Geyer (2001) who found the principal effects of psychedelics involve the cortico-striato-thalamocortical loops which reduce the sensory gating systems of the lower brain structures, leading to a flood of information into higher levels of

the brain. The release of the dopamine system caused by the blocking of the serotonin system produces characteristic effects of psychedelics such as unconditioned pleasurable responses and elicit intrinsic feelings of well-being (Previc, 2009). The combined stimulatory and inhibitory serotonergic effects of psychointegrators result in the increase in information from the environment, body and memory; the enhanced experience and recall of emotions; the stimulation of basic motivations and cognitive processes; and increases in awareness and internal attention (See Winkelman, 2007 for review of basic literature).

The strictly neurological basis of these phenomenological experiences—as opposed to expectations—is demonstrated by Griffiths et al. (2006) carefully designed to double blind study with psilocybin. Those receiving psilocybin had significantly higher measures on all of the scales used to assess mysticism and altered states of consciousness, including some scales that measured introvertive mysticism, extrovertive mysticism, internal and external unity, sacredness, intuitive knowledge, transcendence of time and space, and ineffability. Participants reported significant spiritual and mystical experiences and that these experiences induced persistent effects on the participants' attitudes and moods. Two-thirds of the psilocybin group rated the experience to be among the most meaningful and spiritual experiences of their entire life, with one-third of the total psilocybin group considering the experience to be the single most significant spiritual experience of their life. In addition there were persisting effects noted on the participants' life for the psilocybin groups, including an enhanced positive attitude about life and themselves, accompanied by a positive mood changes and positive altruistic social behaviors. As significant was the lack of any increases in negative attitudes, moods, or antisocial behaviors. Instead, the psilocybin participants showed significantly higher levels of peace, harmony, joy, and intense happiness. These experiences are neurophenomenological in the sense that they reflect neurological action of the substances in producing these experiences. These findings also suggest that the PLUR ethos of raves is a neurological effect, a neurophenomenological ethos.

The effects of psychointegrators on the serotonergic system and dopamine relate to MacLean's model of the evolution of the brain. Global effects of psychointegrators on the serotonergic system enhance reptilian and paleomammalian brain activities. 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. In the paleomammalian brain they release limbic system functions that provide emotional information, a sense of personal relations and bonding. Psychointegrators produce systemic brain integration through liberating our ancient animal brains, imposing the reptilian brain's ritual systems of communication and the paleomammalian brain's emotional, social, and personal nature into the self-conscious processes of the frontal cortex.

The integrative mode of consciousness enhances the integration of information from evolutionarily earlier structures of the brain, in essence enhancing the accessibility of normally unconscious processes by linking information from the pre-verbal structures of consciousness (R-complex and paleomammalian brain per McLean, 1990) within of the frontal brain. 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.

Dopamine Effects on Altered Consciousness

A central feature of the chemical alteration of consciousness involves the dopamine system, which is stimulated by most drugs, including opiates, amphetamines, cocaine, tetrahydrocannabinol, alcohol and nicotine (Previc, 2009). These and other agents act through a variety of systems (serotonin, enkephalin, GABA) to increase dopaminergic activity, producing unconditioned pleasurable responses, as well as sexual behavior and increased eating. Humans' attraction (and addiction) to exogenous sources of dopaminergic stimulants reflects their ability to stimulate the same reward systems that reinforce fitness enhancing behaviors such as attachment, eating and sex. The human dopamine system is part of our mammalian heritage where it has effects on social bonding, beginning with mother-infant bonds and the core functions of the mammalian brain and its emotional, social and self systems (Previc, 2009). A central dopaminergic function involves parasympathetic effects dampening physiological arousal, inhibiting negative emotional arousal of fear and anxiety, leading to a greater sense of internal locus of control. Dopaminergic circuits are also active during exploration of novelty and reward learning, resulting in prolonged effort for delayed gratification and pursuit of goal directed responses.

The overall expansion of the dopaminergic system in primates and humans led to high concentrations in the prefrontal cortex and frontal regions, especially in sensory processing areas where cross-modal integration occurs. Dopamine's central role in the integrative functions of the prefrontal cortex is extended throughout the brain as the nervous system allows the prefrontal cortex to connect to other cortical regions. These dopamine based capabilities expanded in the divergence of our hominin ancestors from hominids through selection for polypeptide precursors and genes involved in opioid regulation (Wang et al. 2005, Rockman et al. 2005). The positive selection for uniquely human genes enhanced our ability to metabolize plant toxins, enabling the body to make use of opiates, amphetamines, and other drugs, including serotonin reuptake inhibitors.

Endocannabinoids

The endocannabinoid system is another neuromodulator neurotransmitter with significant roles in producing alterations of consciousness; one endocannabinoid, anandamide, produces psychoactive effects similar to marijuana, including euphoria, a sense of transcendence, and a sense of contact with the divine (Dietrich & McDaniel 2004). Raves are characterized by the use of marijuana, an exogenous source of cannabinoids, as well as extensive dancing which also stimulates the endocannabinoid system. Endocannabinoids function as neuromodulators with central roles in consciousness, mood, memory, pain and appetite, processes of motor learning, synaptic plasticity and pain suppression. Endocannabinoid systems promote habituation of the stress response through blockage of excessive glucocorticoids secretion, reducing aggression through anxiolytic effects that inhibit excessive arousal. The underlying causes of the positive affect and euphoria produced by dance behavior is revealed by the research of Dietrich & McDaniel (2004). The endogenous cannabinoids are released during and following intense prolonged exercise. Running releases serotonin and dopamine and also increasing serum concentrations of endocannabinoids, contributing to the runner's high and positive effects on mood (Raichlen, Foster, Gerdeman, Seillier & Giuffrida, 2012) . The runner's high is associated with features typical of mystical experiences such as positive emotions such as happiness, joy and elation; a sense of inner peacefulness and harmony; a sense of timelessness and cosmic unity; and a connection of oneself with nature and the Universe (Dietrich, 2003). These effects of cannabinoids and extensive exercise suggest that the human capacity for spirituality emerged as a by-product of long-distance running.

CONCLUSION

The evolution of human ritual capacities expanded the basic functions of ritual found across animal species where they provide a communication medium and enhancement of social cohesion. Diverse effects of ritual elicit emotional bonding and reduce the ego-centeredness that inhibits the experience of community connectedness, enhancing a sense of belonging with others. These capacities are epitomized in the effects of uniquely human capacities for performances of dance and music which provide an enhanced medium for expression of shared meaning and formation of group identity. The biological attachments that mammals evolved to maintain proximity between infants and caregivers needed to be expanded to larger groups in the course of hominid evolution. The innate psychosocial needs of humans for group emotional coordination increased from extended family and bands to even larger groups across the course of human physical and social evolution.

Today humanity, particularly youth, face the same needs. Indeed with the decline of family and geographical community as functional units in the contemporary world, there is an even more critical need for expansion of opportunity for social bonding with peers. The neuropsychology of humans and its development of social identity require a personal emotional life beyond family, an extension of our basic self that involves an intimate adaptation to the broader social world. Nighttime ritual gatherings were the primordial hominid process for meeting these functions, for the production of a personal social identity and a sense of personhood and belonging in relation to others. In the course of hominin evolution our capacity for communal rituals evolved as mechanisms for helping channel the development of social interdependency on others, a coordination of individual neurological, emotional, psychological and social development in relation to significant others.

Our personal and social well-being involves emotional attachments which are based on development and internalization of social identities that are created in the context of collective ritual engagements. Through shamanic ritual, as well as raves, the social bonding processes that began in the mammalian attachment dynamics elicited in caregiver-child relations and bonding experiences have been extended to the broader society through communal rituals. Communal rituals intrinsically elicit attachment bonds and related physiological mechanisms that release endogenous opiates (opioids), producing a sense of connection within the group. Opioid release stimulates the immune system, producing a sense of euphoria and belongingness, enhancing coping skills, and enhancing stress tolerance and environmental adaptation.

Raves of today employ the same basic mechanisms of ancient shamanistic practices, using a variety of ritual activities that engage physical and behavioral mechanisms which stimulate the release of opioids and alter consciousness such as: extensive physical activity such as drumming, dancing and clapping; the emotional modulation produced by dance and music; and nighttime activities when endogenous opioids are naturally highest. Like ancient shamanic rituals, raves produce emotional entrainment and socialization by associating emotionally charged social situations and cultural symbols with the heightened physiological responses produced by ritual drivers such as music and dance. These activities have an ability to produce alterations of consciousness that contribute to intrinsic healing processes and social identity formation that humans have found compelling experiences since early in our evolution.

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KEY TERMS AND DEFINITIONS

Biogenetic Structuralism: An approach that proposes that there are universal structures which underlie both apparent diversity across cultures as well as similarities. Biogenetic structuralism proposes underlying universal structures that are biological in nature and mediate experience. The structures mediating the universal structures of experience are neural networks.

Hominids: Humans and great apes and their common ancestor.

Hominins: Humans and their extinct ancestors and relatives since the divergence from hominids.

Integrative Mode of Consciousness: A brain response that is characterized by highly synchronized brain waves, especially theta (3-6 cycles per second) that are produced by serotonergic discharges in the hippocampal-septal raphe circuitry and imposed on the frontal cortex.

Mimesis: The ability to intentionally represent through imitation.

Neuropenomenology: Explanations of phenomenal experience that are referenced to the functional effects within biogenetic structures, especially neural transmission systems and functional systems of the brain (see Laughlin, McManus, & d'Aquili, 1992).

Psychointegrator: A plant substance which stimulates the integrative mode of consciousness through action on serotonergic neurotransmission.

Ritual: A behavioral enactment which expresses meaning. Stewart & Strathern (2014) characterize ritual in terms of "formality, regularity, stereotyping, special uses of language and communicative gestures and sanctions . . . a term for processes and events that have a particular place in social life."

Shamanism: A spiritual healing practice that evolved in the hominin line from expansions on the biogenetic basis of ritual through mimesis, singing, drumming, dancing and the use of psychointegrators to enhance the integration of consciousness.