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Mind-body medicine and altered states of consciousness in *Homo*

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Abstract: The mind-body relationship has long been a subject of inquiry from both philosophical and scientific perspectives. Ancient Greek philosophers such as Pythagoras and Plato posited dualistic models, where the mind and body are distinct substances. In contrast, modern approaches in Mind-Body Medicine (MBM) offer integrative models that emphasize the interconnectedness of mental and physical states and the proactive role of the patient in their own healing process. This review examines the evolutionary roots of altered states of consciousness (ASC) as a precursor to current MBM techniques. By tracing ASC to early hominins and their cognitive development, it posits that the ability to enter various ASC—such as those used in rituals, meditation, and other mind-body practices—provided evolutionary advantages, influencing both individual fitness and social cohesion. Moreover, this review discusses tonic immobility in animals as a survival mechanism and explores parallels in human and non-human primate behaviors involving ASC. Additionally, neurochemical pathways that govern ASC, such as serotonergic and dopaminergic regulation, are explored for their roles in promoting social behaviors, cognitive flexibility, and emotional regulation. Furthermore, the role of the default mode network is investigated in relation to psychotropic and mood altering substances and altered states of consciousness. This integrated perspective offers new insights into the origins of MBM and underscores the significance of ASC in both evolutionary and contemporary contexts.

Key words: Mental representations, tonic immobility, great apes, neurochemical regulation, serotonergic and dopaminergic systems, default mode network, primary and secondary states, psychotropics.

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Introduction

The mind-body relationship has been theorised over millennia from philosophical and scientific perspectives (Viretta 2019). The ancient Greeks proposed dualistic and monist approaches in understanding the mind-body connection. Both Pythagoras and Plato believed the body and soul were comprised of different substances. In particular, Plato's dualistic model which was based on his theory of archetypes and forms, had a profound influence on western and Islamic philosophical and scientific thought (Uner 2007). Plato's theory was influenced by Anaxagoras who considered Mind (*nous*) as a unique and universal substance – eternal, infinite, self-subsistent and directing all cosmic processes (Hergenhahn 2009; Baloyannis 2018). In his doctrine, Mind pervades and controls all cognitive and limbic functions, directing the 'inner' life of humans (Baloyannis 2016; 2018). Other thinkers such as Alcmaeon, Galen, Hippocrates and Hierophilus considered the brain as the principal organ of cognitive functions (*hegemonicon*) and sensation (Kirk and Raven 1957). Their ideas assisted our understanding on the influence of psychic processes in regulating physiological activities, thus, setting the stage for mind-body techniques.

The field of Mind-Body Medicine (MBM) has grown considerably over the last generation, heralding various interventions and psycho-clinical approaches that are gaining credence in the medical community (Dunne and Schubert 2021). Indeed, beneath the umbrella of MBM is a broad range of interventions which may include complementary and alternative medicine. These interventions are based on an integrative model which views the individual as a physical and spiritual being; second, they emphasise the patient being pro-active in their own healing process via fostering life-style changes (Lemley 2012; Moura 2012). Although, this integrative model demarcates from western biomedicine in some areas, it is being recognised by a growing number of health care and public health professionals for its potential salutogenetic aspects (Wallach et al. 2012). The central proposition of MBM is that humans are able to manipulate mental states which influence neuro-endocrinological regulation with subsequent psycho-physical well-being (Saniotis 2016; Wahbeh et al. 2009). On this theme, Saniotis and Henneberg (2011) note that, "By altering the chemical environment in which the brain operates and relations to external world, the nature of consciousness can be altered".

Mind-Body interventions include various 'western' (bio-feedback, hypnosis) and 'eastern techniques (vipassana meditation, transcendental meditation, yoga, tai chi, chi kung) (Wahbeh et al. 2008). While the aforementioned techniques attempt to induce a parasympathetic response via modulating physiological processes, only bio-feedback utilises medical instruments such as EEG and EMG which are displayed to the patient where he/she can modulate a desired physiological response (Wahbeh et al. 2008; Schwartz and Andrasik 2005). Advances in neuroimaging and neuroscience in the last 25 years have provided a framework for improving our understanding of psychoneuroimmunological mechanisms. Ongoing research in mind-body techniques, as well as their clinical applicability, will further enhance psychotherapeutics, especially in the area of personalised medicine.

Since the human brain is a product of evolution it is crucial that researchers study the evolutionary antecedents that

have shaped it. For instance, the human ability for entering into various kinds of altered states of consciousness (ASC) which are incorporated in MBM, can be better appreciated through the lens of evolution that conferred ancestral hominins with a suite of unique cognitive abilities (Saniotis et al. 2014). Anthropological studies note that ASC would have been utilised by ancestral hominins in various contexts (i.e. healing, religious rituals, art) which increased human cultural complexity and had fitness value (Saniotis and Henneberg 2011).

In this paper, ASC will be examined within the evolutionary context in order to identify important evolutionary precursors of current MBM. This is an area that has hitherto received minimal theoretical focus. The fact that humans are able to enter into various types of altered/dissociative states, with identifiable salutogenic effects, demands greater attention regarding the evolutionary origins of such states.

Mental representations in early homo

Numerous anthropological studies have detailed the human propensity of ASC in diverse cultures (Bourguignon 1977; Dinges 1990; Saniotis 2001; Ebon 1966; Eliade 1964, Krippner 2000; Winkelman 1992; 2000a, 2000b). The anthropologist Erika Bourguignon has noted that 90% of human societies use at least one technique for inducing ASC. Laughlin states that the human brain has evolved to experience manifold phases. Similarly, Henneberg and Saniotis (2009) have argued that by the time of *H. erectus* humans had become adept in mental imagery that would have been used in several ways, from tool development to the creation of imaginary entities which triggered certain behaviours that had fitness value. Interestingly, this ability to create and retain mental images may have involved the integration of cortical and sub-cortical areas, leading to "greater control of mind psychodynamics" and altering consciousness (Henneberg and Saniotis 2009; Winkelman 2000). For instance, the symmetrical nature of Acheulian axes (1.5 mys) which are attributed to *H. erectus*, required a high degree of cortical control in the repeated flaking of the initial stone at different angles, as well as, holding a mental representation of the desired appearance of the object as it was being shaped.

Importantly, the increasing ability in ancestral hominins in creating and sustaining mental representations was part of an evolving cognitive and behavioural kit of culturally based behaviours, informing and shaping each other via self-amplifying feedback mechanisms (Henneberg and Ekhardt 2022). Several feedback mechanisms became positively selected, thereby, generating self-amplifying properties in behavioural and morphological features in early homo: increasing social co-operation and reduction in aggression, extended childhood rearing, tool-making, complex procurement practices, and aesthetic consciousness (Henneberg and Ekhardt 2022).

Winkelman (2013), proposes that cultural activities such as early rituals informed changes in consciousness and novel kinds of self experience – these altered kinds of experience evolved from much older "cognitive modules", becoming a template for symbolic dependent imagination which could be shared with other group members. Enhanced motor control – due to humans possessing increased cortical, cerebellar and basal ganglia inhibition, smaller muscle units and higher levels of cortical and spinal grey

matter enabled the evolution of precise motor patterns, facilitating ASC within collective rituals, chanting and dancing (Winkelman 2013).

Altered states of consciousness in the animal kingdom: Tonic immobility

Over evolutionary history, animals have developed different types of strategies in order to reduce predation. Apart from the sympathetic nervous system mediated "flight or fight" a third existential strategy involves an animal entering into a disassociative state of tonic immobility (TI) also referred to death feigning, (*thanatosis*), freezing, "playing possum", or "playing dead" in response to predatory threat (Humphreys and Ruxton 2018; Damas-Moreira 2021). Tonic immobility has been widely reported in mammals (Francq 1969), reptiles (Lipinski et al. 2021; Burghardt and Greene 1988; Muscat et al. 2016), amphibians (Sanchéz et al. 2016; Sazima 1974, Toledo et al. 2010), birds (Sargearnt and Eberhardt 1975), fish (Tobler 2005), and insects (Allen 1990; Oliver 1996; Cassill et al. 2008).

Tonic immobility has been postulated as an adaptive behaviour that may be employed as a last line of defence, following detection from a predator (Humphreys and Ruxton 2018). Various authors note that TI may cause a predator to pause or to lose interest in the prey animal, thereby providing an opportunity for the latter to escape (Bertoluci et al. 2006; Rogers and Simpson 2014; Lipinski et al. 2022). Furthermore, Roelefs (2017) claims that tonic immobility triggers altered somatic processes, including slowing down of heart rate (bradycardia) and changes in body temperature, respiration and in somatic posture. For instance, when threatened the American possum may undergo tonic immobility where its body becomes curled and stiff with eyes half closed and with bared teeth. During this time, its anal glands may secrete a foul smelling liquid that is a characteristic feature of post-mortem putrefaction. The American possum can subject itself in this altered state for up to four hours after which its somatic processes return to normal.

It is noteworthy that tonic immobility activates the sympathetic and parasympathetic systems. The initial act of predator/prey confrontation activates a sympathetic response in the latter (characterised by increased arterial pressure and cardiovascular output, long distance optic acuity, bronchial vasodilation, hypothothalamic-pituitary-adrenal axis, increased muscle tone and glucose output from the liver) triggering a parasympathetic response with subsequent cardiac deceleration and entering into a state of tonic immobility. In *homo*, this switching between the two autonomic systems can be self-induced in order to enter into a desired ASC, which will be discussed later.

Like non-human animals, humans also have the ability to undergo a "freeze" response which amplifies inhibition response. This kind of response is often triggered during a violent or sexual assault, enabling the assailant to accomplish their illicit act. It has been postulated that in humans the "freeze response" involves subcortical areas such as the reticular formation and the locus coeruleus which are involved in arousal, alertness and modulating psychoneuroendocrine responses. During a traumatic/emergency event these brain structures may activate a "network reset" characterised in tonic immobility (Bouret and Sara 2005).

Altered states of consciousness in the great apes

Apart from tonic mobility there has been little theoretical work done in other ASC in non-human animals. The exception to this is Samorini's seminal work (2002) on the widespread use of hallucinogenic plants and ethanol in the animal kingdom. According to Samorini, ASC produced by plants may enable fixed instincts to be circumvented, enabling for new kinds of behaviours and techniques to be learned by individual animals. Kelley (2004) also notes that several animal species conduct exploratory behaviours in order to access wild plants with hallucinogenic properties. In short, the findings of various authors reveal a pan universal proclivity in vertebrates and invertebrates to induce ASC mainly via the consumption of natural hallucinogenic substances, and that this "psychonautic" tendency may have evolved over hundreds of millions of years (Kelley 2004; Samorini 2002; Kehoe and Blass 1986; Panksepp and Huber 2004).

Being phylogenetically nearest to *homo*, an examination of non-human primates may provide insight regarding the evolutionary origins of ASC in the hominin clade. Non-human primates in the wild have been observed to identify and consume specific plants for their hallucinogenic properties. For example, Gorillas have been seen to search and consume the Iboga plant for its hallucinogenic effects (Samorini 2002). Gorillas in Equitorial Africa also seem drawn to eating the leaves of Caffea liberica (*Rubiaceae*) and Theobroma cacao (*Sterculiaceae*) (Pi 1977), which which contain caffeine and theobromine respectively (Cousins and Huffman 2002). Other studies show that wild primates will consume fermented plants/fruits containing alcohol (Amato et al. 2021; Hockings et al. 2015). What these studies show that consumption of alcohol and subsequent "drunkard" like behaviours may be an unescapable result of their frugivorous diet (Hockings et al. 2015). Within experimental conditions, monkeys have self administered ethanol to the point of reduced motor co-ordination (Deneau et al. 1969).

Apart from substance induced ASC, apes also seek other types of ASC that derive from movements that alter somatic equilibrium. A recent study reveals that captive gorillas engage in the act of high speed rope spinning in order to induce ASC. Due to their vestibular homology, gorillas are capable of inducing similar neurophysiological after-effects of rope spinning as humans do (Lameira and Perlman 2023). This apparent shared tendency to induce ASC in apes and humans provides an important window for understanding the evolutionary adaptive value of ASC in the hominin lineage (Lameira and Perlman 2023). It can be argued, that this proclivity in self inducing ASC in humans and great apes had probably existed by the time of the last common ancestor of hominin and great ape lineages.

Interestingly, spinning in both apes and humans transitions from the initial active sympathetic stage to a parasympathetic finale. In apes, the latter is characterised by lying down, probably as a response of subsequent vertigo after experiencing euphoria. Alternatively, spinning in humans can be both spontaneous or ritualised. A recent study shows that the Sufi Whirling Dervishes of the Mevleviye Sufi order located in Konya, Turkey and founded in 1273 (Smeets 2006), perform a whirling meditation without experiencing balance or vertigo problems. This could be due to structural

alterations to the default mode network (DMN) coordinating perception and motion (Cakmak et al. 2017). Surprisingly, the vigorous and prolonged nature of the whirling meditation (approximately one hour) achieves a high meditative state of awareness in line with other studies on experienced meditators that showed the deactivation of the DMN (Cakmak et al. 2017; Brewer et al. 2011).

Ritual healing hypothesis and the disassociative aptitude in homo

For several decades anthropologists have extensively examined ASC from mainly non-western and traditional cultures. Their investigative peregrinations have been invaluable in formulating our current understanding of MBM. One of the foremost anthropologists of the 20th century was Victor Turner who expanded upon van Gennep's theory of ritual. Much of Turner's work focussed on transition periods of ritual which van Gennep had earlier referred to "limen", which in Latin means "threshold". Turner (1969, 1974) further refined this idea and retitled it "liminal" – a ritual state in which participants undergo a symbolic transformation that is antithetical to that experienced in the everyday life. In this state, temporal and social boundaries are temporarily cessated and supplanted by the realm of myth, that confounds the boundary between the real and the imaginary (Krippner 2005).

In this sense, liminality transcends ritual forms and includes the realm of mind, of Jung's "collective unconscious", that boundless and ineffable storehouse of symbols whose antecedents derive from a time long before the advent of *homo*. Colin Turnball's re-analysis of liminality warns us against limiting this concept to a "transitory in-between state of being" (1990:80). This realm also extends itself to hypnotic induction and trance states, where Paleolithic shamanism derives its tradition. Krippner (2005) speculates that hypnotic induction is a form of self-hypnosis, a dissociative state engaging the mythic imagination whereby the individual is disconnected from their ordinary state of awareness and enters into an altered experience that is indeterminate and fluid. For Krippner, hypnosis blurs "psychological boundaries".

The apparent universal nature of ASC brought Paul McClenon (2004) to suggest that human hypnotic aptitude was developed during the Upper Paleolithic period. Even if human hypnotic/disassociative ability had been increasingly improved from this period onwards, it was based on much earlier evolutionary mammalian antecedents as was previously discussed. He further notes that disassociative genotypes in *homo* were positively selected over evolutionary history because they conferred fitness value. According to McClenon, disassociative states would have enabled individuals for coping with trauma, reducing stress response and cohesifying group ties. Rituals were developed over a long time period where cortical areas (mythopoietic ideations) synchronised with limbic and sub-cortical regions (affective states), generating a fusion of emotion, behaviour and thought (Winkelman 2002). In humans as in other mammals limbic activation is biased towards parasympathetic dominance as discussed earlier. Similarly, Krippner (2000:96) notes that ASC involve cortical synchronisation with slow wave emissions from the limbic system. Next, it has been shown that shamanic based ritual techniques trigger the release endogenous opiates, thereby eliciting physiological responses to ritual of symbolic manipulation (Winkelman 2002: 1881). Third, long attention span is

a signature feature of *homo*. Human ability to remain in attention states for long time periods, important in many meditational techniques such as Vipassana – the precursor of modern mindfulness meditation, would have been crucial in other cultural areas such as tool production, development of art and parental rearing. These cultural modes of production in early *homo* would have informed each other via amplification feedback mechanisms (Henneberg and Ekhardt 2022), primarily under neuro-hormonal regulation of dopaminergic and serotonergic systems (Saniotis et al. 2021).

Raghanti et al. (2010) have proposed that the prefrontal cortex in humans and chimpanzees have a high density of serotonergic afferents that may provide greater social inhibition and impulse control. The neurochemical hypothesis posits that serotonergic activation of limbic structures such as the amygdala may have altered striatal serotonin levels in ancestral hominins due to selective pressures favouring pro-social behaviours, impulse control, language development, "cooperative subsistence activities" and problem solving (Raghanti et al. 2018; Lew et al. 2019, Hare et al. 2007; Saniotis et al. 2021). It is well known that the human hippocampus has dense amounts of serotonergic receptors and cortical regions – the latter being the most recently developed. Additionally, the 5-HT2AR serotonin receptor may have facilitated eusocial activities in ancestral hominins and improved neuroplasticity.

Dopaminergic regulation has had no less importance in the evolution of human cognition. Previc (1999; 2009) informs us that dopamine is involved in several motor and cognitive functions including memory, neuromodulation and motivation (Klein et al. 2019; Salamone and Correa 2012; Raghanti et al. 2010). Previc also states that humans have approximately 30% higher T4 (thyroxine) levels than found in chimpanzees (Previc 2002). Thyroxine is central in the conversion of tyrosine to dopamine. Higher levels of T4 in humans facilitate higher cognitive abilities in *homo* (Previc 2002). In humans, structures which form the basal ganglia such as the medial caudate nucleus are more influenced by the control of dopamine secretion than in non-human primates. It has been postulated that increased dopamine activity in this region improves cognitive and behavioural plasticity (Raghanti et al. 2016). Additionally, a correlation has been shown between reduced motivation inclination and increased secretion of striatal dopamine and lessened willingness for action (Kjaer et al. 2002).

Behaviours requiring fine and precise motor movements such as tool making, language production, music and artistic creation require both dopaminergic and serotonergic activity. Both systems also inform body proprioception during rhythmic motor sequences (Rodriguez-Fornells et al. 2012; Clark and Tamplin 2016). Furthermore, the creation and maintenance of rhythmic motor sequences as manifested in dance or walking meditation activates endorphins under the control of dopaminergic and serotonergic regulation (Clark and Tamplin 2016; Rodriguez-Fornells et al. 2012).

Use of psychotropic and mood-altering substances, ASC and the default mode network

Hitherto, there has been a plethora of anthropological and evolutionary research on the use of psychotropic and mood-altering substances in hominins (Nesse

1997; Winkelman 2000, 2002, 2004, Saniotis 2010; Saniotis and Henneberg 2012; Sullivan and Hagen 2002). Both Winkelman (2001) Winkelman (2001) and Saniotis and Henneberg (2012) note that ancestral hominins probably had an innate predilection towards ingesting psychotropic and mood-altering substances in order to experience ASC. Winkelman (2004) further claims that the use of psychotropic plants may have influenced neurotransmitter regulation in ancestral hominins, as well as being sources of neurotransmitters, thereby, informing human brain evolution. Whatever the motivation for using psychotropic and mood altering substances in the evolutionary past, it seems likely that their use became a feature in many shamanistic societies, and still play a part of religious rituals in various cultures (Grob 1998). By the time of the late Neolithic period the use of psychotropic and mood altering substances in order to experience ASC had become a feature of various religions and esoteric *cults (i.e. Eleusinian Mysteries, Dionysian Mysteries*, the use of cannabis in Vedic based cultures).

It is only in the current generation that neurobiological explanations for ASC and psychotropic and mood altering substances have been increasing. For example, psychedelics such as Ayahuasca and psilocybin (which contain N,N-dimethyltryptamine (DMT)) are attracted to subtypes of serotonin (5-HT) receptors (Alonso et al. 2015; Halberstadt et al. 2011). These psychedelics' affinity with 5-HT receptors have been shown to induce ASC including alterations in affectivity, sensory perception and sense of self (Gattuso et al. 2023; Nichols 2016; Speth et al. 2016). Recently, neuroimaging techniques have indicated specific brain regions which psychedelics influence – these include the anterior and posterior cingulate cortex, medial frontal cortex and various areas of the parietal lobe (Cahart-Harris et al. 2012; Palhano-Fontes et al. 2015; Alonso et al. 2015). Of increasing interest is the influence of psychedelics on the Default Mode Network (DMN) – an interconnected regional network consisting of four functional hubs: angular gyrus, posterior cingulate cortex (PCC), precuneus and the prefrontal gyrus (mPFC); these hubs show elevated blood flow and metabolic activity even when at rest (Greicius et al. 2009; Gattuso et al. 2023; Cahart-Harris and Friston 2010). The DMC is also deactivated when an individual is immersed in a goal orientated task (Raichle et al. 2001). However, the DMN is unique in that it has been shown to be involved in the "attentional system" (Cahart-Harris and Friston 2010).

Modern theorists have developed a theory of the function of the DMN based elaborated on Freud's classic theory of the ego (Cahart and Friston 2010). Freud had considered two basic processes which inform human consciousness – secondary or waking state within which the ego operates and non-ordinary, primary state; the former state inhibits limbic and paralimbic activity, whereas the latter mode is characterised as being free and unconstrained of cultural bound behaviour (Freud 1940; Cahart and Friston 2010). Victor Turner's hypothesis of structure and anti-structure (1969, 1974) elaborates on Freud's two processes. Cahart and Friston (2010) argue that DMN functions to suppress and subordinate the anarchic impulses of the limbic influenced primary process. Second, they speculate that the processes of the DMN are cognate to "high levels of and inferential hierarchy" that functions to control

the free flowing energy of the primary process. Psychosis, or in this instance, drug induced ASC often to a breakdown of top-down control. Importantly, a reduction of top-down control may increase sensory excitation of the auditory and visual systems (often noted in individual experiences when taking Ayahuasca and LSD) (de Araujo et al. 2012). Muthukumaraswarmy et al. (2013) further posit that posterior cingulate desynchronization is due to the excitability of pyramidal neurons that have abundant 5HT2A receptors. Thus, the posterior areas of the limbic system influence the flow of information from the prefrontal cortex, with subsequent relaxing of executive control (Alonso et al. 2015).

Although, some ASC may involve reduced activity in certain brain regions which have been associated with advanced tool making, our understanding of this process is unclear. For example, many types of ASC incorporate the autonomic system and control network (use of "behavioral synchrony", "attentional distraction", "automatic imitation of scripted sequences", evocation of the limbic system) (Hobson et al. 2018) producing a sensory and affective overload. This often triggers a deep parasympathetic response often associated with hypnotic, catatonic and psychotic states. Second, by its nature toolmaking demands the creator to form a picture in their mind of the desired product, which informs the tool's construction. This ability to form a picture of the tool in mind – that includes attention to planned movements, motivation and decision making in real time, incorporates the mpFC (part of the DMN) and the mid dorsolateral prefrontal cortex (dlPFC) (part of the control network) (Stout et al. 2015).

However, some caution is warranted especially in the use of psychedelics for psychiatric therapy. Although, psychedelics can potentially alter gene expression (Martin and Nichols 2017) and neuroplasticity, it is difficult in gauging to what extent the benefits of psychedelic therapy result from neuroplastic modifications on either cellular or network (DMN) levels (Gattuso et al. 2023).

Conclusion: Implications for MBM in medicine

Over the last generation there has been increasing interest in exploring altered states of consciousness in relation to MBM. During the 20th century, anthropologists conducted exhaustive ethnic studies on healing rituals where altered states of consciousness were employed by ritual healers. For example, Bourguignon (1973) notes that 90% of 430 societies still employ at least one type of mind-body technique for inducing ASC. There are now a plethora of research studies on MBM for treating both physiological and psychological disorders. Consequently, MBM is now becoming an acceptable part of western medical practice. Scientific studies have identified that the use of MBM (i.e. music therapy, muscle relaxation, guided imagery, hypnosis) in conjunction with pharmacotherapy and cognitive-behavioural therapy may facilitate pain management and increase mental well-being in cancer patients (Astin 2002; Richardson et al. 2007; Carlson and Bultz 2008). Furthermore, the lifting of the decades long ban of the use of Lysergic acid diethylamide (LSD) in psychiatric practice will provide an important adjunct to cognitive-behavioural therapy. Lysergic acid diethylamide is a non-addictive psychedelic drug and played an invaluable part in psychiatric

therapy during the 1950s–1960s before being proscribed by the Nixon administration. It has been shown that LSD had for years manipulated ASC in patients during psychotherapy for the treatment of anxiety, depression, cancer and addiction (Saniotis 2020).

In light of research into the DMN and ASC the authors speculate that the "task-sensitive coupling" (Hobson et al. 2015) between the control network and DMN has implications for MBM. At this stage, we still do not have sufficient knowledge of the DMN and its correspondence with the reticular system which also co-ordinates different states of consciousness. However, Cahart-Harris et al. (2014) have highlighted that the primary state has greater connectivity, as well as being poised between order and chaos. Thus, the human brain has greater affinity with disordered psychological states than the brains of other animals. These authors further claim that during evolution human consciousness underwent increasing disorder (entropy-expansion) followed by increasing reorganisation and relaxing (entropy-suppression), and that the adult brain exhibits the latter (Cahart-Harris et al. 2014). Yet, greater entropy means an increasing range of possible mental states (Cahart-Harris et al. 2014) which provides more opportunities for mind-body therapies (i.e. meditation, visualisation, psychedelic therapy, biofeedback), since these use a repertoire of cognitive processes. What MBM may provide is a temporary retrieval of the primary state – a release from the cognitive dictates of the control network with subsequent freedom to experience states of consciousness that are culturally inhibited, albeit, psychologically beneficial.

Conflict of interests

Authors declare no conflict of interests.

Authors' contribution

KM – conceptualized the initial scope of the paper and designed the study protocol. Conducted a comprehensive literature review and analyzed neurochemical pathways discussed in the manuscript. Wrote the initial draft, focusing on historical and philosophical perspectives of the mind-body relationship and evolutionary aspects of ASC; AS –collaborated on refining the paper's concept and scope. Conducted in-depth analyses of the evolutionary psychology aspects and the neurobiological mechanisms associated with ASC. Reviewed and edited the manuscript, providing critical revisions for sections discussing tonic immobility and its parallels in human and non-human primate behaviors. Supervised the overall development of the manuscript.

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