

Holotropic Breathwork: Models of Mechanism of Action

Respiración Holotrópica: Modelos de los Mecanismos de Acción

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Abstract

Objectives: critical review of etiological theories of phenomena reported in Holotropic Breathwork [HB]. Method: literature on Holotropic Breathwork, hyperventilation syndrome, polyvagal theory, SARs theory, classical mytho-poetic traditions, the role of music, anomalous experiences and healing, and classical psycho-spiritual explanatory models are reviewed. Discussion: physiological and neurophysiological models, transpersonal, and cognitive psychological models, ethno-epistemological problems and methodological concerns are reviewed. Narrative logic versus stochastic models is examined. Conclusions: voluntary over-breathing and music provide access to non-ordinary states through the putative effects of vagal toning and sonic integration. Cognitive processes may play a role in permitting the anomalous internal narrative experiences.

Keywords: Holotropic Breathwork, voluntary over-breathing, autonomic nervous system, polyvagal theory, music

Resumen

Objetivos: revisión crítica de las teorías etiológicas de los fenómenos reportados en la respiración holotrópica (RH). Método: revisión de la literatura sobre la respiración holotrópica, el síndrome de hiperventilación, la teoría polivagal, la teoría SARs, las teorías mitopoiéticas clásicas, las experiencias anómalas y de sanación, y de los modelos explicativos psicoespirituales clásicos. Discusión: el presente artículo se revisan modelos fisiológicos y neurofisiológicos, modelos transpersonales y modelos psicológicos cognitivos, problemas etno-epistemológicos y cuestiones metodológicas. Finalmente, se examina la lógica narrativa frente a los modelos estocásticos. Conclusión: la hiperventilación voluntaria y la música permiten el acceso a estados no ordinarios de consciencia a través de los supuestos efectos de la tonificación vagal y de la integración a través del sonido. Los procesos cognitivos pueden jugar un papel en el proceso permitiendo que se produzcan las experiencias narrativas internas anómalas.

Palabras clave: Respiración Holotrópica, hiperventilación voluntaria, sistema nervioso autonómico, teoría polivagal, música

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Introduction

The model of a mechanism of action comes from concepts of mechanics and process, which are based on logic. These models have relevance in the *hylotropic* world, a concept developed by Stanislav Grof MD referring to the world of infinite differences experienced in our ordinary, culturally conditioned, consciousness (Grof, 1985).

Mechanism of action models may help us understand and elucidate the generation of *holotropic* [unity/non-difference] experiences by Holotropic Breathwork [HB]. Dr. Grof asserts that Holotropic Breathwork allows access to a transpersonal boundlessness, unitive experiences of ecstasy, and mythopoetic archetypes of the collective unconscious (Grof, 1988).

Holotropic Breathwork (HB) has two major components, which appear to provide access to anomalous, transpersonal experiences in non-ordinary states of awareness. These two are 1] *voluntary over-breathing* or hyperventilation [colloquially called 'breathwork'], and 2] *thematic evocative, music*. The neurophysiology of these two elements is currently understood to provide a loosening of emotional control, integrative states, and bonding experiences (Harner, 2013; Rhinewine and Williams, 2007; Thaut, 2013). Anomalous transpersonal experiences are a horse of a different color (Cardena, Lynn and Krippner, 2013)

How are they generated neurophysiologically? This is not well understood. The term 'generated' is based on a biomechanical materialistic worldview; and it is this view, which is called into question by the anomalous transpersonal experience (Grof, 1985; Cardena, Lynn and Krippner, 2013). The anomalous experiences reported by subjects during HB are not conventional; they are non-ordinary (Grof, 1985). A materialistic view might dismiss them as impossible (Grof, 2006). Release from the conditioning of consensus reality is not commonly reported in Western scientific literature (Cardena, Lynn and Krippner, 2013).

Holotropic Breathwork

HB was developed by Stanislav and Christina Grof as a simple set of therapeutic techniques that appear to produce profound transpersonal and cathartic emotional experiences with regularity. HB subjects report anomalous experiences similar to phenomenological descriptions of the various levels and types of experience manifested in psychedelic sessions (Grof, 1988). These experiences were reported by 82% of psychiatric inpatients, who experienced HB in a study

conducted by Eyerman. Remarkably, these patients did not report either familiarity with spiritual disciplines or prior psychedelic experiences (Eyerman, 2013). HB allows psychedelic-like experiences, similar to the phenomenology reported in the "cartography of inner space" ascribed to psychedelic sessions with LSD-25, on a regular basis. (Grof, 1988; Eyerman, 2013) Current understanding of the physiology associated with hyperventilation does not indicate a significant difference from normal respiration (Gerbarg and Brown, 2005; Hornsveld et al, 1996).

Voluntary over-breathing

Over-breathing is utilized in medicine to stimulate seizures, and to reduce brain swelling. It is also found to be a symptom of panic and anxiety states as well as of sexual arousal (Alexopoulos, Christodoulou and Toulgaridis, 1996; Lewis and Howell, 1986). The symptoms of the *hyperventilation syndrome* are often ascribed to panic disorder. These include breathlessness, dyspnea, light-headedness, paraesthesiae, numbness, and a variety of pains, especially chest pains, palpitations, and sweating. These may be associated with a feeling of impending, loss of consciousness and fear of imminent death. General symptoms of anxiety and depression, as well as those of any organic disease, may coexist in the absence of organic disease (Alexopoulos, Christodoulou and Toulgaridis, 1996; Lewis and Howell, 1986). The results from provoking these symptoms remain controversial. Induction of respiratory alkalosis in the neurosurgical recovery suites by use of a respirator, and the pharmacologically induced paralysis of voluntary and involuntary respiratory musculature is employed in an attempt to reduce the swelling of the brain after craniotomy. So respiratory alkalosis and reduction in cerebral brain flow have been hypothesized to occur during voluntary over-breathing. Hornsveld and Garssen (1997) have demonstrated that it does not occur in voluntary hyperventilation or over-breathing. *Hyperventilation syndrome* has since been considered an elegant but scientifically untenable concept, to echo Hornsveld's follow-up discussion. Respiratory alkalosis had previously been thought to reduce ionized calcium in the blood, and thereby give rise to tetany, tingling sensations, induction of epileptic seizures, and induction of interictal epileptogenic activities seen on the electroencephalogram.

Significant alkalosis does not appear to occur with voluntary hyperventilation at a rate that differs significantly from controls in healthy subjects. Hypocarbica may occur with alveolar and arterial carbon dioxide tensions dropping below 35 mm Hg or an induction of central apnea through both rostral and caudal

ventrolateral nuclei of the medulla oblongata, which modulate sympatho-parasympathetic tone and, notably, vagal tone (Kerr and Julu, 1999).

Observations of blood pH during voluntary over-breathing in normals do not support the respiratory alkalosis hypothesis (Gerbarg and Brown, 2005). The pivotal studies of Hornsveld demonstrated no significant differences in PH and blood chemistry with hyperventilation and have been reproduced numerous times in the intervening 2 decades, although the theory is still reproduced without critical comment in a number of venues (Alexopoulos, Christodoulou and Toulgaridis, 1996; Kerr and Julu, 1999; Rhinewine. and Williams, 2007)

Decreased cerebral blood flow has also been hypothesized to cause hyperventilation's effects of on the brain, and psychedelics have been hypothesized to work similarly (Carthart-Harris, et al, 2012; Kerr and Julu, 1999). Theoretically, the resulting reduction in cerebral blood flow was thought to allow subcortical [limbic and brain stem] activity, to be released from the inhibitory influences associated of the neocortex (Rhinewine. and Williams, 2007). Then, subconscious or unconscious processes were presumed to emerge into consciousness (Grof, 1988; Rhinewine. and Williams, 2007). Whether or not cerebral blood flow changes due to the influence of psychedelic drugs, this mechanism of action may not consistently contribute to the psychedelic-like experiences induced by over breathing in HB (Grof and Grof, 1975, 1988). It is possible that the vagal-autonomic influences on the nuclei in the medulla oblongata may influence brain blood flow to certain regions or may drive a slowed brain wave. This may indeed mimic psychedelics effects on the brain, but controlled trials would need to be done to prove this hypothesis (Kerr and Julu, 1999). Minimal respiratory alkalosis during hyperventilation may indeed occur briefly during over-breathing, but it is transient and brief; it appears to be swiftly eliminated by buffers in the blood and compensating renal function within less than 20 minutes. Often, the anomalous transpersonal experiences and carpal-pedal spasm appear after the initial twenty minutes. Since the initial Hornsveld articles in 1996 and 1997, papers continue to appear describing hyperventilation induced respiratory alkalosis, but these results are for individuals with medical illness, not normal subjects.

Hyperventilation syndrome was held responsible for much of the symptomatology of panic disorder from its initial delineation in 1937 to the 1980's. This notion has been replaced by the view that other factors such as autonomic instability underlie both hyperventilation and panic disorder. Although there is a clear association between panic and hyperventilation, "the neurologic basis for this is still unresolved" (Kerr and Julu, 1999).

Are there other candidates for a mechanism of action of Holotropic Breathwork's psychedelic-like experiences? Two alternative explanations are proposed in this paper: the autonomic nervous system and SARs theory, and the polyvagal theory.

Autonomic nervous system and SARs

Alternative explanations may include the parasympathetic autonomic nervous system changes induced by over-breathing as occur during yogic voluntary breathing exercises, called *pranayama*. Pranayama breath exercises change the autonomic tone of the upper thorax and neck at the level of fibroblasts by affecting the *slowly adapting stretch receptors* [SARs]. This leads to a change in chemical regulation of the peripheral nervous system, as well as effecting reflex synchronization of brain electrical activity (Jerath et al, 2006) There is not a lot of data on SARS physiology. However, the regulation of breathing has been noted to induce an emotional calming effect in many studies. Stress and anxiety reduction does occur in HB, but often it is only one of many diverse affects produced.

Polyvagal theory

Another candidate for generating psychedelic-like states of consciousness in yoga and shamanism is *polyvagal theory*, which plays a part in the SARs theory in the reflex brain synchronization. The 10th cranial nerve, the vagus, "wanders" through the trunk of the body, enervating multiple areas such as the larynx, respiratory, gastrointestinal, and cardiac physiology. Some yogic traditions have proposed that over-breathing drives the rhythmic afferent vagal impulses from the pelvic diaphragm to the brain, altering the neurophysiology. The vagal nerve distributes feedback to multiple areas of the brain, releasing substances as oxytocin, dopamine, serotonin, and norepinephrine (Gerbarg and Brown, 2005). Oxytocin is currently considered to be involved in the neurophysiology of the mother-infant bonding, as well as the boundarylessness of states of serenity and the romantic bonding and empathy. Multiple other neurotransmitters are released by the afferent impulses of the vagal nerve, including endorphins and encephalins. There are reports that stress-reduction programs involving over-breathing relieve PTSD/trauma symptoms. It has been proposed that these benefits occur by stimulating the vagus nerve (Gerbarg and Brown, 2005). The afferent vagal nerve input to the brain is widely distributed to multiple regions, and releases various neurotransmitters, both cortically and subcortically. These alterations in neurochemistry may promote mystical and/or trance states of

consciousness reported in yoga and shamanism (Sivananda, 1935).

Neurophysiology may support the yogic claim that toning the vagal nerve gives the experience of “therapeutic” expanded states of consciousness (Eliade, 1951, 1958; Gerbarg and Brown, 2005; Harner, 1990; Patanjali, 1912; Sivananda, 1935). This theory is compromised by negative emotional states of distress and alienation, which are associated with over-breathing and perhaps vagal toning (Eliade, 1951, 1958; Grof, 1988; Harner, 1990). Such challenging, difficult states occur in yogic, shamanic, psychedelic, various mystical states, as well as in HB sessions (Cardena, Lynn and Krippner, 2013; Eliade, 1951, 1958; Grof, 1988; Harner, 1990, 2013; Sivananda, 1935, 1999). These negative states are usually viewed as transitional stages on the way to more integrative, inner harmony. (Cardena, Lynn and Krippner, 2013; Eliade, 1951, 1958; Grof, 1988; Harner, 1990, 2013; Sivananda, 1935, 1999). These difficult states include journeys to underworlds, experiences of cosmic dissolution and disintegration, hell states, and other themes of intense suffering. (Cardena, Lynn and Krippner, 2013; Eliade, 1951, 1958; Grof, 1975; 1988; Harner, 1990, 2013; Huxley, 1954; Sivananda, 1935, 1999). Vagal toning would need to be able to generate predictable sequences of positive and negative anomalous transpersonal experiences; these highly complex narratives might be considered to lie beyond the information capacity of a small nerve bundle, even with the rich neurophysiological distribution of the 10th cranial nerve [vagus]. The fullness of mythopoetic imagery as experienced in HB, shamanism, psychedelics, and meditative disciplines has also been classically described in the works of Homer, Virgil, Dante and different shamanic tribal cultures; it requires an enormous narrative capacity (Cardena, Lynn and Krippner, 2013; Eliade, 1951, 1958; Grof, 1975; 1988; Harner, 1990, 2013; Homer, 2009; Huxley, 1954; Ovid, 2009; Sivananda, 1935, 1999). The vagus nerve may be able to act as a trigger for anomalous neural nets that might then facilitate narrative [as in classical tales], integrative [and mysterious] experiences that are not generally allowed by culturally conditioned neural networks (Cardena, Lynn and Krippner, 2013; Grof, 1985; 2006). Anomalous transpersonal experiences probably require the support by highly complex neural network involving cortical and sub cortical regions. Vagal toning might disinhibit vast neurophysiological resources. However, this is purely conjecture without empirical evidence, to date. Vagal toning may, therefore, be tentatively proposed as a contender for a mechanism of action for HB. Psychedelic like experiences may be routinely induced by voluntary over breathing, pranayama breath control techniques, and other forms of breath regulation, such as chanting and physical methods of auto-

nomic regulation. Perhaps this vagal toning hypothesis deserves further neurophysiological research.

Classical Western culture

The mythopoetic tradition found in the Western Classical tradition has been significantly discounted by the sensory/objective approach of modern materialism. *Mythopoetic* refers to the making of a myth or myths, according to the OED. Mythopoetic archetypal experiences are reported by artists and poets such as Blake and Wordsworth, whose experiences apparently occurred without the use of mind altering substances (Fay, 1995; Weir, 2003). This debasement has been abetted by materialistic science's, often disenchanting and reductionist perspective (Tarnas, 2006). The classical literature of the West displays intimate familiarity with deep mythopoetic, ‘psychedelic-like’ experiences. Ancient classical literature narrates the myths of gods and goddesses, titans, journeys to Heaven and Hades, the worship of the planets as deities, the mystery schools of Eleusis, Orpheus, Dionysius, Pythagoras, Egypt, Mithras from the Greco-Roman era and the Celtic Druid Priest craft, Judeo/Christian Cabalism, Essene mysticism, Islamic Zikr, and the rituals of the tribes neighboring the Roman Empire. These were effectively viewed as poetic conceits until the discovery of LSD and other psychedelics (DeKorne, 1994; Tarnas, 2006).

After WW II, botanical entheogens, LSD-25, other psychedelics, and modern psychopharmacology have reintroduced the three realms [heavens, hells, and a not so ordinary world in-between] of the mythopoetic and shamanic traditions to Western culture. Unfortunately, for centuries these realms had been ‘off the map’ of customary, rationalistic Western experience. (DeKorne, 1994; Leary, Metzner and Alpern, 1964; Tarnas, 2006). When they were re-introduced in the mid twentieth century by psychedelics and entheogens, there were many adverse reactions from the uninformed medical management of the more difficult aspects of inner journeying. (DeKorne, 1994; Leary, Metzner and Alpern, 1964). These appear to have described in ancient Greek, Latin, and Indian classical myths as well as the shamanic traditions. (Eliade, 1951, 1958; Harner, 1990, 2013; Homer, 2009; Huxley, 1954; Ovid, 2009; Sivananda, 1935, 1999; DeKorne, 1994; Leary, Metzner and Alpern, 1964). Linguistic roots continue to display the classical period's understanding of consciousness and the psyche of contemporary Western languages, and they continue to be reflected in ordinary speech. *Psyche* is a Greek term and denotes breath, consciousness, or soul. In Ancient Greece, altering the breath may be conjectured to have

meant altering the *psyche*, that is, consciousness. A similar understanding may apply to the Latin word *spiritus*. The end of life and consciousness is still often called breathing one's last breath, or expiring.

The mythopoetic worldviews of the classical world and shamanism have continued in many of the cultures of the non-Western world. The late Basque anthropologist Angeles Arrien has noted that 80% of the 500 cultures studied by anthropology are still utilizing anomalous transpersonal experiences in their healing rituals and rites of transition. In classical yoga, the Sanskrit word for breath is *prana*, which is the connection of the mind to the soul and universal consciousness, *Atman-Brahmin*. Altered breath control in yoga, *pranayama*, is considered a powerful technique for achieving expanded consciousness in various yogic traditions in Asia. *Bhastrika*, or bellows breathing [a form of voluntary over-breathing], is a *kundalini* yoga tradition technique employed to produce anomalous transpersonal states including the boundaryless experience of *Atman-Brahman* in the practitioner. (Eliade, 1951, 1958; Harner, 1990, 2013; Huxley, 1954; Sivnanda, 1935, 1999; Weir, 2003).

Music

The music-breath combination format similar to HB has been facilitating anomalous transpersonal experiences in a great many human cultures for at least 70 to 120 thousand years or more. (Clottes, Lewis-Williams and Hawkes, 1998; Eyerman, 2013; Lewis-Williams and Pearce, 2004). Some music formats were developed for psychotherapy during the mid-twentieth century by Helen Bonny and others (Bonny, 2002; Pickett, 2002). Grof employed a music format for LSD-25 research sessions at the Maryland Psychiatric Institute, when the psycholytic model of 30 to 60 psychoanalytically oriented sessions was curtailed by legal research restrictions on psychedelics. The political atmosphere of the time restricted the legal use of psychedelics such as LSD, and the research format was limited to 3 sessions. Music was found to help facilitate access to deep emotional, psychologically integrative states in individuals suffering from thought, mood, anxiety and substance disorders- the exception was obsessive-compulsive disorder, which did not appear to respond (Grof, 1970; 1988). Similar results to 30 to 60 sessions of psycholytic therapy (using low doses of LSD or other psychedelics) were observed in 3 sessions of music assisted LSD psychedelic therapy sessions (using high doses of LSD or other psychedelics).

Gentle music opened LSD-assisted psychedelic therapy sessions. In HB, soothing, gentle music was moved to the end of the session to assist re-entry with grounding back into ordinary states or externally

oriented reality. Sonic driving music is employed in the beginning of HB sessions as it helps activate the effort involved in voluntary "over" breathing". More emotionally challenging music is placed in the middle. A similar format may be found in many classical music compositions with *allegro*, *forte*/ *mezzo forte*, and *adagio* [*crescendo*/ *climax*/ *decrescendo*] (Caplan, 1998).

Music helps facilitates inner self-reflection and emotional access. It appears to have an integrative effect on the neurophysiology and engage the entire brain: cortical, subcortical, brainstem, and autonomic (Harner, 2013). Rhythmic drumming, singing and chanting is used in many cultures to induce non-ordinary, trance, mystical, and shamanic states, for both religious/spiritual and healing purposes (Eliade, 1951; Harner, 1990, 2013, 2014). The musical rhythm and rhyming of poetry, and certain cadences in spoken language and theatrical productions appear to allow access to the cathartic mythopoetic realms, that express realms beyond the surface meaning of the words employed (Eliade, 1951; Grof, 1985, 1988; Yogananda, 1946; Whalley, 1997). This does not occur in analytic discursive narratives, especially those well-reasoned and logical discourses that are the staple and substance of most scientific literature. The mathematical formulae, such as those in physics, have been found to produce a similar integrative state, sometimes described as elegance or beauty by the scientists involved, like LSD assisted therapy, in which the experimental sessions use music "to deepen self-awareness and facilitate emotional processing" according to Dr. Peter Gasser (2014).

Discussion

These two elements, over-breathing and music provide access to anomalous experiences of non-ordinary states. Some of the neurophysiology is already understood to provide emotionally integrative, unitive states. The access to dissonant states is not as well studied in music or polyvagal theory, however these challenging states are observed to be part of the journey in HB (Grof, 1988; Grof and Grof, 1989). They require understanding and support on the part of both the experiencer and the facilitator. Clinical observation and traditional shamanic- mythopoetic wisdom indicates that these states may need to be fully experienced in order not be gripped by them, either consciously or subconsciously (Grof, 1988; Harner, 1990; Grof and Grof, 1989).

Dr. Grof offers etiological theories of the etiology of panic, choking, terror, etc, based on an expanded model of psychodynamic causation (Cheetham, 2012; Grof, 1985, 1988; Grof and Grof, 1989; Harner,

2013; Hillman, 1972). Cognitive models have heuristic value; they may allow a cognitive reframe, a change in perspective, which has the potential to free a person to embrace experiences of deep-rooted trauma or conflicts in a new way. Their utility lies in their explanatory power, which may provide the courage to work through highly challenging experiences. The model employed can transcend current understanding of subjective history and experience. Cosmic mythologies, alternate universes, metaphysical realms, and non-duality are models employed as part of the healing narrative. (Cheetham, 2012; Hillman, 1972; Langer, 1958).

These may indeed be a product of a cultural syntax, or some inherent property or language, a function of psycholinguistics of certain languages, and have only a temporary, relative value as an explanation. They are models derived from culturally conditioned linguistic lenses, and the projections inherent in conditioned cognitive habits or sensory perceptions. A deconstruction of a particular language into its root symbols and underlying logic may demonstrate its particular explanatory utility (Cheetham, 2012; Hillman, 1972; Langer, 1958). The appetite for narrative and the emotional logic of stories appears to be inherent in humans.

Narrative and the capacity for storytelling of emotionally cathartic drama appear to be innate in human beings. Symbol making associated with deeply gripping emotional energy may indeed be therapeutic. James Hillman has explored the myth of therapy, the healing act of the narrative in biographical story telling (Hillman, 1972). Personal biography satisfies a certain internal need for emotional growth through the creation of a personal myth. The sharing of intimate, biographical drama may satisfy both shameful-dissonant and nurturing-harmonious contexts. In *The Poetics*, Aristotle ascribes healing power to the release of dissonant feelings, termed catharsis, in the mirroring provided by witnessing tragic drama (Whalley, 1997). HB mobilizes dissonant, cathartic, as well as euphoric and deeply nurturing feelings and internal mythopoetic experiences. Themes of death, loss, defeat and other grievous emotionally dissonant states may give way to struggle, rage, belligerence and then to resolution, peace, ecstasy and transcendence (Grof, 1985, 1988; Rhinewine and Williams, 2007). In HB, the entire cycle may repeat itself, perhaps several times in one session.

Information theory, as developed by Claude Shannon (1949), posits noise as the basis of signal or information. The formulae require both noise and signal to be infinite. That infinite information is based on a greater infinite noise and that these two infinities give rise to recognizable patterns of meaningful narrative is a form of magic we take for granted daily.

The mystery of the creation of meaning compares with the complexity of the formation of matter from the infinite quantum field. Both are *mirabile dictu*. HB, like life itself, is powerfully engaging, cathartic, nurturing, and remains mysterious.

Conclusion and Future Suggestions

HB, developed by Stan and Christina Grof, is a major contribution to the exploration of non-ordinary states of consciousness. It reliably accesses the Jungian collective unconscious without the use of drugs. It remains an open research challenge to determine what physiological and/or psychological factors facilitate non-ordinary states of consciousness, whether with drugs such as psychedelics and entheogens or without them. Thanks to the persistent efforts of Rick Doblin and the Multidiscipline Association for Psychedelic Studies (MAPS) to promote research in this field, clinical studies are again being pursued and published. Dr David Nutt, chair of the EU's psychopharmacology committee, has published data showing the low risk of harm with these substances. HB appears to be another low risk methodology.

Robert Cloninger has developed the first genetically based, validated, scale of transpersonal experiences in the Temperament and Character Inventory (Cloninger et al, 1994; Cloninger and Svrakic, 1997). This scale has found wide acceptance in developmental biological psychiatry and psychology. That profound psychological transformations change is a normal part of the human development is no longer speculative theorization. Responsible governmental agencies are obligated to fund research into the clinical utility of these approaches, as well as to systematically investigate their putative mechanisms of action. Investment of scientific resources into human developmental psychology and physiology represents an opportunity to change the psychology of humanity. Taking this opportunity may greatly improve humanity's survival potential; failure to do so may cause reduce our survival potential and incur incomprehensible morbidity and mortality. R. Buckminster Fuller's analysis of the resources of the planet indicated that we have more than enough resources to live very prosperously, in peace and harmony, without poisoning the planet. A change in the psychology of human beings is what is necessary to allow the rational use of world resources (Fuller, 1972). The climate change crisis has pushed the issues of human transformation to the fore. Political and scientific leaders must investigate and utilize these psychological tools of transformation. This is a matter of profound global urgency.

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