

The Top Down Consciousness-Mind-Matter Ontology

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Abstract: *The consensus cosmological theory of the origin of the universe holds that it emerged in a big bang 13.7 billion years ago—apparently from literally nothing. There were no initial conditions, inherent nature, order, purpose, design, or underlying non-physical existence from which the big bang emerged. In pre-inflationary theory, nothing instantaneously became fundamentally random, inherently dynamic quantized gravity and Higgs fields subject to invariant laws of nature. As the story continues, four fundamental particle-force fields emerged through spontaneous symmetry breaking and congealed into stars, planets, organic molecules, living cellular organisms possibly with proto-conscious mentality, and later into humans with complex enough nervous systems to generate higher-order conscious behavior. This fragmented, reductive view is associated with a bottom up matter-mind-consciousness ontology. In this view, consciousness is an emergent property of random bits of matter/energy that bind together from lower-order physical processes into higher-order, unitary biological organisms which then develop apparent causal influence on their parts. How the closed chain of cause and effect could unlink itself and insert a conscious observer with causal efficacy in the physical is utterly mysterious. In this view, consciousness must be a powerless epiphenomenon, or be non-existent and thus a fundamental misperception in humans that begs explanation. This view is characteristic of reasoning and sensory experience in the ordinary waking state of consciousness, in which there is a fundamental fragmentation of experience into the outer objective world and inner subjectivity that the reductive physicalist paradigm cannot reconcile. In contrast, the holistic view in Vedic science is a top down consciousness-mind-matter ontology, in which everything in nature progressively emerges within the perfectly orderly unified field, Atma or pure Being. All phenomenal existence remains within the unified field and condenses through sequential symmetry breaking into manifest creation, from higher-order holistic processes to lower-order inert parts. That view is systematically unfolded in Rik Veda, and extensively described in Vedic literature such as Vedanta, Sankhya, and Ayurveda. It is consistent with developing unified field theories, spontaneous sequential symmetry breaking, quantum decoherence, the 'arrow of time,' and the 2nd law of thermodynamics that imply the universe emerged from the lowest entropy, super-symmetric unified state. From that view, the origin of the universe can be characterized as a 'Big Condensation' rather than 'Big Bang,' because all phenomenal existence remains within the unified field, rather than blasting out from nothing to create everything including space-time. These contrasting reductive and holistic views are reconciled in the natural development of higher states of consciousness beyond the ordinary waking state. The Vedic science of Yoga provides systematic means to validate the consciousness-mind-matter ontology through direct empirical experience of gross and subtle diversified fields of nature and the transcendent unified field that underlies and permeates them.*

1. Consciousness in reductive physicalism: the parts create the whole

The reductive physicalist or materialistic paradigm in modern science attempts to describe a causally closed clockwork physical universe (Hawking, 2001), in which mind and consciousness do not have ontological existence or causal roles. In this bottom up matter-mind-consciousness ontology, lower-order quantized wave-particles somehow gain proto-conscious mentality through cohering into neural networks sufficiently complex to generate higher-order mind and consciousness. How the closed chain of cause and effect that began before conscious minds existed could unlink when the requisite complexity is reached and insert a causally efficacious mind with unitary control over its parts is utterly mysterious. Consciousness ends up being a powerless epiphenomenon, or even non-existent such as in eliminativist approaches.

This paradigm contains other fundamental paradoxes, including the 'hard problem' of consciousness, free will, life emerging from inert matter, order emerging from *fundamental* random disorder, and ultimately everything emerging from literally *nothing*. It is associated with popular misinterpretations of the two most successful theories in modern science—relativity theory and quantum theory—that have contributed to ungrounded cultural relativism and to the meaninglessness of life based on fundamental randomness. This has eroded the philosophical ground for moral and ethical behavior, fueling the existential angst and nihilism that has plagued human society in the past century.

1.1 Reductive physicalist theories are based on the ordinary waking state of consciousness

Inflationary big bang theory, the consensus model of the origin of the universe, is associated with the reductive physicalist paradigm. In this theory, the universe apparently began instantaneously from literally *nothing* as quantum fields that congealed into stars, planets, and living cellular organisms eventually with higher-order conscious processes. From a functional emphasis within this paradigm, consciousness emerges from randomly fluctuating bits of energy/matter that bind into highly ordered neural networks to generate consciousness when the parts are sufficiently complex. Accordingly, robots become conscious with sufficiently fine-grained interactive referential networks, regardless of the structural materials. From a structural emphasis, even simple neuronal systems somehow become inherently proto-conscious, becoming higher-order consciousness with increasingly complex referential networks. In the *functional identity hypothesis*, structure and function are identical in neurons and there is no subjective-objective gap—where there are functioning neurons, there is some degree of consciousness. How this reconciles with some physical matter particles and cells becoming proto-conscious while others don't, with extensive findings that most psychological processes are said to be unconscious in the normal functioning brain, and with the common intuition that we humans have causal efficacy are major concerns.

The reductive physicalist worldview is associated with a meaning of consciousness drawn from experience in the ordinary waking state, in which consciousness is present in waking experience and absent in deep sleep, coma, or anesthesia. Constrained by this view, there has been little consideration of either higher states of consciousness or the possibility that conscious mind relates to fields of existence more fundamental than the physical—both of which are increasingly supported by cutting edge theoretical and empirical research.

The objective approach in modern science, closely related to reductive physicalism, focuses on sensory experience and logical reasoning as the basic means of gaining knowledge. Experience relates to careful observation of natural phenomena via the

ordinary senses; reason relates to rigorous logic to analyze and predict them. Abstract reasoning, the Piagetian endstate of formal operational thought, is theorized to be the necessary cognitive developmental basis for scientific thinking (Piaget, 1972). In order to protect against unreliable subjectivity in experience and reasoning, the objective approach relies on consensual validation, or public agreement. It is useful to recognize, however, that consensus is based on the level of functioning of those who contribute to it. Practically the entire enterprise of modern science is based epistemologically on reasoning and gross sensory experience shared by scientists in the ordinary waking state of consciousness. There is virtually no recognition of this state-dependent limitation and how it results in fragmented knowledge and experience.

The ordinary waking state is characterized by the experience of being *conscious of* some outer object of experience. This is an objectified, representational, reflective mode of knowing in which there is a separate object of experience, process of experiencing, and experiencer. It is the phenomenological basis for the common definition of consciousness as being *conscious of* a separate object of experience. It directly relates to the pretheoretical assumption of the independence of observed and observer, objectivity and subjectivity, fundamental to the objective approach and its predominantly outer, third-person perspective.

In the past century, the new physics progressed beyond this pretheoretical assumption. For example, a key implication of quantum theory is that objectivity is not independent of subjectivity (the measurement problem). According to orthodox interpretations of quantum theory, the conscious observer somehow effects the transition from quantum uncertainty to classical discreteness through instantaneous collapse of the quantum wave function upon observation (Herbert, 1985). However, a major quandary has been emerging. Neither of the two fundamental and most successful theories in modern science—relativity theory and quantum theory—bridge the gap between observed and observer, objectivity and subjectivity. But a third view, the *most* fundamental theory—unified field theory that proposes a single unified source of everything—logically necessitates that the gap be bridged completely.

In this paper a logically consistent alternative to the reductive physicalist worldview is summarized that is drawn from holistic Vedic science. The Sanskrit term *Veda* refers to totality of knowledge. It is a completely unified, top down (higher-order to lower-order) consciousness-mind-matter ontology in which the parts emerge from the whole. This holistic approach based on ultimate unity is consistent with theories of the unified field as the source of everything. Mind and matter emerge from the ultimate unity, conscious Being or Atma (Boyer, 2007).

1.2 Unified field, objective-subjective gap, and subtler nonlocal levels

Fortunately the new physics has progressed to the stage in which the fragmented parts of nature are beginning to recollect into a unified state. In this progress, researchers are grappling with the enigma that *matter doesn't have a material basis*. Rigorous theory and experiment are leading to the rational conclusion that the paradigmatic belief in materialism or physicalism is untenable at fundamental microscopic and ultramicroscopic levels of nature.

Through investigating these more fundamental levels, major issues have arisen about the relationship of the observed and the observer. Historically these issues were prominent in philosophy, associated with the *mind-body problem*, and more recently the so-called *hard problem* of consciousness (Chalmers, 1996). They also are recognized to be embedded in the *measurement problem* in the new physics and the *explanatory gap* between mind and brain in cognitive science and neuroscience. These issues now

concern subtler, more interconnected, entangled levels of nature and their relationship to mind and consciousness. Though perhaps quite difficult to accept given the still popular belief in mainstream modern science that there is nothing deeper than the physical, there is clear progress in quantum, quantum gravity, and unified field theories toward subtler, ontologically real, nonlocal levels underlying matter.

1.3 Progress on the mind-body problem beyond orthodox quantum theory

Interpretations of quantum theory have gone beyond the original orthodox interpretation mentioned above that there is no quantum reality (only classical reality with a quantum description of it) to the understanding that quantum wave collapse is an *objective reduction* (Hameroff and Penrose, 2000; Penrose, 2005). The quantum wave function is now being theorized to collapse through interaction with the classical environment (quantum decoherence), which can occur independent of a conscious observer (Greene, 1999, 2004; Smolin, 2001; Penrose, 2005). This implies that both quantum and classical objects relate to ontologically real levels of existence, and moreover that they causally interact.

'No collapse' interpretations of quantum theory also can be understood to imply that mind and consciousness do not emerge from interactions at the classical level of neural functioning. In the 'many worlds' version, a new mind-world is created instantaneously for every possible outcome of events in nature (Everett, 1957), not due to conscious observation. However, this interpretation is at best a heuristic that otherwise violates the laws of conservation. Both the 'many worlds' and the orthodox interpretations don't provide even the possibility of any causal mechanics for mind-worlds or quantum wave function collapse, rather proposing that they are *instantaneous*. These interpretations are artifacts of subjective mathematical models imposed upon the objective world. More recent interpretations have advanced beyond these particular 'collapse' and 'no-collapse' models. Wave function 'collapse' is starting to be understood as a change of the inner knowledge state of the knower due to an observation with little if any influence on the independent objects being observed (Fuchs, 2001). It is becoming recognized that in the older interpretations the change in knowledge state due to observation has been objectified onto quantum and classical levels of nature, due to lack of recognition of deeper, more fundamental levels.

Fortunately the mathematical wave function model of quantum theory is now being conceptually disembedded from the ontologically real particle and wave levels of existence (Boyer, 2007). To exemplify using the Schrödinger's Cat paradox, it is not that the cat is in a superposed alive-not alive state until observed, but rather that the observer's knowledge of the cat's state is probabilistic and uncertain until an observation is made. In this interpretation there is the classical particle level of material objects and the quantum wave-field level of objects, both of which are real and differ from the subjective knowledge state of the observer. The theorized quantum wave function 'collapse' is not causal of the quantum 'object' becoming a classical physical object due to conscious observation. The classical objective level associated with the local particle interaction model of causality (including the discrete physical state of the cat) is ontologically distinct from the more abstract wave-field level (quantum wave), as well as from the even subtler ontologically real mental level where there is a mathematical model of nature (associated with the mathematical quantum wave *function*). To resolve the Schrödinger's Cat paradox—and to clarify the objectivity-subjectivity relationship—recognition is needed of these different ontological levels and how they interact, related to emerging theories of levels of space (Greene, 1999, 2004; Smolin, 2001, Boyer, 2007).

Progress toward subtler, ontologically real, nonlocal levels of space underneath ordinary physical space is evident in theories of quantum gravity. For example, string theories propose six or seven higher dimensions, in which strings vibrate. Although these higher dimensions are additional mathematical degrees of freedom proposed to explain string motion, they also are conceptualized as higher spatial dimensions (Greene, 1999)—sometimes associated with mathematical space, conceptual space, configuration space, field space, imaginary space, hyperspace, phase space, nonconventional space, information space, and even mental space and quantum mind. Geometric ‘objects’ such as strings and branes in compactified higher-dimensional space are theorized to be the source of physical objects in ordinary space (Greene, 1999). This implies causal interactions between material objects in physical space and geometric ‘objects’ in conceptual, mathematical space. Superstring M-theory also posits zero-branes in a non-commutative geometry that imply an ontologically real field underlying particulate matter. These theories are suggestive that material objects in ordinary local, physical space-time and geometric ‘objects’ in higher-dimensional and even nonlocal space relate to distinct, ontologically real levels of existence. Also, precise mathematical formulations in loop quantum gravity theory and black hole thermodynamics posit a *pure geometry* of quantized information space as the source of ordinary physical space-time (Smolin, 2001). These theories not only propose an underlying information space more fundamental than ordinary physical space, but also that it actually generates ordinary physical space.

The neorealist interpretation based on Bohmian mechanics goes much further, proposing a *sub-quantum* ontologically real level of existence. This interpretation is consistent with Einstein’s notion of ‘hidden variables’ associated with his belief in the incompleteness of orthodox quantum theory (Bohm, 1980; Bohm & Hiley, 1993, Talbot, 1991). It provides a mathematical model of elementary particles as ordinary, real, classical objects with *intrinsic* dynamic properties (not occurring via observation) that matches the probabilistic predictions of quantum theory. This is based on the addition of an underlying, ontologically real, nonlocal wave field—the quantum potential or *psi* wave (Bohm & Hiley, 1993; Goldstein, 1998). The indeterminacy of dynamic properties of quantum phenomena is not due to an inherent uncertainty—the Heisenberg uncertainty principle—but rather to unfathomable complexity, as in classical uncertainty. This extends determinism and causal efficacy, as well as objectivity independent of the conscious observer, beyond quantum mechanics. It proposes that a subtle, real, nonlocal, non-material pilot wave causally guides the motion of real local particles (Bohm, 1980; Bohm & Hiley, 1993). Elaborations of this interpretation associate this subtler wave field with a causally efficacious level of nonlocal mind, called the *implicate* order (Bohm, 1980; Bohm & Hiley, 1993). In distinguishing a grosser classical explicate order and a subtler non-classical implicate order, however, both are understood as aspects of an ultimate holism (Bohm, 1980; Bohm & Hiley, 1993), super-implicate order or unified field.

In the context of levels of space, the concept of subtlety can be attributed qualitative and also quantitative dimensions. It refers to being finer-grained and permeating, as in smaller time and distance scales and higher frequency vibration. But these reductive notions need to be accompanied simultaneously by the notion of bigger and more encompassing, as in unbounded fields. In the progress toward ultimate holism, the parts need to be delineated and unified at the same time, in order to account for the totality of nature as completely unified field while at the same time appearing as diverse local parts such as quanta and particles. This involves both smaller and bigger simultaneously, a key principle of nonlocality supported empirically by tests of Bell’s theorem.

The interpretations of quantum theory advancing beyond orthodox interpretations summarized here are moving toward defining a causal connection between the real, local field of matter and an underlying real, quantized information space (Smolin, 2001) and further to a nonlocal, non-quantized field of mind (Bohm, 1980; Bohm, & Hiley, 1993). In the transition from matter to mind, reductive physicalist theories in which mind and consciousness are products only of neural functioning at the much grosser classical level are giving way to more comprehensive views of subtler levels of nature. The belief that brain and mind are just in the head is no longer tenable, because minds, brains, and all material objects are no longer just localized physical matter. Neurocognitive models of mind and consciousness have yet to incorporate these important advances.

2. Nonconventional space-time underneath the Planck scale

Some quantum gravity and unified field theories suggest that nature is unified at the level where the fundamental forces merge into a single field at the Planck scale (10^{-33} cm)—the hypothesized level of super-unification (Greene, 1999, 2004; Hagelin, 1987, 1989). But this doesn't provide a model of a *completely* unified field. If the unified field were to be completely undifferentiated in its unity, it would underlie any discrete quantized field. An extra-dimensional space or pure geometry of quantized information bits, or qubits, doesn't yet describe a completely unified field. If quanta are discrete, such as Planck-size bits, then there is some form of separating membrane or boundary, and even the most fundamental quantum field would not be completely unified. Discontinuous bits of matter, energy, or information need to merge into a continuous wholeness if there is a field beyond all gaps and boundaries, completely unitary and one with itself—ultimate holism. Notions of space-time that incorporate and go beyond classical relativity and quantum theories are needed for a completely unified field.

In the view that space-time ends at the Planck scale, the concept of something smaller is meaningless—or undefined. In this view, there is either motion within the speed of light and the light cone (relativity theory) or quantum mechanical tunneling that instantaneously ports objects between relativistically undefined regions of space-time outside the light cone without traveling in between (quantum theory) (Greene, 1999). On the other hand, in Bohmian mechanics, the subtle psi wave field *mediates* nonlocal effects (Bohm & Hiley, 1993). In this nonlocal wave field, motion is faster than light-speed but not instantaneous (Greene, 2004; Bohm & Hiley, 1993), and not via the particle interaction model of causality. A distinguishing feature of this theorized subtler field would be not its dimensionality in ordinary conventional physical space-time but rather its nonlocality, entanglement or interconnectedness in an underlying and more abstract *nonconventional* space.

The field of nonconventional space would exist in between local physical existence and the unified field. It would be *both smaller and bigger* than any aspect of physical existence. It would be hidden with respect to conventional physical space-time not due to it being higher-order, compactified spatial dimensions as in string theories, but rather because it is subtler than, encompasses, and permeates conventional space-time and all matter in it. It would not be compactified, but rather unfurled and much more extensive than all of relativistic, quantized, conventional space-time. Fortunately the notion of space-time is being disembedded from Einstein locality and gravity, light-speed and the light cone, Planck scale quantization, and the particle interaction model of causality. Relativity and quantum theories now can be understood to delimit only conventional ordinary physical space (Bohm & Hiley, 1993; Boyer, 2007).

In the more abstract and expanded view that is unfolding, space and time can be conceived to be ultimately the infinite eternal unified field, with levels within it

characterized by different limitations—analogueous to air being subtler than water, and invisible space being subtler but permeating both air and water. The infinite eternal unified field would be the ultimate substrate, and the phenomenal manifest levels would be determined by the degree of subtlety and interconnectedness of the ethers, fluid-like mediums, or membranes that comprise objects in each increasingly limited level from subtlest to grossest. Mind would have nonlocal 'extension' in nonconventional space—a subtler field more abstract than gross conventional space-time, in which real non-material 'objects' exist. These subtle phenomenal 'objects' would causally interact in the form of abstract, more interconnected, nonlocal, non-quantized waves of information/energy.

In this more holistic view, fundamental ontological distinctions can be made between three levels of nature: 1) the gross level of conventional local space-time associated with the explicate order; 2) a subtler, nonlocal level associated with the implicate order, and 3) the transcendental, *completely* unified field or ultimate oneness within which subtle and gross levels phenomenally manifest, or the super-implicate order (Boyer, 2006, 2007, 2007a). In this perspective, the limitations of light-speed and Planck-scale quantization are textural qualities of the ether of classical or gross conventional space-time only.

3. Unified field theory in modern science and ancient Vedic science

A major challenge of unified field theory is to integrate classical relativity theory and quantum theory (Greene, 1999). This concerns many of the same issues in bridging the gap between objectivity and subjectivity in quantum theory and the mind-body problem and explanatory gap in neurocognitive science.

Unfortunately modern scientific progress toward the ultimate unity has been only theoretical—an 'intellectual wholeness.' The difficulty of bridging the gap between objectivity and subjectivity in a completely unified field theory is due to inability to investigate directly the theorized subtler levels of nature and their ultimate unified basis. This is the technological specialty of the holistic approach of Vedic science, associated with the consciousness-mind-matter ontology. It involves not only indirect objective empirical research of the outer natural world, but also direct subjective empirical research of the inner natural world in the inner laboratory of the mind. Within the limitations of gross empiricism and locality in the ordinary waking state of consciousness, the subtler and increasingly unified levels have been experientially and even conceptually inaccessible.

3.1 The whole creates the parts: the holistic approach of Vedic science

The great accomplishment of modern science in beginning to formulate mathematical models of the ultimate unity of nature has established the theoretical basis to link up with the most ancient continuous knowledge system of holistic Vedic science that directly accesses that unity. Only in recent decades has modern science glimpsed deeply enough into nature to see the linkage with this most ancient continuous knowledge tradition. Previously thought to be at variance with modern scientific accounts, ancient Vedic science has been corroborated by contemporary formulations that provide similar descriptions of an infinitely dynamic, self-interacting unified field. Until modern science arrived at a rational theoretical framework to consider mathematical formalisms of a unified field, the correspondence with Vedic science was not recognized. The most parsimonious explanation for the correspondence is that the two traditions of knowledge converge on the same unified field from their respective

vantage points (Hagelin, 1987; Alexander, Boyer, & Alexander, 1987). Logically, there is only one completely unified field.

Vedanta is an aspect of holistic Vedic science that emphasizes the directly experienced perspective of the ultimate unity or wholeness of nature. In this perspective the phenomenal parts emerge within the ultimate wholeness. The whole precedes the parts, is the basis of the parts, and creates the parts. Eternity is the basis of time, infinity is the basis of space, and immortality is the basis of mortality. This subtle but profound change in perspective—from bottom up reductionism to top down ultimate holism—is consistent with developing unified field theories.

3.2 The unified field as the lowest entropy, super-symmetric state of order

A key component of super-symmetric unified field theories is that the four fundamental force fields emerge through spontaneous sequential symmetry breaking (Greene, 1999; Hagelin, 1987). This implies that the unified field itself is highly symmetric, even a field of perfect order. The notions that the unified field is the source of everything, the basis of all the laws of nature, and the origin of universal order throughout nature also are consistent with the understanding that it is a field of perfect order. In addition the quantum mechanical principle of the unbounded quantum wave as a coherent state that decoheres through interaction with the environment is suggestive that fundamental quantum fields are associated with increased symmetry, coherence, and order (Greene, 2004; Penrose, 2005). The understanding that time is unidirectional (past to present to future)—related to the second law of thermodynamics which states that change is from orderly states of low entropy to less orderly states of higher entropy—suggests as well that the source of change in nature is a state of lowest entropy.

In quantum field theory, space is *not* empty nothing; it at least contains vacuum fluctuations. With the advent of unified field theory, the universe is more appropriately viewed as manifesting from *something*—even from the source of everything. From a reductive *negational* perspective, it can be thought of as nothing-ness, but not literally nothing. Other terms such as the Void or the Transcendent similarly emphasize negation, in order to contrast it with the relative fields of sensory experience (Shear, 2002). Unified field theories, increasingly consistent with Vedic science, posit that nature phenomenally manifests in sequential phase transitions that spontaneously occurred as temperature dropped and the universe expanded, through which the four fundamental particle-force fields differentiated. This can be likened to phase transitions of H₂O *condensing* from steam to water to ice as temperature drops; at each stage, symmetry is reduced. In this view, the four forces potentially *pre-existed* in the perfectly symmetric super-unified state. But also, as the source of continuously occurring quantum vacuum fluctuations, random jitters, zero point motion or inherent dynamism, the unified field continues even with the progressive symmetry breaking. The underlying unity doesn't go away when diversity begins. If it continues even after the theorized big bang and the fundamental forces differentiated, then it is more than the unification of these forces. The perfect symmetry of the unified field is undisturbed by symmetry breaking into finite manifestation. This is crucial for understanding the source of order expressed in the laws of nature. In this view, order emerges from the perfectly symmetric, lowest entropy state of the infinite eternal unified field, not from *fundamental* randomness.

If the universe were fundamentally random, any outcome would have equal possibility at any moment, making any consistency or patterns—and any science—incredibly unlikely (Smolin, 2001). But 'when' the theorized big bang 'began,' an orderly

temporal sequence also began. At least in the natural world as we understand it through science, an event manifests in an orderly manner from the previous event, consistent with the second law of thermodynamics, decoherence, and the arrow of time (Penrose, 2005). This also implies that the source of everything at the beginning of the universe was a state of lowest entropy and highest order. These points are all consistent with the holistic view in Vedic science that the unified field, Atma or pure Being, is the orderly unified totality of the laws of nature within which all diversity in nature emerges (Hagelin, 1987, 1989).

3.3 The unified field as the coexistence of opposites of infinity and point

In the top down consciousness-mind-matter ontology of holistic Vedic science, the transcendent, *indescribable* unified field can be described as inherently conscious, orderly, and dynamic. In order to provide an explanation for the process of phenomenal manifestation, the 'nature' of the unified field is initially described as the simultaneity of infinite silence and infinite dynamism, whole and part, infinity and point. In each point is infinity, and the infinite singularity contains infinity of points. It is the coexistence of opposites of infinity and point. Remaining beyond all duality, to explain phenomenal manifestation (also sometimes referred to as *Maya*, or measurable existence), its essential non-dual nature is attributed two coexisting opposite qualities.

To explain how the opposites coexist, the unified field of eternal infinite Being is described as *infinite self-referral*, instantaneously reverberating from infinity to point and point to infinity, infinitely referring or *curving back upon itself*. In this dynamical process, it is said that the opposite qualities of infinity and point become expressed in increasing limitation, extending from the totality of Being to the phenomenal appearance of no consciousness, no intelligence, and no life at the most expressed level of gross inert matter—such as rocks and earth. Remaining nothing other than ultimate unity or wholeness, its phenomenal expression is perceived in terms of levels of nature from the most to least reflection of the ultimate unity.

4. Cosmological theories, Higgs field theory and the unified field

In the holistic view of interconnected levels of phenomenal nature, everything condenses from and within the unified field. Subtle levels are a limitation of the unified field, and gross levels are a further limitation of subtle levels. The whole creates the parts, and the parts remain within the whole. The ultimate whole is simultaneously *smaller than the smallest and bigger than the biggest* (Katha Upanishad 1.2.20, Nader, 2000)—point and infinity at the same time, beyond ultimate reductionism and holism.

4.1 Space-time as the infinite eternal doesn't 'blast out'

In holistic Vedic science, gross conventional and subtle nonconventional levels of space-time are phenomenal limitations of the underlying infinite eternity *that is already present everywhere*. Space-time does not begin at a point and expand out in all directions from an almost infinitely dense singularity, an inert Planck-size quantum, or *nothing* blasting out in a big bang (Greene, 1999). Rather, infinite space and eternal time phenomenally *condense* many 'points' simultaneously (everywhere). The subtlest finite space is the closest to the infinite self-referral of infinity and point. At the gross level of conventional space-time, infinite self-referral of the unified field appears completely hidden in local object-referral, such that discrete, independent, localized

objects are the predominant experience in ordinary waking consciousness (Boyer, 2007, 2007a). This holistic view is consistent with the contemporary model of space as *flat*, in the sense of extending in all three directions without being curved. Theoretical physicist and string theorist Brian Greene (2004, pp. 249-50) states:

“Normally, we imagine the universe began as a dot...in which there is no exterior space or time. Then, from some kind of eruption, space and time unfurled... But if the universe is spatially infinite, *there was already an infinite spatial expanse at the moment of the big bang*... In this setting, the big bang did not take place at one point; instead, the big bang eruption took place *everywhere* on the infinite expanse. Comparing this to the conventional single-dot beginning, it is as though there were many big bangs, one at each point on the infinite spatial expanse. After the big bang, space swelled, but its overall size didn't increase since something already infinite can't get any bigger... [T]his example of infinite flat space is far more than academic... [T]here is mounting evidence that the overall shape of space is not curved... [T]he flat, infinitely large spatial shape is the front-running contender for the large-scale structure of space-time.”

In holistic Vedic science the mechanics of manifestation at all levels of nature are characterized as the self-interacting dynamics of the unified field *curving back upon itself*. In the unmanifest level, it is *infinite* self-referral, infinity in each point. On the ultramicroscopic manifest level it is associated with a *mandala* form (like a circle or sphere) as in the concept of *Hiranya garbha* or cosmic egg; and ultramicroscopically with curving back into discrete units such as point particles, quanta, and atoms: “*Prakritim swam avashtabhya visrijami punah punah*’ (*Bhagavad-Gita*, 9.8) Curving back upon My own Nature, I create again and again.” (*Celebrating perfection in education*, 1997, p.103).

In this view the phenomenal universe and the capacity to experience it correspond, or refer to each other. Dimensions of space and time in addition to the ordinary four dimensions may not be necessary to account for the origins of matter, or for nonlocality—if they are limitations within the eternal infinite unified field. Four-dimensional space-time is sufficient to provide the experiential framework for the senses of perception. Conventional space-time generally relates to the locus of experience or frame of reference associated with phenomenal experience of gross empiricism in the ordinary waking state of consciousness. Nonconventional, nonlocal, non-material space-time is said to relate to subtle experiences in higher states of consciousness, usually only occasionally glimpsed in the ordinary waking state if at all. The transcendent infinite eternal is said to be the primary locus of experience in the highest state, called Unity Consciousness (Maharishi Mahesh Yogi, 1963, 1967; Boyer, 2007).

4.2 Inflationary big bang cosmology

To explain symmetry breaking or condensation into particles with mass, the theory of *Higgs fields* developed in recent decades. This theory is considered to be one of the most important concepts proposed in the past century in theoretical physics (Greene, 2004). The theory proposes that in the third phase of symmetry breaking into the weak and electromagnetic forces, a Higgs field condensed to a nonzero value when the temperature of the universe dropped to about 10^{15} degrees, creating a Higgs ocean—analogueous to steam condensing into water. The Higgs ocean can be described as a kind of viscosity (ether or medium) throughout space that resists change in motion,

giving the property of *mass* to particles. Another Higgs field—grand unified Higgs—was proposed to explain the earlier second phase of symmetry breaking of the strong and weak nuclear forces. A third Higgs field was proposed to explain the first phase of symmetry breaking when gravity emerged—related to *inflationary big bang theory* (Greene, 2004).

According to this theory, for an extremely brief time period of 10^{-35} seconds at the outset of the big bang, gravity became a repulsive force that drove the emerging universe into a colossal expansion (Guth, 1997). This inflationary event functioned as a Higgs field—the inflaton field—contributing a uniform negative pressure to space that produced a repulsive force so strong that the universe expanded by a factor as much as 10^{90} . This is much faster than light-speed but is thought not to be inconsistent with it, because light-speed applies to motion *through* ordinary space whereas inflationary expansion refers to the inflation *of* ordinary space (Greene, 2004). This also implies an underlying level of space involving motion faster than the speed of light but not instantaneous.

Inflationary big bang theory postulates a total amount of matter and energy in the universe that is considerably more than the tally of visible objects, which contribute about five percent of the total. Astronomical research suggested that additional matter is needed to hold galaxies together, which led to the theory of *dark matter*, estimated to account for an additional twenty five percent. Observations that the universe is expanding based on measurements of the recession rates of supernova led to revival of the cosmological constant, associated with *dark energy*. It was estimated that the rate of expansion requires a cosmological constant associated with an amount of dark energy that contributes about seventy percent of the total, which fits the remaining amount in inflationary theory (5% + 25% + 70 %). This consensus theory of an inflationary big bang is further supported because it is said to provide an explanation for how matter formed into stars and galaxies (Greene, 2004).

But what triggered inflationary expansion? How did literally *nothing* blast out? An elaboration of inflationary theory proposes that the big bang emerged from a *pre-inflationary* period, in which the gravitational and Higgs fields were bumpy, chaotic, and highly disordered; and eventually a random fluctuation produced the values needed for inflationary expansion. However, this certainly doesn't sound like everything came from *nothing*. Astronomer David Darling (1996, p. 49) states the issue clearly:

“What is a big deal is how you got something out of nothing. Don't let the cosmologists try to kid you on this one. They have not got a clue either... “In the beginning,” they will say, “there was nothing—no time, space, matter, or energy. Then there was a quantum flutter from which...” Whoa! Stop right there... First there was nothing, then there was something. And the cosmologists try to bridge the two with a quantum flutter, a tremor of uncertainty that sparks it all... and before you know it, they have pulled a hundred billion galaxies out of their quantum hats... You cannot fudge this by appealing to quantum mechanics. Either there is nothing to begin with, no pre-geometric dust, no time in which anything can happen, no physical laws that can effect change from nothingness to somethingness, or there is something, in which case that needs explaining.”

How inflationary cosmology reconciles with theories of the unified field seems to be a concern. If the unified field is the lowest entropy super-symmetric state, then the theory of the pre-inflationary period that low entropy came from inflationary expansion suggests the inconsistency that something existed *prior* to the unified field. Also of concern is how the pre-inflationary period reconciles with quantum gravity theories that posit information space or some form of higher-dimensional space generating physical space (described

earlier). Information space is not characterized as just a bumpy, chaotic, randomly fluctuating field. It at least suggests order, in the sense of generating the functional structure of physical space-time and all matter.

A more integrated way of looking at these issues is to consider pre-inflationary theory as another angle on the theorized subtle non-material domain of nonconventional space underlying the Planck scale. The subtle level as a pre-inflationary period or 'pre-conventional' level would include the order in nature that creates the gravitational field, Higgs field, and inherent dynamism. Importantly these theoretical developments reflect growing recognition of three fundamental principles: an unclearly defined inherent dynamism associated with quantum theory; a fundamental attractive or unifying force generally thought of as gravitation associated with relativity theory; and a fundamental resistance to attraction conceived in terms of Higgs fields.

In holistic Vedic science, space and time as infinite eternal totality or Being is conditioned in the process of phenomenal manifestation into increasing localization, discreteness, and mass—consistent with the theory of sequential symmetry breaking. According to this more integrated understanding, there might be individual big bangs with respect to specific black holes within conventional space-time. But with respect to the entirety of cosmological existence, the big bang could not be an *explosion* but rather an implosion or *condensation*, because everything resulting from it remains *inside* the unified field. It would not create space-time, but rather be a limitation of infinite eternity—perhaps a 'big condensation,' but not a 'big bang' creating space-time and everything from literally nothing (Boyer, 2007a).

5. Sankhya: sequential emergence of parts within the whole

Holistic Vedic science begins with ultimate unity or wholeness. It thus has to account for how the parts emerge from the whole. It also needs to explain how a considerable portion of manifest creation appears not to be conscious, if everything is ultimately the unified field of conscious Being. This is opposite of the impossible task in reductive physicalism to explain how inert, randomly fluctuating physical particle-forces emerging from nothing create conscious beings with unitary causal control over their parts in a closed causal chain that began long before the theorized emergence of any form of conscious mind.

If the ultimate unity is to be analyzed into phenomenal parts via the discriminating intellect, its first conceptual delineation can be described in terms of infinity of points in the undivided wholeness, each point containing the whole—*infinitely* self-interacting. Again, this can be described as a duality of point and infinity, part and whole, while remaining the non-dual whole. It is associated with the level of *Veda* where the abstract laws of nature are said to be structured, and within which the subtle and gross levels of nature sequentially emerge as phenomenal limitations of the absolute unity into relative diversity. It is the integration of the reductive point value expressed in the concept of parts, quanta and atoms, and the holistic infinite value expressed in the concept of unbounded waves and the all-encompassing unified field. The reductive particle notion is associated with the gross relative or objective material level, the nonlocal wave notion with the subtler subjective level, and the simultaneous integration of part and whole, point and infinity, with the self-interacting unified field. This delineation corresponds to the consciousness-mind-matter ontology, as well as the *three-in-one* self-interacting dynamics of the *Veda* (Hagelin, 1987, 1989). Cosmological and quantum field theories are progressing toward an expanded model of three corresponding domains of nature: the conventional, physical space-time field or grossest level characterized by Einstein

locality and quantization; the subtler, non-material, entangled, nonlocal field of nonconventional information or mental space; and the lowest entropy, super-symmetric, infinitely self-interacting unified field. This trinity is consistent with ontological levels in Vedic science (Boyer, 2006, 2007).

5.1 Three core cosmology issues relate to forces of nature in Vedic science

Taking this another step, in the developing cosmological theories referred to above there are three fundamental issues emerging: from whence the order, the dynamism, and the mass? These three issues are beginning to match up with the three fundamental forces of nature in the Sankhya system of Vedic science, called *Sattva*, *Rajas*, and *Tamas*. These three forces relate to the principles of attraction (gravitation), activity (inherent dynamism), and inertia or resistance to change (mass, Higgs fields). They also can be associated with creation, maintenance, and dissolution operators conducting all change in nature.

In conventional space-time, *Sattva* can be related to the attractive force of gravity, and the gravitational constant. It also can be related to the third law of thermodynamics: decreased activity associated with decreased temperature in material systems, resulting in decreased entropy, a fundamental negentropic process in the maintenance of order in nature. *Rajas* can be related to inherent dynamism, and possibly the Planck energy and light-speed, associated with the creation operator. *Tamas* can be related to inertia or resistance to change, the concept of mass and Higgs fields that counteract change, the dissolution operator, and possibly Planck's constant (Boyer, 2007).

5.2 Further enumeration of fundamental forces of nature in Vedic science

Sankhya enumerates in more detail the sequential emergence of the phenomenal parts of nature within the unified wholeness of Veda—how the parts systematically emerge from the whole, corresponding to spontaneous sequential symmetry breaking in unified field theory. It identifies twenty five categories or levels of nature, which manifest sequentially from the unified field or Being. The levels are grouped into three basic domains: the unmanifest domain of the unified field or universal Self (Purusha/Prakriti duality), the subtle relative and subjective domain of mind (Mahat, Ahamkar, Manas, ten Indriyas, five Tanmatras), and the gross relative objective domain of matter (five Mahabhutas).

Sankhya provides a delineation of the consciousness-mind-matter ontology and relationships within it as expressions of the three fundamental forces of *Sattva*, *Rajas*, and *Tamas* (Maharishi, 1967; Bernard, 1947). These three forces condense into five fundamental constituents expressed in the ancient categorization of the five basic elements of space, air, fire, water, and earth (Mahabhutas) comprising all ordinary classical physical objects (Maharishi, 1967). Unfortunately these ancient concepts had been interpreted much too crudely in modern science and have not been seriously considered with respect to the known fundamental forces (Lincoln, 2004; Boyer, 2007).

On the gross objective level of nature, these five constituents express the abstract principles of vacuity (space), mobility (air), transformation (fire), liquidity (water), and solidity (earth). They also can be described as fields or ethers with progressive limitations, each more expressed one embedded in the previous one and manifesting an additional limitation or quality (Maharishi, 1967; Bernard, 1947). The constituent of *space*, for example, contains in latent form all the other four properties, but expresses only the qualities of space—similar to the unified field before symmetry breaking. As physical phenomena, these five fundamental constituents or elements would be

expected to map onto the known quantum particle-force fields in modern physics. A reasonable mapping, consistent with sequential symmetry breaking, is that *space* relates to gravity, *air* to gravity and the strong nuclear force, *fire* to gravity, strong and weak forces, and *water* and *earth* to all four including electromagnetism (Boyer, 2006, 2007, 2007a).

In holistic Vedic science these five fundamental constituents (Mahabhutas) together constitute the most expressed, grossest domain of phenomenal existence. They also are said to correspond to the five senses of perception—hearing, touch, sight, taste, and smell—as the basis of sensory qualia. Although no additional ontological levels of existence manifest from them, a vast diversity of natural phenomena emerge from their combinations and permutations. These phenomena comprise the ultramicroscopic, microscopic, macroscopic, and ultramacroscopic cosmological levels of the gross physical universe that have been the object of objectified modern science. As described in this paper, cutting edge theories are progressing beyond this gross local relative domain of nature to the underlying subtle nonlocal relative domain, and further to the infinitely self-interacting transcendent unified field, or the Veda.

6. Practical applications: the Vedic developmental technology of Yoga

Because modern science is just now approaching the doorstep of the ultimate unity in unified field theories, it initially might be difficult to accept that ancient Vedic scientists—Vedic *rishis*—had that knowledge long ago. Until recently ancient records were not understood, at least on their surface, to provide major answers supporting the thesis that they embody advanced scientific knowledge. Archaeological theories have fit these ancient records into a general view of history concluding that all ancient civilizations were at lesser developed stages of knowledge. While the philosophical depth and influence of ancient Vedic science were noted, its practical technologies were not applied or even properly understood. When that knowledge provided little practical value to daily life, it fell out of sight for millennia. In our modern times the work of foremost Vedic scientist and educator Maharishi Mahesh Yogi has been invaluable for reestablishing the completely unified value of ancient Vedic science and reviving its practical applications in the language of modern science as *Maharishi Vedic Science and Technology*.

In the reductive perspective, space is conceptualized in terms of the measurement of distance and time in terms of duration. This is associated with the function of intellect in ordinary waking consciousness that delineates, analyzes, and enumerates the parts of nature—sometimes called *Buddhi* in Vedic science. In the holistic perspective, space ultimately refers to infinity and time to eternity. When the parts of nature are experienced as primary, the ultimate wholeness, totality, or Oneness is lost—called *Pragya aparadh*, the *mistake of the intellect*. Development of higher states of consciousness is said to reestablish wholeness or unity as the natural primary experience of being (Nader, 2000; Alexander, Boyer, and Alexander, 1987; Boyer, 2007).

For many centuries Vedic science remained in obscurity as irrelevant to daily life, due to misinterpretation by scholars without the needed experience to interpret it in its totality. It was classified as mythological, pre-scientific, and only of historical significance. These investigators did not conduct sufficient empirical research to validate Vedic knowledge in the inner laboratory of their own minds using the systematic subjective technologies contained in ancient Vedic science. Maharishi (1974, pp. 312-13) explains:

“This tragedy is the fate of a path of knowledge based on direct experience when the means to that direct experience has been lost. Past attempts to interpret the *Vedas*, whose basic subject matter is the recorded experience of evolution through...(higher) states of consciousness, must obviously have been hopeless in the absence of any personal knowledge of these...states.”

Maharishi Vedic Science and Technology applies systematic, replicable subjective means of gaining knowledge to develop the mind directly—first-person direct empirical experience—in addition to the indirect third-person objective approach that focuses only on outer-directed experience and reason within ordinary developmental limitations. It emphasizes the fundamental principle that ‘knowledge is different in different states of consciousness (Maharishi, 1972).’ Our state of consciousness determines our view of the world. The type of separation of objectivity and subjectivity that characterizes the objective approach of modern science is identified as a defining feature of the ordinary waking state of consciousness. In this state, knowledge and experience of nature are fragmented, partial, lacking fundamental unity, and often presumed to be essentially meaningless.

6.1 Transcendental consciousness: direct experience of wholeness or unity

The objective approach starts with ordinary sensory experience and then reductively analyzes material objects to their most fundamental constituents. In this ordinary experience, the fragmented localized model of nature already has been imposed on the natural world by the observer’s state of consciousness and limited range of empirical experience. We are now at least intellectually progressing beyond this epistemological approach to an understanding of deeper, more interconnected, non-material levels not built of fundamental Planck-size quantum bits limited by Einstein locality. But when the means of gaining knowledge remains *objectified*—an outside, objective, third-person perspective only—and the habit of reductive conceptualization is engrained, these more holistic levels remain quite challenging even to envision. Within the constraints of the reductive physicalist paradigm, it is impossible to build a coherent explanation of how the whole comes from the parts but gains top down, higher-order, unitary causal control over the parts. The reductive physicalist view has things upside down, or outside in. Instead of the universe narrowing down to a quantized elementary unit of nature such as a Planck-size string or brane emerging from nothing, it is better understood as just the opposite. The reductionism needs to expand to include an underlying, more holistic level beyond fundamental quantum bits into ontologically real nonlocal waves in a subtler ether or encompassing field of nonconventional space-time. Then even further, this conception needs to be transcended into an underlying, all-encompassing, holistic, completely unified field.

In the objective means of gaining knowledge, the focus has been almost entirely on outer tangible observables. As discussed in this paper, in the past century modern science has progressed far beyond tangible, directly observable sensory phenomena. This places more emphasis on reason, such as mathematical modeling, in formulating consistent scientific theories (Penrose, 2005; Smolin, 2001; Boyer, 2007). However, reasoning processes, as well as sensory experience, still involve active mentation. Thinking, whether concrete or abstract, whether of matter, energy, nothing, the unified field, or God—as well as introspection and self-reflection—habitually keeps the thinker in the mental activity of ordinary waking experience. Within this active mental state, the

inner silence of *Transcendental Consciousness*, the ground state of the mind, is rarely attained or even understood. Maharishi (1963, pp. 23-25) explains:

“Underneath the subtlest layer of all that exists in the relative field is the abstract, absolute field of pure Being which is unmanifested and transcendental... Experience shows that Being is the essential, basic nature of the mind; but, since It commonly remains in tune with the senses projecting outwards toward the manifested realms of creation, the mind misses or fails to appreciate its own essential nature, just as the eyes are unable to see themselves. Everything but the eyes themselves can be seen through the eyes. Similarly, everything is based on the essential nature of the mind...and yet, while the mind is engaged in the projected field of manifested diversity, Being is not appreciated by the mind, although It is the very basis and essential constituent.”

A fundamental tenet of Maharishi Vedic Science and Technology is that the unified field of nature is a field of consciousness that can be directly experienced as the source of both objectivity and subjectivity. This is in distinct contrast to the reductive physicalist paradigm in which consciousness is an emergent epiphenomenon of cellular and molecular levels of the brain and does not exist at more fundamental levels. In holistic Vedic science the physical brain and body don't produce consciousness, but rather just the opposite: consciousness creates mind and body—the consciousness-mind-body ontology. Mind and body *localize* consciousness into a *state of consciousness* in an individual being (Boyer, 2007).

The difficulty of resolving the *hard problem* of consciousness has been due to lack of systematic reliable means to isolate consciousness from the mental activity of ordinary individual waking experience. In the absence of direct experience of consciousness itself, consciousness is habitually associated with individual mentation and is thought to be a conceptual construction in some yet to be identified localized level of brain physiology—rather than the brain as a gross material transducer of nonlocal, unbounded consciousness (Boyer, 2007). Both the universal non-contextual and individual contextual levels of experience need to be incorporated into an expanded definition of consciousness. Such an inclusive definition might be in this direction (Boyer, 2007):

Consciousness is wakefulness, alertness, or awareness itself; in its simplest, self-referral state it is the unbounded, universal, transcendental essence of nature, and in the ordinary waking state it is the bounded, individual, object-referral awareness of some object of experience in nature.

A reliable technology drawn from Vedic science for effortlessly settling down mental activity to transcend individual mind and experience directly its underlying universal ground state, Transcendental Consciousness, has been taught by Maharishi since the 1950s. This systematic procedure, known as the *Transcendental Meditation™ technique*, is an effective means through which the gap of empirical experience leading to these divergent reductive and holistic views of consciousness is naturally bridged.

A large body of research on the psychophysiological, physiological, and behavioral correlates of Transcendental Consciousness has accumulated over the past thirty-five years in refereed scientific journals (Scientific research—Collected papers, Vols. 1-5, 1977-90). This research corroborates ancient Vedic references on the transcendent state as a *fourth state of consciousness* distinct from the ordinary three states of waking, dreaming, and deep sleep, identified by terms such as *Atma*, *samadhi*, *turiya chetana*, *para chetana*, and *parama vyoman*. It strongly supports the claim that the

developmental technology of the TM technique is effective for attaining regular experiences of Transcendental Consciousness. This state is described as the active ingredient in fostering natural development beyond the ordinary three states to even higher states of consciousness. In Maharishi Vedic Science and Technology, the fourth state of consciousness, Transcendental Consciousness, eventually becomes the permanent basis for the ultimate unified experience of nature in the highest state of consciousness—Unity Consciousness (Boyer, 2007).

7. Conclusion: validating the consciousness-mind-matter ontology

The change from the reductive physicalist matter-mind-consciousness ontology to the holistic consciousness-mind-matter ontology provides a coherent, logical basis for addressing fundamental paradoxes in modern science. This change of perspective, consistent with Vedanta and Sankhya in Vedic science as well as with developing unified field theories, has profound implications for understanding the foundations of reality, cosmological origins, universal order, and the mind-matter relationship, as well as for applying this more integrated knowledge for higher individual and societal development. It promotes a rational understanding of systematic technologies drawn from ancient Vedic science that settle down the mind to its ground state in Transcendental Consciousness beyond the ordinary waking state.

The technologies in Maharishi Vedic Science and Technology for systematic development of higher states of consciousness are said to provide reliable means for direct empirical validation of the consciousness-mind-matter ontology. They integrate third-person objective and first-person subjective methodologies into a comprehensive empirical investigation of the fundamental unity of nature in a systematic, lawful, but expanded scientific context.

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