Major progress linking modern science and Vedic science*

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prasaad cinhani purah phalani

Auspicious signs and signatures precede eventual fruitful actions. (Kalidasa)

The exponential rate of growth of information in recent years is one indicator of the unprecedented phase transition we are witnessing throughout the world. In virtually every area of society, it is a time of rapid change marked by shifting paradigms, erosion of traditional social values, moral and ethical challenges, tension and violence, and even risk of nuclear annihilation and dismantling of our natural genetic heritage. We are at a critical threshold at which the outer objective focus on the material level of life has gotten ahead of inner subjective development of our minds (1). But in the fog and mist of these turbulent times, a new era of hope and progress in scientific knowledge is unfolding that is far more significant than any paradigm shift in the 400 hundred year history of this Age of Science. Scientific advances now have brought us to the doorstep of the ultimate unification of nature in unified field theory. These advances are auspicious precursors to a profound integration of knowledge that is propelling the Age of Science into a genuine Age of Enlightenment (1).

Progressive views of empirical science

The great accomplishment in modern science of getting to the stage to be able to formulate theories of the ultimate unity of nature—unified field theory—has established the theoretical basis for linking up with the most ancient continuous knowledge system of holistic Vedic science that directly accesses that unity. It is only in recent decades that the light of modern science has illumined nature deeply enough to be able to see the heretofore hidden and overlooked 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 self-interacting unified field, Atma, at the very basis of nature. Until modern science arrived at a rational theory of a unified field of all of nature, the correspondence with ancient Vedic science for the most part was not recognized. The most parsimonious explanation for this correspondence is that the two traditions of knowledge converge on the same unified field (1, 2, 3). Logically, there is only one completely unified field.

However, modern scientific progress toward the ultimate unity has been only theoretical—an intellectual wholeness or appreciation of unity from a conceptual and mathematical perspective. Though the progress is commendable, it has not yet included empirical validation of that unity, the central focus and contribution of ancient Vedic science. This calls for deeper investigation into research methodologies in ancient Vedic science, how they are compatible with and complement modern science, and how direct empirical validation of unity can be systematically attained.

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Integrating objective and subjective means of gaining knowledge

Modern science has focused intently on objective investigation of the natural world from the outer, objective, third-person perspective. From this perspective, ancient Vedic science had been placed in the context of Indian philosophy or even religious faith, rather than an empirically-based scientific approach to knowledge. It had been mistakenly thrown into the category of unreliable, subjective, first-person approaches considered not useful for establishing consensually validated knowledge according to the tenets and methodology of objective modern science. But now there is growing appreciation of the unique contribution of ancient Vedic science with respect to its methodological principles and technologies. The gap between modern science and ancient Vedic science is closing, toward a grand unification of these historically divergent knowledge traditions.

One major step toward this grand unification is modern scientific progress in recognizing the role of the conscious observer in the process of measurement. This recognition is one of the key advances—and challenging dilemmas—of the paradigm shift from classical to quantum physics over the past century. This shift has placed an understanding of the nature of mind and consciousness as fundamental to theories of the physical world. Along with this paradigm shift is recent growing interest to investigate mind and consciousness within the new quantum paradigm. In modern science, the role of subjectivity at quantum levels of nature and its interaction with the physical level of nature are increasingly appreciated to be crucial even for a coherent understanding of the physical world, including the structure and function of the brain and the place and role of consciousness.

Another major step is progress in the appreciation of reliable first-person methodologies for deepening subjective experiences of mind and consciousness that foster higher stages of human development. Systematic subjective methodologies are increasingly appreciated as valuable contributions to increase mental acuity and creative energy toward developing a comprehensive, integrated understanding and experience of nature. The methodologies of ancient Vedic science are being revived and recognized as offering much more of a systematic approach to knowledge acquisition than previously appreciated in the world-wide community of scholars. For millennia ancient Vedic science remained in obscurity due to misinterpretation by Western and Eastern scholars without the needed experiential development to interpret it. Classified as mythological, pre-scientific, and largely only of historical significance, these scholars did not follow through with sufficient direct empirical research to validate Vedic knowledge in the inner laboratory of their own minds. This is because the essential knowledge of systematic, subjective developmental technologies contained in ancient Vedic science was not understood or available.

Modern science rejected first-person phenomenological methods precisely because subjective experiences were too unreliable and variable, both intra-subjectively and inter-subjectively. With the revival of efficacious systematic subjective methods of gaining knowledge, a new era is unfolding in the scientific context. Eastern subjective and Western objective methodologies are converging into an integrated means of gaining knowledge. This is being validated through first-person direct empirical experience in the inner laboratory of the mind, and corroborated through empirical, third-person indirect psychophysiological correlations in the experimental laboratory. Developmentally higher experiences are being validated through well-designed research that shows increased coherence in neural, psychological, and behavioral functioning in the brain and conscious experience (1).

Indeed, a more careful examination of the range of traditional Vedic means of gaining knowledge reveals many of the same fundamental principles found in objective modern science. An important view of Vedic methodologies presents knowledge acquisition in terms of *tattvajnana* (basic principles), *shastrajnana* (scientific theories, formulae, and derivatives therefrom), *ganitajnana* (mathematics, geometry), *prayogajnana* (experiments), and their relationship to *vyavaharajnana* (applied to real life situations, or external validity). The gap in between is filled by *sutrajnana* (brief, compact, algorithmic writing), *yantrajnana* (literally, knowledge of machine, controlling system), and *tantrajnana* (technological objective productive knowledge). These approaches have their source in *mantrajnana* (inner source of the whole field of knowledge). These general approaches fill in the gap between subjective and objective dimensions, related to the epistemological division into knower, knowing, and known—the fundamental trinity found in the common objective experience of nature characteristic of the ordinary waking state of consciousness. Empirical validation or proof is established through *pra-mana* (literally, progressive, standard measurement, both qualitative and quantitative), the major source methodology of which is direct sensory perception (*pratyaksha*). But it is crucial to recognize that this has two facets: outer, external, gross, objective sensory perception in the ordinary waking state of consciousness; and extra-ordinary, inner, refined, subtle perception associated with development of higher states of consciousness. The latter is called *yogaja* (caused by systematic practice of Yoga).

Further validation is through corroboration from secondary proofs or theories of knowledge, like *anumana* (literally the one that follows the accepted primary unit of measurement, such as inference and clear indication), *upamana* (literally, minor, inferior measurement theory such as simile, anology, similarity, or comparison), a*pta* (the knowledge of accomplished masters), *shabda* (words of one who expresses actual truth based on the source of verbal expressions), *yukti* (literally, integrated knowledge endowed with maturity, wisdom, experience, from the root *yuj-yok*—or in English, yoke, to join or combine), *arthapatti* (the emerging circumstantial knowledge that arises as the outcome or result of inquiry), *an-upalabdhi* (knowledge by absentia), *sambahava* (knowledge by probability), *aitihya* (knowledge from past history), *purana* (unchanging knowledge), *ingita* (knowledge by sign or signature), *chestita* (knowledge by movement and behavior), and so on.

In Vedic science, Sanskrit and Paninian grammar are the linguistic sources and unifying media of communication and expression. Panini's grammar is the model even for ancient and modern Indian languages, grammars and sciences, which keep pace with religion yet transcend them, as articulated by Patanjali. The major character of many Indian traditions begins with Veda, and includes such main associations as *pinda-brahmanda* (microcosm and macrocosm), *bheda-abheda* (identity and differentiation, diversity in unity), and *karya-karana-siddhanta* (the law of causation), which also are fundamental modern scientific concepts. Both approaches to knowledge acquisition, therefore, are very much complementary to each other, not at all as they may have appeared. They can very nigh play a parallel role of countercheck and validation, notwithstanding the apparent differences, distinctions, and superficial contradictions.

In spite of external differences as regard to the various Indian sciences as well as religious faiths and spiritual traditions, *Yoga* is the unifying approach to higher knowledge based on actual direct empirical experience of the ultimate unity—which modern science has only intellectually glimpsed in unified field theory. However, the ultimate strength of the Indian tradition is direct experience of unity—self-realization, self-revelation, cosmic realization, and liberty from bondage, ignorance, misery and

unhappiness. This inner development to unity consciousness beyond the ordinary waking state has yet to be unfolded in mainstream modern science.

Bridging the objective-subjective gap

Applying the practical knowledge of modern science, inner subjective experience has remained separate and isolated from the outer natural world. This experiential separation or gap directly relates to the philosophical tenet of the independence of objectivity and subjectivity long considered essential to the objective approach of modern science. This is one important example demonstrating that, at this stage of development of modern science, the knowledge and experience gained through the objective approach remains fragmented. The primary locus of experience in modern science remains the concrete, sensory, external, objective material world only, believed to exist independently from the inner subjective knower. This fragmented knowledge and experience is directly associated with the lack of fundamental grounding in modern and post-modern social thought, which has rendered modern life devoid of existential meaning, purposeless, ungrounded, and unfulfilling to the knower. Modern science has paid virtually no attention to development of inner mental resources to guide balanced use of outer material resources. It has developed a massive body of reliable knowledge of the gross material level of nature, mainly derived from logical theories and empirical experiments. It certainly represents major steps of progress over previous eras marked by irrationality and unfounded beliefs. But epistemologically, it is limited to gross sensory experiences in the ordinary waking state of consciousness. Based on application of the principles of modern science focusing only on the gross outer level of the physical world, modern and postmodern life has been tightly bound to the superficial flatland of material existence (1).

With even slight reflection on the part of the investigator or observer, however, one finds a subjective underpinning to all of the perceptual, cognitive, memory, and intuitive processes involved in any objective observation of nature. Knowledge is fundamentally a subjective phenomenon; objective knowledge has a subjective basis. Any third-person objective observation, any consensual validation or inter-subjective agreement across observers, has at its base the first-person empirical experience of individual conscious observers. The fragmenting experiential separation that has been a core feature of modern scientific objectivity is now fundamentally challenged by the interaction of the observed and observer in quantum theory. This core dilemma in quantum theory has brought to the forefront of modern science the important issues of the role of mind and consciousness and how they relate to the physical world.

At the same time these developments are taking place, a revival of ancient Vedic science has been underway, and its practical technologies have been made understandable in the modern scientific context. Ancient Vedic science is becoming increasingly recognized as based on systematic, reliable, and verifiable means of gaining knowledge. It is an integrated *empirical* science that incorporates both subjective and objective approaches. It emphasizes systematic, reliable, replicable first-person, subjective methodologies that had been missing in modern science. It is in the systematic development of higher states of consciousness that the dilemmas and paradoxes so recalcitrant in the modern scientific context can be resolved. Efficacious means to expand human experience beyond the ordinary waking state of consciousness, to transcend ordinary mental activity, is the practical basis for fully linking modern science and Vedic science. Transcending the limitations of the ordinary waking state of consciousness, individual psychology can be unbound, and we can fully realize our natural, essential universal status. That has been the perennial message of ancient Vedic rishis and all of the wise—whatever their cultural, intellectual, secular, or sectarian backgrounds and history (1).

But accessible, reliable means to foster the inner transcendent state had been lost to human society, eastern and western. An efficacious scientific methodology to attain the transcendent state was missing, not only in modern scientific methodology but also in philosophical, religious, and spiritual traditions world-wide. In the absence of systematic experiential means to transcend thought, thoughtful people have resorted to complicated means in laudable but ineffective efforts to attain it, frequently based on misinterpretations of developmental technologies in ancient Vedic science. This unfortunate legacy is now ending with major advances in the revival of natural, holistic developmental technologies drawn from ancient Vedic science. The unique and invaluable contribution to these advances of the consciousness-based approach of Maharishi Vedic Science and Technology led by foremost Vedic scientist and educator His Holiness Maharishi Mahesh Yogi is increasingly recognized. The Transcendental Meditation technique of Maharishi Vedic Science and Technology has been shown to be a systematic, effortless yogic practice that is a reliable means for direct experience of transcendental consciousness. This is extensively supported by well-designed published psychophysiological, psychological, and behavioral research (5). For millennia, the tragic loss of the practical developmental technologies in ancient Vedic science had constricted human development. Maharishi 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 experiences of evolution through…(higher) states of consciousness, most obviously have been hopeless in the absence of any personal knowledge of these…states (4)."

> "Science is universal. The terms 'eastern science' and 'western science' simply denote different approaches to the object of inquiry, different approaches to knowing and to living the reality of life… Western science rejects any trace of subjectivity on the path of investigation because the observer's state of awareness differs according to the condition of his nervous system and when this changing subjective element is involved in perception, perception will never by reliable… The subjective approach to knowledge aspires to create a state of consciousness that does not change… Through the eastern approach to knowledge it is possible for every man to be a scientist, a knower of truth, by developing that non-changing state of consciousness as a permanent reality (5)."

Maharishi further describes the non-changing state of transcendental consciousness and the simple, natural method of how to attain it:

> "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 (6)."

> "The Transcendental Meditation technique is an effortless procedure for allowing the excitation of the mind gradually to settle down until the least excited state of mind is reached [pure Being]. This is a state of inner wakefulness with no object of thought or perception, just pure consciousness aware of its own unbounded nature. It is wholeness, aware of itself, devoid of differences, beyond the division of subject and object—transcendental consciousness (7)."

In the Indian context, direct experience of transcendental consciousness is associated with *Yogaja pratyaksha* (direct perception born of yoga practice), which can be described as a supra-rational and trans-secular state. The state is also variously identified with such terms as *Atman, Samadhi, Turiya-cetana, para-cetana* and the realm of *parame-vyoman*. In its higher sense, it is described as an ever-awakened state (*nitya-jagrta),* throughout waking-dreaming-sleeping states. Vedic rishis or seers were said to have reached that state. But reliable systematic means to develop it had been lost to society. Fortunately, a considerable body of experimental evidence on the psychophysiological and behavioral correlates of transcendental consciousness has now accumulated. This evidence indicates that higher states of consciousness are being reliably reported, and corroborated experimentally, through regular practice of the systematic developmental technologies revived from ancient Vedic science (8).

Reports of transcendent experiences appear in the literature of many cultural traditions, but ancient Vedic records contain the most extensive and detailed accounts. Until recent years, it had been quite difficult to investigate such experiences systematically using formal experimental methods. This was due significantly to lack of a comprehensive theoretical framework to interpret the reported higher experiences, lack of experimental paradigms to examine the reports, and especially lack of systematic means to replicate the experiences reliably and under testing conditions. It has been estimated that as little as one-tenth of one percent of the college population, for example, may have such experiences (9). The Transcendental Meditation technique has been an important catalyst to extend research into higher states of consciousness by providing a reliable, repeatable methodology through which large numbers of regular practitioners report frequent experiences of transcendental consciousness (1).

Revered individuals throughout history have described exalted inner experiences as an important source of meaning in their lives and inspiration for their contributions to the sciences, arts, humanities, and religion. Contemporary developmental theories have attempted to characterize the most advanced stage or *end-state* of ontogenetic development. The theories have focused initially on stages of growth in adolescence and early adulthood within the range of ordinary experience in the general population. Subsequently the theories have been extended into more advanced stages in adulthood (1). Perhaps the most influential modern scientific theory of psychological development is the perceptual-cognitive theory of developmental psychologist Jean Piaget (10). This theory proposed a sequence of stages of cognitive growth toward adulthood, from the dominance of sensorimotor processes (typically ages 0-2) to the theorized end-state of abstract reasoning or formal reasoning associated with rational scientific problem solving. In modern education, the focus of training has been almost entirely on building abstract reasoning ability, the object-oriented representational mode of rational thought characteristic of the objective approach in modern science. Much of the time students are engaged in active mentation that keeps attention in an outward, objectifying direction. By force of habit, deeper, more settled, refined inner experiences are de-emphasized and often completely masked.

More recent developmental theories address adult growth beyond formal operations, called post-formal or post-representational development (9, 11). These theories propose even higher stages of growth, similar to psychologist Abraham Maslow's theory of self-actualization (12). One prominent theory of post-formal, post-conventional development focusing on moral judgment was proposed by developmental psychologists Lawrence Kohlberg and R. A. Ryncarz (11). This theory describes higher development beyond abstract reasoning or formal operations to a 'natural law' orientation toward ethical and moral questions, characterized by the

view that, "human responsibilities, duties, and rights are not arbitrary or dependent upon social convention but are objectively grounded as laws of nature (11, p. 195)." In these theories of higher human development, the highest stages are theorized not to be achievable only through formal operational thinking but to require some form of transcendent experience involving a sense of connection or unity between the individual self and the cosmos. In Maharishi Vedic Science and Technology, transcendence has been proposed to be as fundamental for promoting development beyond representational thought or abstract reasoning as language and symbol use are for growth beyond the sensorimotor level to the cognitive level of abstract reasoning (13). In this sense, however, transcendence does not refer to integrative experiences such as communion with nature or a greater appreciation for humanity and the world family. It refers to transcending the individual mind completely and directly experiencing its basis in the transcendent unified field of Being, or Atma.

Real progress on the mind-body problem

Much of modern science can be viewed as an investigation into more fundamental, underlying levels of nature, generally progressing to smaller and smaller time and distance scales in pursuit of the essence of matter. Initially prominent in this investigation was some form of atomistic theory. Early in modern science, atoms were thought to be the fundamental 'uncuttable' constituents of nature. Eventually it was found that about 99.999999999999 % of the atom's size was empty space, similar on a microscopic scale to the relative distances between planets on the macroscopic, astrophysical scale of our solar system (1). Then it was found that atoms are 'cuttable' into even more elementary particles such as photons and electrons. Further progress to a more abstract version of atomistic theory led to quantum field theory and almost infinitesimally small wave-particle energy packets as fluctuations of unbounded energy fields. Four underlying quantum fields have been identified, namely the electromagnetic, weak and strong nuclear fields, and gravitation. Research in theoretical and experimental particle physics is attempting to unify these four fields into a single source of everything in nature—unified field theory. The electromagnetic, weak and strong nuclear forces have been unified theoretically in grand unified theory, but unifying these three forces with gravitation has been a momentous challenge (1).

One important direction in recent research toward unification of the four fundamental forces integrates super-symmetry and string theory. Strings are theorized to be infinitesimally small filaments, sometimes also called branes (membranes). The vibrations or fluctuations of these abstract geometric objects are theorized to generate all the objects in our objective four-dimensional world of ordinary waking experience. Using mathematics from the 1940s, (structure, functers, categoricalness, etc.) along with set theory, string theorists are trying to model how from these fundamental geometric objects arise all the particles and forces found in nature. However, there is considerable controversy in contemporary quantum physics whether super-symmetry and strings and branes actually occur in nature, and whether they are the appropriate concepts for modeling nature at the incredibly tiny time and distance scale hypothesized to be the limit of space and time—the Planck scale of 10^{-33} cm (1). If these abstract geometric objects (strings and branes) are in some way real, they would relate to fundamental curvatures of the space-time geometry itself beyond matter. We are now at the point in the modern scientific investigation of nature that the search for the essence of matter has gone beyond all forms of matter to a theorized non-material basis of material creation. Modern physics is now grappling with the enigma that "matter does not have a material basis (1, p. X)." Even further, new theories are developing that propose ontologically real, non-local, *non-material* levels of nature underlying quantized particle-force fields—a *sub-quantum* reality.

For example, loop quantum gravity theory posits that quantized particle-force fields are underlain by an even more abstract, non-material, quantized *information space* (qubits) from which our familiar ordinary space-time is generated (14). Other theories propose an abstract, non-material field underlying all matter that is a field of non-local *mental space*. This subtle wave field, sometimes called the *psi wave* (15, 16), is theorized as guiding matter particles in ordinary conventional space-time. In this theory, there is an ontologically real mind-like field of non-quantized information and energy underneath and permeating material creation (16). It is at this level that the causal efficacy of mind and the possibility of free will once again become theoretically viable in modern science, based on theorized levels of nature subtler than the presumed closed chain of physical cause and effect in classical physics (1).

In these systematic reductive investigations of incredibly tiny levels of nature, modern science is now being directly confronted with the relationship of objective matter and subjective mind, the observed and observer. Historically this was a core issue in philosophy, associated with the *mind-body problem* and more recently with the so-called *'hard problem'* of consciousness. Today it is recognized to be central to the *measurement problem* in quantum physics and the *explanatory gap* between brain and mind in psychology, cognitive science, and neuroscience. The theories introduced above that posit ontological levels of nature underneath physical levels represent substantive progress toward addressing the mind-body problem. These subtler, non-material levels are being characterized in terms of mind rather than matter, a non-local field of mind that permeates and causally influences matter (16, 1).

Along with this progress, at least some modern scientists are beginning to turn attention toward the investigation of the observer of nature, the knower of knowledge, and to consciousness itself. In this context, the progress described earlier of research on transcendental consciousness—the fourth state of consciousness—becomes especially significant. Before this progress, there was virtually no recognition of the state-dependent limitations of modern scientific knowledge and experience, being constrained within the ordinary waking state of consciousness and focusing only on outer objective phenomena (1). While reports of regular transcendent experiences in developmentally higher states of consciousness are now being rigorously investigated in the scientific context, another major development linking modern science to ancient Vedic science concerns progress in theoretical understanding of the nature of consciousness. Theories of consciousness are now the cutting edge of research in diverse fields in psychological and cognitive science, computer science, quantum physics, and neuroscience. This research is focusing on the ontological place and role of consciousness. These theories are greatly advanced by deeper investigation into Vedic science, such as Sankhya and Ayurveda which address fundamental ontological issues (17, 1).

The matter-mind-consciousness ontology in modern science

Inflationary big bang theory is the consensus model of the origin of the universe in contemporary cosmology. In this theory, the universe emerged instantaneously from literally *nothing* as randomly fluctuating quantum fields that congealed into stars, planets, and living cellular organisms that eventually developed higher–order, conscious cognitive processes. This theoretical framework is associated with the fragmented reductive physicalist paradigm in mainstream modern science that the whole is created from combining the parts, a bottom up matter-mind-consciousness ontology from more basic, lower-order to emergent higher-order functions (1). The general model of the ontology of consciousness in modern science is that it is an emergent property of complex interactive neural networks in the physical brain. In

this view, consciousness and mind exist only on the basis of physical matter and ultimately are nothing other than physical processes (1). The reductive physicalist or materialistic paradigm in mainstream modern science has attempted to describe a causally closed clockwork physical universe. In this paradigm, mind and consciousness have no actual place or causal role as ontologically real levels of existence in the physical world. Fundamental parts or bits of quantized energy/particles somehow gain proto-conscious mentality in neuronal cells that interact in networks to generate conscious mind. Proto-conscious mentality is theorized to emerge spontaneously through Darwinian evolutionary processes, either from complex neuronal interactions or to be inherent in cellular structures somehow emerging from inert matter (1). This paradigm does not explain how the closed physical chain of cause and effect could unlink itself and insert a causally efficacious conscious observer at any level of physical existence. The conscious observer ends up being powerless and epiphenomenal, or even a non-existent misperception.

Consistent with this view, the evolution of higher-order conscious human behavior does not mean that humans are evolving toward anything other than meaningless survival; there is no place for intrinsic values of any kind. Fundamental paradoxes remain in this paradigm, such as the 'hard problem' of consciousness, free will, life emerging from inert matter, order emerging from fundamental random disorder, and ultimately everything emerging from nothing (1).

The two most successful theories in modern science are relativity theory and quantum theory. These theories have been misinterpreted and misapplied in modern culture, contributing to beliefs respectively in cultural relativism and *fundamental* randomness or chance in nature. These misinterpretations have fueled beliefs in morality based only on social convention and the meaninglessness of life, which have undermined the philosophical ground for moral behavior, increasing existential angst and nihilism that have plagued society throughout the 20th Century (1).

These beliefs and theories are constrained by an understanding of consciousness drawn from subjective experiences in the ordinary waking state of consciousness. In this understanding, consciousness is present in waking experience and absent in deep sleep, coma, or anesthesia. This understanding doesn't address higher states of consciousness, or the possibility that mind and consciousness relate to underlying abstract fields more fundamental than the physical level of nature—both of which facilitate more holistic understanding and experience of nature (1). It is a fortunate advance that reductive physicalist beliefs and theories are being thoroughly challenged by the most fundamental theory developing in modern science, unified field theory. According to this theory, the super-symmetric, lowest entropy unified field is the source of order in nature, rather than nature being *fundamentally* random. This has tremendous implications for a positive transformation in modern and postmodern culture. It is consistent with holistic Vedic science (1).

The consciousness-mind-matter ontology in holistic Vedic science

anorapi abhagasya disha vibhago vidhiyate
(vakyapapadiya of Bhartrhari)

Even of *anu* the undivisible one, there is possibility of dividing it directionally.

By differentiating space (region), time also gets differentiated.

Kalat kriya vibhajyante, akasat sarva murtayah

> All those which have forms, are differentiated and distinguished by *akasha,* while actions are differentiated or divided by time.

Holistic Vedic science, as articulated in Maharishi Vedic Science and Technology, presents a logically consistent and more comprehensive alternative to the reductive physicalist paradigm still prominent in mainstream modern science. The holistic approach of Vedic science can be described as a top down consciousness-mind-matter ontology in which the parts emerge from the whole, consistent with developing theories of the unified field. In the holistic view, matter and mind emerge from consciousness. Consciousness itself is at the level of pure Being, or Atma; and from conscious Being, the subtle field of mind emerges, as well as all grosser levels of energy and matter-particle fields. This is just the opposite of the reductive physicalist matter-mind-consciousness ontology (1).

In the holistic approach, the reductive physicalist paradigm that the whole emerges from combining the parts is characteristic of reasoning and consensual validation based only on fragmented, outer, object-oriented experience in the ordinary waking state of consciousness. Vedic science provides systematic developmental technologies for direct empirical validation (through regular practice of yoga) of the consciousness-mind-matter ontology in higher states of consciousness, beyond the ordinary waking state within which objective modern science has been constrained.

In the top down consciousness-mind-matter ontology, the ultimate *indescribable* unified field can be described as inherently conscious, orderly, and dynamic. To explain the process of phenomenal manifestation, the 'nature' of the unified field is described as the simultaneity of infinite silence and infinite dynamism, wholeness and part, infinity and point. In each point is infinity, and the infinite singularity contains infinity of points. It can be described as ultimate reductionism to infinity of points, and ultimate wholeness of infinite singularity, at the same time (25). It is the coexistence of opposites of infinity and point; but it is *non-dualistic*. Remaining beyond all duality, to explain phenomenal manifestation it is attributed two coexisting opposite qualities. As Maharishi has recently stated: "Silence and dynamism, they are one thing, not two things (18)."

To explain how the opposites coexist, the unified field is described as *infinite self-referral*, instantaneously reverberating from infinity to point and point to infinity, infinitely *referring or curving back upon itself*. In the process of phenomenal manifestation, the apparently opposite qualities of infinity and point become expressed in increasing limitation, extending from infinite wholeness, totality of existence, or Being to the phenomenal appearance of no consciousness, no intelligence, and no life at the most expressed levels of gross inert matter (1). In the holistic view, our familiar, conventional, physical space-time is a phenomenal limitation of the infinite unity *that is already present everywhere*. Space doesn't begin at a point and expand out in all directions from an almost infinitely dense singularity or Planck-size quantum blasting out in a big bang from literally nothing. Rather, infinite space and eternal time phenomenally *condense* many 'points' simultaneously (everywhere) (1). This expanded, holistic conception of space is consistent with the contemporary model of space as *flat* in the sense of extending in all three directions without being curved. Theoretical physicist Brian Greene 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 (19, pp. 249-250)."

In the holistic view, the self-referral dynamics of the unified field *curving back upon itself* can be said to characterize the mechanics of manifestation at all levels of nature. On the unmanifest level, it is infinite self-referral. On the ultramacroscopic manifest level, it is associated with a *mandala* form, as in *Hiranya garbha* or the cosmic egg. On the tiniest ultramicroscopic levels, it can be associated with curving back into discrete particles, including point particles, Planck-size quanta, and atomic structures (1).

"Prakritim swam avashtabhya visrijami punah punah (*Bhagavad-Gita, 9.8)*

Curving back upon My own Nature, I create again and again." (20)

In that perspective, space-time can be conceived in terms of the unified field as infinite eternal existence, associated with Veda (1). It is conditioned in the process of phenomenal manifestation into tangible levels of increasing localization, discreteness, and mass. These levels are perhaps more easily conceived as mediums, ethers, or 'fluid-like' sheathes or membranes much more abstract than conventional physical space-time. Each grosser level is permeated by, and emerges ontologically from, its subtler underpinning. These ancient concepts of ethers or sheathes to describe ontological levels of nature are being revived and are again appearing in contemporary cosmological theories.

In quantum field theory, space is *not* empty nothing; it at least contains vacuum fluctuations, or zero point motion (19). With the advent of unified field theory, the universe is more appropriately viewed as manifesting from *something*—even from the *source of everything* (21, 19, 1). In sequential stages, phase transitions spontaneously occurred as temperature dropped and the universe expanded, in which the four particle-force fields differentiated. This can be likened to phase transitions of H_2O *condensing* from steam to water to ice as temperature drops. At each stage, symmetry is reduced. In this view, the fundamental forces potentially *pre-existed* in the perfectly symmetric, super-unified state of the unified field. But also, as the source of continuously occurring quantum vacuum fluctuations, zero point motion or inherent dynamism, the unified field continues. If it continues even after the theorized big bang and the forces differentiated, then it is more than the unification of the four fundamental forces. The underlying unity doesn't go away when diversity begins; all diversity is within unity. 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 completely unified view, order emerges from the perfectly symmetric, lowest entropy state of the unified field, not from *fundamental* random disorder (1).

Implications for the reductive theory of the 'big bang.'

It was mentioned earlier in this paper that the consensus model of the origin of the universe is inflationary big bang theory. This model is a product of the reductive approach in modern science, and is associated with the view that the universe came into existence randomly from literally *nothing.* Holistic Vedic science and the consciousness-mind-matter ontology of the universe emerging from the super-

symmetric, perfectly orderly totality of the unified field imply a completely different view of cosmological origins. Again, as theoretical physicist Brian Greene points out:

> "A common misconception is that the big bang provides a theory of cosmic origins. It doesn't. The big bang is a theory…that delineates cosmic evolution from a split second after whatever happened to bring the universe into existence, but it says nothing at all about time zero itself… [T]he big bang leaves out the bang. It tells us nothing about what banged, why it banged, how it banged, or, frankly whether it ever really banged at all (22, p. 272)."

Astronomer David Darling points to major concerns with the reductive view in contemporary cosmological theories that the universe emerges from nothing:

> "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… "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 (23)."

In the holistic view, there is no *outside* of the unified field; everything is within it. This has major implications for cosmological models such as big bang theories. There might be individual big bangs with respect to specific black holes in conventional space-time. With respect to the entire cosmology of existence, however, 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 from nothing (24). This reflects the subtle but immensely important change from the reductive view to the holistic one that is starting to emerge in modern science and is fundamental to Vedic science.

Ontological levels of nature enumerated in Sankhya

It is in the context of the consciousness-mind-matter ontology that many misunderstood and rejected aspects of ancient Vedic science now can be shown to be of relevance within the purview of modern science. This would include principles of Ayurveda, Sthapatya and Vastu, Jyotish, Vedic Mathematics, and Vedic Yajnas. These aspects of Vedic science can be comprehended in the scientific context, based on the consciousness-mind-matter ontology, enumerated for example in Sankhya as levels of fluctuations, pulsations, or vibrations that make up the deterministic structure of phenomenal nature (1).

For example, Vedic Mathematics is a number system that is based on unmanifest wholeness, the Absolute Number, expressed in the concept of the symbol 'zero' or nothing-ness, of which all the written numbers are a modification (25). It emphasizes both inclusive and exclusive approaches to logic and mathematical principles; that is, *and* rather than just *or*, such as plus *and* minus together rather than just plus *or* minus. Focusing on holism and simultaneity, it is said to have the potential to resolve paradoxes faced by modern science and modern mathematics arising due to binary or two-valued logic, in terms of discrete versus continuous or digital versus analogue. Binary relation, binary logic, binary algorithm, plus-minus, zero-one, on-

off are such expressions that symbolize duality. Vedic mathematics accommodates this, yet transcends it to the non-dual realm.

As another example, in Vedic science the systematic methodologies of *Yajna* are said to form the link between the 'three worlds (*bhu, bhuvah, svah*).' Yajna is known as a ceremonial procedure that includes such ingredients as sacred fire, oblation with ghee or honey, and recitation of specific Vedic sounds. But this is only its local, objective, surface, ritualistic behavioral aspect. Yajna reflects an especially integrated understanding of deterministic relationships between transcendent, subtle, and gross levels of nature associated with the holistic consciousness-mind-matter ontology. In a similar way that information to shape all aspects of a tree is contained in the DNA code, the total information in the laws of nature is contained in the Veda and can be accessed to produce specific effects on the level of objective behavior. As an analogy, it can be compared to a laboratory experiment in which certain chemicals are carefully put together to produce compounds with specific properties based on the laws of chemistry. However, the process of Yajna applies much subtler non-local dynamics that just now are beginning to be considered in the quantum mechanics of non-locality beyond the limitations of the speed of light, as well as in unified field theories. It involves wave mechanics of specific material objects and impulses of Vedic sounds, in terms of both physical locality and non-physical non-locality. The procedures are precisely detailed in the Veda, and are carefully implemented by Vedic scientists or *pundits* extensively trained in how to utilize non-local connections at the unified level of nature's functioning (1).

Both modern science and ancient Vedic science analyze the phenomenal universe in terms of the concept of wave motion, vibration, pulsation, or fluctuation of underlying fields, and ultimately of the theorized all-encompassing unified field. The concept of vibrations or pulsations of the unified field in phenomenal manifest creation is fundamental to the Vedic concept of *prana*, frequently translated in terms of breath. It is directly related to innumerable dualities—such as inner and outer, expansion and contraction—that are ubiquitous in descriptions of nature in holistic Vedic science as well as modern science.

These descriptive dualities are by virtue of the nature of the intellect to superpose binary discriminations upon the ultimate, transcendental, indivisible, indescribable totality of the unified field—Atma, Brahm. The nature of the functioning intellect is that there is an inherent implication of duality in any discrimination. In the process of conceptualizing, identifying, delineating, naming, or labeling anything, there is a tacit implication of some relative, contrasting thing or principle. Although the functioning of the discriminative intellect involves both inclusive and exclusive categorization processes—unifying *and* diversifying—most often the diversifying aspect is emphasized. This is associated with the ordinary function of intellect that delineates, analyzes, unfolds, and enumerates—sometimes called *Buddhi* in Vedic science. When the phenomenal parts of nature are experienced as primary, the essential wholeness, unity, or oneness of life is lost. This is called '*Pragya aparadh*,' the '*mistake of the intellect*.' Development of higher states of consciousness reestablishes wholeness or unity as the natural primary experience (1).

Examples of fundamental dualities common in intellectual analysis of nature include that in the identification of singularity there is a contrasting non-singularity, and in unity there is implied diversity. There is the duality of binary relationships, binary logic and algorithm, binary numerical knowledge representation, infinity and point, Purush-Prakriti in Sankhya, particle and wave in quantum theory, bosons and fermions in super-symmetric string theory, discrete and continuous, digital and analogue, holism and reductionism, wholeness and part, mind and body, function

and structure, and so on and on (1). These dualities are phenomenal delineations of the ultimate non-duality due to the functioning of the intellect. Existence of space, existence of time, existence of motion—existence itself—are conceptions intimate to the functioning of the intellect. In the process of phenomenal manifestation, they become relative realities with two opposite phases (+ ve, - ve) relative to each other. The intellect is not just a function of individual mind, but also is a function of Universal Mind involved in the mechanics of creation from indivisible, unmanifest Oneness to the phenomenal diversity of manifest existence.

Sankhya enumerates the sequential emergence of the parts of nature as phenomenal manifestations within the unified wholeness of Veda—how the parts emerge from the whole. It identifies 25 categories or levels of nature, which manifest in sequential symmetry breaking from the unified field. These 25 levels can be grouped into three basic domains of nature: the unmanifest domain of the unified field or universal Self (Purusha/Prakriti), the subtle relative and subjective domain of mind (Mahat, Ahamkar, Manas, Indriyas, Tanmatras), and the gross relative objective domain of matter (Mahabhutas). Sankhya provides a detailed delineation of these levels that corresponds to the consciousness-mind-matter ontology (1).

Sankhya is that aspect of Vedic science which is described as a numerical approach to knowledge. It focuses on enumeration, categorization, or classification within the ultimate unity or unified field. Sankhya is a nominal term meaning number or digit. It is a feminine word from the root √*khya*—to express, articulate, explain, with prefix *sam*, signifying summation, integration, proper, just, exact, positive sense. As such it means proper, exact expression of measurement, the quantitative element excluding looseness, ambiguity, etc. This has great significance for modern science.

The most fundamental enumeration of nature in Sankhya and the source of all other dualities is *Purusha/Prakriti*. This can be directly related to the self-referral coexistence of opposites of infinite silence and infinite dynamism. Remaining indivisible unity or oneness, there is a superposed intellectualization into duality as the basis for phenomenal manifestation of the whole of nature into the parts of nature (1). Prakriti is sometimes identified as the basic material of manifest creation or Body, and Purusha as Spirit. Prakriti also relates to the concept of *Maya*. Rgveda describes Indra as assuming multiple forms due to his inner power called Maya.

> Indro mayabhih puru-rupa iyate (Rgveda)
>
> Indra due to his measuring power assumes multiform (profile).

Maya is commonly understood as illusion; but this is an implied or derived meaning. It is from the root *ma*—to measure, quantify, a divine power or inner capacity which has qualitative or quantitative measuring capacity. From the same root comes *mana* (measurement units, scales), *pramana* (proofs or validity of knowledge, standard, reference framework), *anumana* (inference based on accepted standard units, as reference and following it, *anu* = follow, *mana* = standard unit), *upamana* (*upa* = secondary, similar, with *mana* = reference, standard) and probably means knowledge by simile, analogy, and comparisons. These concepts are directly related to a central tenet in modern science of the principle of measurement. In Vedic science, they concern the concept of 'measurable existence,' the phenomenal delineation and enumeration of the infinite eternal indivisible totality of natural law, the singularity of the unified field of natural law, the universal Self, pure Being.

The subtle manifest level of nature in the Sankhya enumeration includes Mahat, Ahamkara, Indriyas, and Tanmatras, which together with Purusha and Prakriti have been referred to as the *'inner dimension'* (1, p. 218). The inner dimension comprises all the levels of nature more fundamental than the gross physical level of nature. These subtle, non-local, non-material levels of nature associated with non-conventional space-time permeate the local, material, physical levels of nature associated with conventional space-time.

The gross manifest level of nature is comprised of the Mahabhutas. This physical domain includes everything in the gross relative levels of nature where energy and intelligence manifest in some form of atomistic theory involving discrete units of space-time (1). In Sankhya, this level is composed of innumerable permutations and combinations of the Mahabhutas, the five fundamental constituents of objective nature, one emerging from the other in a progression from subtler to grosser. They are expressed in sequential enumeration or symmetry breaking into the ancient delineation of five basic *constituents* of space, air, fire, water, and earth that make up all objects in the gross material domain (1).

These five constituents embody the abstract principles of vacuity (space), mobility (air), transformation (fire), liquidity (water), and solidity (earth). They also can be described as fields with progressive limitations, each more expressed one emerging from the previous one and expressing an additional limitation or quality, like concentric sheathes or ethers. 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. In ancient Vedic science, these five qualities or constituents directly correspond with the five sensory modalities of hearing, touch, sight, taste, and smell. This five-fold correspondence of fundamental constituents in nature and sensory capabilities is basic to the concept of *qualia* or sensory experience, but this is not yet appreciated in modern science (1).

Unfortunately these ancient concepts have been interpreted much too crudely in modern science, and were not seriously considered with respect to their possible relationships to the known fundamental forces (26, 1). As physical phenomena, these five fundamental constituents would be expected to map onto the quantum particle-force fields. According to Boyer (1), one reasonable mapping is that s*pace* 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.

Space (Akasha)

Conventional physical space-time is characterized by local interactions limited to the speed of light, directly related to the Planck scale, zero point motion, and the uncertainty principle. These characterize the unifying gravitational force field, associated in Vedic science with the level of gross space.

Air (Vayu)

The unifying force of gravity attracts space-time into clumps of the space-time field, further condensing and binding into a gaseous state, which expresses the principle of *air*. Air has the quality of expansion to fill the available space within gravity, with the additional limitation of *impermeability*. The ether that manifests the qualities of space condenses into a more limited field or medium, which transfers energy via compression and rarefaction of quantized wave motion in space. In particle physics, the forces that bind or glue particles into atomic nuclei and compounds are the strong force and gravity.

Fire (Tejas)

The next level of *condensation* is fire, associated with luminosity, form, transformation, heat, temperature, radiation, combustion, oxidation, and similar processes. When there are aggregates of quantized points as volumes in space that cannot penetrate each other, as in air, their agitation increases when space is further limited. Pressure and activity rise, increasing temperature or heat, which can lead to radiation. This involves the weak and strong nuclear forces in combination with the force of gravity.

Water (Apas)

The next level is water, *condensing* further from space, air, and fire; which expresses the abstract principle of liquidity, fluidity, or flow of energy along a path, such as a current of water. This concerns flow or motion to fill the available space within the limitations of its permeability, but a denser flow due to increased mass. This type of energy flow can be associated with the electromagnetic force, and especially the properties of electricity, in conjunction with weak and strong forces along with gravity.

Earth (Privithi)

The grossest constituent, earth, expresses solidity and inertness, with the least degree of directional freedom or flow. It is a further limitation of the liquid form, such as ice from water, when motion and temperature associated with heat or fire is reduced into a more rigid, less dynamic state of solid matter. It is the endpoint of the process of manifestation or *condensation*—the most fixed inert state of nature. The abstract principle and constituent of earth can be associated most closely with magnetism (water with electricity), in combination with the other four forces. The magnetic force is a dipole system in which the opposites of attraction and repulsion (north and south poles) are contained in one field. It flows in a defined *circular* path that *curves back upon itself* in a closed loop perpendicular to the flow of electric current, a further limitation compared to electricity (1).

In this model of the full range of levels of nature, these five fundamental constituents together constitute the most expressed, grossest domain of phenomenal existence. Although no additional ontological levels of existence emerge from them, a vast diversity of natural phenomena manifest from their combinations and permutations. The levels of gross objective existence associated with the Mahabhutas include the ultramicroscopic, microscopic, macroscopic, and ultramacroscopic cosmological levels of the gross physical universe that have been the object of mainstream objective modern science.

As introduced earlier in this paper, it is fortunate that cutting edge quantum and quantum gravity theories have been progressing beyond this gross relative domain toward systematic understanding of the underlying subtle non-local, non-material relative level of nature and further to the infinitely self-interacting, all-encompassing unified field. Thus three fundamental domains of the totality of nature are becoming delineated—the gross manifest relative domain, the subtle manifest relative domain, and the unmanifest transcendent domain—all three phenomenally existing within but ultimately nothing other than the one unified field of nature, the unmanifest level of Veda (1).

Fundamental forces in Vedic science and modern science match up

des-kala-kriya-drayamatram eve jagat trayam
(yogavasistha)

This world (with three units in one) is nothing but space-time-action as substances.

In the conceptual delineation of duality, there is an implied trinity. The trinity is also ubiquitous in both ancient Vedic science and modern science, as well as in religious traditions (1). Most ancient sciences, in India and elsewhere around the world, also share with modern science a common source in binary simple logic from which emerge three-fold and sometimes four-fold and five-fold schemes in light of various models of symmetry and laws of conservation. A similar scheme can be found in advanced computer science.

For example, in the delineation of observer and observed there is the connecting process of observing; in the delineation of creation and dissolution operators there is the maintenance operator, in the delineation of subject and object there is the predicate, and in the delineation of Father and Son there is the Holy Spirit. Also, there are the fundamental trinities of knower-process of knowing-known, sat-cit-ananda, rishi-devata-chhandas, Brahma-Vishnu-Siva, and so on. Trinity implies duality and transcendental, addressing two-valued logic and three-valued logic as well. This is significant because two-valued logic creates paradoxes, which cannot be solved by it. Only as late as 1963 did Bertrand Russell propose three-valued logic mathematically to address two-valued paradoxes.

In Sankhya, the five fundamental qualities and constituents (Tanmatras and Mahabhutas) are a further delineation of the three fundamental forces of *Sattva, Rajas, and Tamas*, the *trigunas*. They also relate to the five fundamental constituents grouped into the *tridoshas* in Ayurveda. These levels of fundamental trinities in ancient Vedic science ultimately can be associated with the *three-in-one self-interacting dynamics* of the unified field in Maharishi Vedic Science and Technology (1). In the theoretical developments mentioned earlier concerning the origin of the universe, there also are three fundamental issues emerging: what is the cosmological origin of order, of dynamism, and of mass? These three fundamental issues are beginning to match the three fundamental forces of nature of *Sattva*, *Rajas*, *and Tamas* extensively referred to in Vedic science. On the gross physical level, these fundamental forces can be related 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 (1).

In the gross material domain of conventional space-time, Sattva can be related to the attractive force of gravity, and the gravitational constant. It also can be related to the 3rd 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, and possibly Planck's constant. The three values from which the hypothesized most fundamental unit of ordinary physical space-time, the *Planck length* (10^{-33} cm), is derived—gravitational constant, light-speed, Planck's constant—also appear to correspond on the gross material domain with the fundamental forces of Sattva, Rajas, and Tamas (1).

loko yam purusa – sammitah
yavanto vai puruse bhava visesah tavanto loke|
yavanto loke tavanto puruse
(Charaka Samhita)

This universe is symmetrically equivalent to (this) person. As much number of specific components are there in man that much number of specific components are present in the universe as much number of components are there in the universe, that much are present in man."

In Maharishi Vedic Science and Technology, Veda is the record of the self-referral mechanics of creation. The Veda is the language of nature, and the sequential structure of Vedic sutras is the sequence of steps of how the laws of nature manifest the phenomenal universe (1). Because the universe is nothing other than the unified field of nature, and the unified field is a universal field of consciousness that is the core of individual consciousness, the abstract mechanics of creation are said to be directly experienceable as 'the finest fabric of consciousness.'

The sound vibrations of the Veda, called *Shruti*, are the wave mechanics of the totality of nature that structure all objects in nature, subtle and gross. The individual human physiology encompasses the totality of these fluctuations, and encompasses the same fluctuations that make up the entire cosmos. Thus the individual is cosmic, the individual is Veda (3). That is the meaning of many Vedic expressions, such as the integrative Vedic statement from various Vedic texts, 'I am That, Thou art That, all this is That, and That alone is.' These expressions can be related to different perspectives of the ultimate unity of nature. 'I am That' can be associated with the first-person perspective, 'Thou art That' with the second-person perspective, 'All this is That' with the third-person perspective, and 'all this is That' with the three-in-one perspective of the totality of the unified field. These expressions relate to natural experiences in the highest state of consciousness, the culmination of the process of human development and evolution.

Seven states of consciousness

In Maharishi Vedic Science and Technology, the full range of human development and evolution is described in terms of the sequential unfoldment of seven states of consciousness. As Vedic educator Dr. Bevan Morris states, "There are seven distinct states of human consciousness, each with its own physiology and each with its own world of experience (27)." Here is a listing of the sequence of the seven states of human consciousness. In this brief description, they are placed on a continuum from virtually no wakefulness to infinitely full wakefulness, distinguished by the experience of self and environment (subject and object) characteristic of each state (1, p. 424).

"Waking *(Jagrat Chetana)*—individual self and relative environment;
Dreaming *(Swapn Chetana)*—illusory individual self and illusory environment;
Sleep—*(Sushupti Chetana)*—virtually no experience of self or environment;
Transcendental consciousness (*Turiya Chetana*) —pure wakefulness, universal Self only;
Cosmic consciousness *(Turiyatit Chetana)* —universal Self and separate environment;
Refined cosmic consciousness or God consciousness *(Bhagavad Chetana)*—universal Self and maximum relative value of environment;
Unity consciousness *(Brahmi Chetana)*—object and subject are one; the environment is nothing other than the universal Self."

The first three ordinary states of waking, dreaming, and sleeping are commonly recognized in modern science. The fourth state, identified as transcendental consciousness (Turiya, Samadhi) is now being phenomenologically and psychophysiologically corroborated in the experimental laboratory, along with increasing evidence of even higher states. The delineation of these natural states provides a systematic framework for understanding the vast variety of accounts and teachings in historical literature that sometimes may appear contradictory and confusing. It is important to recognize that they reflect views of the unified totality of life from the vantage points of different states of consciousness.

In Maharishi Vedic Science and Technology, natural development to the end-state or highest state encompasses the full range of levels of nature. The active ingredient in facilitating this development is transcendental consciousness, the fourth state of consciousness. This state is the simplest ground state of the individual mind, the state of unbounded inner silence. The entire course of evolution through the seven states of consciousness is unfolded within the ground state of the mind, self-referral transcendental consciousness. The full range of levels of nature and the evolutionary sequence associated with them can be summarized in five concepts (1):

Atma—transcendental consciousness, the universal Self on the individual level;
Veda—the unmanifest basis of phenomenal creation, the home of all the laws of nature;
Sharir—the individual body reflecting the structure of the entire cosmos, the cosmic individual;
Vishwa—the entire structure of the universe, the cosmic body;
Brahm—the Self on the cosmic level, permanently living the totality of life in fully awake unity consciousness.

The seven states of consciousness also have a correspondence with the six Vedic *Darshanas* (1). Each Darshana presents the wholeness or totality of knowledge, while also at the same time emphasizing a particular level or state. The first three Darshanas—Nyaya, Vaisheshika, Sankhya—emphasize theoretical understanding of the totality, and the second three Darshanas—Yoga, Karma Mimansa, Vedanta—tend to focus on direct empirical experience of the totality. Yoga can be associated with the fourth state (transcendental consciousness) and its stabilization in the fifth state (cosmic consciousness); Karma Mimansa more with the sixth state, refined cosmic consciousness or God consciousness; and Vedanta with the seventh state, Unity (1).

A direction for further progress in linking Vedic and modern science

On a practical level, it seems apparent at this point that the most important further step in linking Vedic science and modern science is incorporation of the systematic developmental technologies in Vedic science into higher education, as well as into the daily research practice of scientists. This can provide natural, effortless experiences of transcendental consciousness toward permanent enlightenment in higher states of consciousness through optimal development of mind-body functioning. Regular direct empirical experience of transcendental consciousness is the missing link in education, as well as in scientific practice world-wide. It may also be fruitful for modern scientists and Vedic scientists to formulate a common platform for integrative investigations into the ultimate unity of nature, and in particular the unification of relativity and quantum theories into a mathematically consistent unified field theory. So far there is no adequate coordination of experiments throughout the world; total unification is missing. Concerning this aspect of scientific knowledge acquisition, the common platform might include the following areas of consideration:

i) conceptual common platform (basic principles, theories)
ii) experimental common platform for both
iii) experimental design, fabrication
iv) common parameters for measurement
v) mathematics, algebra, geometry, statistics, common for both
vi) definitions, formulae, equations, derivations
vii) location, direction, number of experiments
viii) observations, interpretations
ix) any other static-dynamic aspects, local (part), non-local (whole) etc.

Conclusion

ekena ha va vijnatena sarvam vijnatam syat
(upanisad)

By knowing that one, indeed, all becomes known

It is an auspicious time in the history of modern civilization. We have arrived at the doorstep of the ultimate unity, the source of everything in nature. As stated in the book Bridge to unity:

> "All the research in modern science has led to the doorstep of the ultimate unity of nature. The next step is direct empirical validation of unity. That requires going beyond sensory experience and reasoning, the basic means of gaining knowledge in modern science. It is most fortunate that we now have systematic means to unify completely our theoretical understanding and empirical experience of nature based on a holistic science of consciousness. Consciousness is the 'lamp at the door,' illuminating both the outer diversified field of knowledge and the inner unified field of knowledge. Through this more inclusive science, we are stepping into a genuine Age of Enlightenment (1, p. V)."

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