



Reconciling Realism and Idealism: A New Model of Space Time

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Abstract

An approach to reconcile realism and idealism—and the ‘mind/body problem’—is proposed, based on examining the direction and key implications of progress in physics. The direction is from tangible ontological ‘objects’ such as particles to less tangible epistemological ‘processes’ and abstract ‘fields.’ Physical realism is associated with local wave-particle fields, and mental idealism with nonlocal wave fields. The concept of levels of space time is proposed to bridge local matter and nonlocal mind toward a rational, logically consistent model of how they causally interact.

Key Words: Realism, Idealism, Particles, Fields, Locality, Nonlocality, Unified Field, Free Will.

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Introduction

The job of physics used to be straightforward: identifying consistent patterns of change in the natural world as laws of nature. Whether the objects measured *really* do exist—as well as what and where laws of nature are if they also exist—was of little concern for ‘calculating’ physicists. In part, this was due to categorizing what is ontologically ‘real’ as a philosophical issue not answerable using the accepted methods of investigation. A strong case can be made that it also was due to tacit belief that the objects *really* are ‘real.’ These quotes of Einstein support the case:

The belief in an external world independent of the perceiving subject is the basis of all natural science (1965, p. 201).

An essential aspect...of things in physics is that they lay claim, at a certain time, to an existence independent of one another, provided these “objects” are situated in different parts of space.... Unless one makes this kind of assumption about the independence of the existence of (the “being-thus”) of objects which are far apart from one another in space—which stems in the first place from everyday

thinking—physical thinking in the familiar sense would not be possible.

It is also hard to see any way of formulating and testing the laws of physics unless one makes a clear distinction of this kind (Dickson, 1998, p. 154).

These quotes reflect the classical view that real objects exist *out there* in conventional space and time *independent from the observer* and also *independent from each other*. This view is consistent with *scientific* or *physical realism*, which attributes ‘reality’ only to tangible, concrete objects and events in conventional space and time. It frequently is accompanied by the belief that mind and consciousness are *epiphenomena* of physical matter with no real causal influence—which Einstein seemed also to think. In this view, the closed physical causal chain has no place where it can be broken for mind to insert a causal influence on it—thus, there is no free will. However, this view is now severely challenged by progress beyond concrete matter particles to abstract theorized fields that link objects together on finer-grained, deeper levels of nature.

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A subtler model of *levels of spacetime* helps reconcile realism/idealism, mind/body duality, and the related ‘explanatory gap’ between brain and mind. It counters the long-held view that mind as having a causal influence on matter is a ‘category error.’ It is fundamentally important to recognize that the direction of progress in physics has been to more abstract levels of nature toward seamless links between matter, mind, and consciousness. *That* is needed for a logically consistent theory of a *completely* unified field that links objectivity and subjectivity for real free will and personal responsibility—which are not consistent with classical or quantum theories.

Progress from Concrete Inert Matter to Abstract Sentient Mind

As experiments probe smaller and smaller time and distance scales, *direct* observation of the ‘objects’ investigated with unaided and aided ordinary senses is no longer feasible or adequate. *Indirect* ‘observation’ has become necessary, adding layers of technology between the ‘objects measured,’ ‘processes of measurement,’ and ‘measurer’ (Hensley, 2019). It also requires more interpreting of experimental results, relying more on mathematical logic as a criterion to support or reject theories (due to difficulty of empirical testing at extremely tiny time and distance scales).

The concept of static, inert ‘matter’ is being superseded by dynamic ‘energy’ and ‘relational processes.’ The ‘objects’ investigated are now frequently considered more abstractly as ‘processes’ rather than ‘objects’ (Boyer, 2013). This reflects progress from the *object of experience* to the *process of experiencing*, far beyond what we can ‘see’ with our ordinary senses to theorized finer levels of nature and more abstract meanings of what an ‘object’ is. It reflects increased epistemic emphasis and reduced ontic emphasis. Also, reluctantly for many, it brought back the *measurer*—the mind and consciousness of the scientist/observer—into the scientific picture. The old mind/body problem and how mind and matter could causally interact are now central issues in physics, such as, for example, in the ‘measurement problem’ and quantum theory interpretations.

Very importantly, the direction of progress has been from directly observed macroscopic objects to microscopic cells, molecules, unobservable ultra-microscopic elements, atoms, sub-atomic particles, virtual particles, quanta, quantum fields, strings/branes, quantum gravity, to more abstract

qubits that relate bits of spacetime to bits of ‘physical information’ in Shannon-type ‘objective’ information fields. Further, the direction is to epistemic systems/relational theories and ‘biological shaping’ information fields more fundamental than inert particle physics, and now to meaningful ‘semantic’ information fields associated with qualia (subjective experiences). These ‘information fields’ are attributed more *mind-like* than *matter-like* properties. Acknowledging the major significance of this progress, a recent *Scientific American* blog appropriately asserts that “physics is inexorably pointing to mind” (Kastrup, 2019).

Moreover, some physicists now contend that there is no ‘real’ matter and no ‘real’ objects—‘objects’ are just fluctuations of mathematical field space. But a crucial issue to be addressed is: Does a mathematical field space actually exist as ‘real’ in the natural world, or is it just a relational concept in imagined conceptual mathematical space—in other words, relations without *relata*? How could mind and matter causally influence each other if either (or both) doesn’t *really* exist? Is mind real, is matter real, or neither, or nothing? Or is it that, fortunately, our views of ‘reality’ are becoming more abstract as we begin to understand subtler levels of the real, entangled and deeply interconnected natural world in necessary logical steps toward a *completely* unified field? Physics needs to address ontology, which directly concerns the contrast of *realism* and *idealism*.

Without getting into meanings of scientific theory in the philosophy of science, *realism* is the belief in a real world existing apart from our minds as well as our theoretical interpretations of it. It is frequently associated with *materialism* or *physicalism*, the belief that the natural world is built of matter. In this belief, everything is physical matter, and mind and consciousness are due to physical interactions completely accounted for by (supervening on) the brain/body. But in probing deeper into the natural world, physicists are coming to the conclusion that *matter doesn’t have a material basis*. The concept of *realism* is extending beyond tangible matter. And further, some major theories are proposing a real *non-material*, more mind-like basis of matter.

However, there still is considerable reluctance to accept a *non-material* basis of matter, even when indirect evidence is accumulating in that direction. But how could brains exist if matter doesn’t? If matter doesn’t exist, and if mind is just



epiphenomenal, and if abstract fields are just mathematical concepts that are not ontologically real, then what, if anything, exists? And then what is physics *really* about? Certainly, we are beyond the understanding it is just about inert elementary particles. *Realism* is not just *materialism*, *physicalism*, or even just *naturalism*. Physics now extends to much more abstract levels of nature, including real *information fields*—progressing toward *Totality as the ultimate reality*, as in theories of a *completely* unified field.

In contrast, *idealism* is the belief that matter is a product of mind. Physical matter is held to be a *mental construct* with no ontological existence separate from mind. In this belief, mind ‘creates’ the natural world, and there is no *mind-independent* reality. In contrast to Einstein’s quotes on realism is this quote from Varela, Thompson, and Rosch (1993, p. 161) on idealism:

[T]he realist naturally thinks that there is a distinction between our ideas or concepts and that which they represent, namely, the world. The ultimate court of appeal for judging the validity of our representations is this independent world.... The idealist, on the other hand, quickly points out that we have no access to such an independent world except through our representations. We cannot stand outside of ourselves to behold the degree of fit that our representations might have with the world. In fact, we simply have no idea of what the outside world is except that it is the presumed object of our representations. Taking this point to the extreme, the idealist argues that the very idea of a world independent of representations is itself only another of our representations....

Some idealists, and also some physicists, agree material objects such as particles are not real. Some idealists further hold that mind and consciousness are real, though matter is not. Philosopher Ken Wilber (1998) brings out further the contrast between realism and idealism:

[M]uch of what we take to be perceptions are actually conceptions, mental and not empirical.... Thus, when many empiricists demand sensory evidence, they are actually demanding mental interpretations without realizing it.... (pp. 121-123).

Although this supports idealism, this next quote from Wilber (1998) supports realism:

The “difference” between your fingers might be a mental construct, but the fingers themselves in some sense preexist your conceptualization

of them; they are not totally or merely a product of mental constructions....A diamond will cut a piece of glass, no matter what cultural words or concepts we use for “diamond,” “cut,” and “glass,” and no amount of cultural constructivism will change that simple objective fact.... So it is one thing to point out the partial but crucial role that interpretation plays in our perception of the world....But to go to extremes and deny any moment of objective truth at all (and any form of correspondence theory or serviceable representation) is simply to render the discussion unintelligible” (pp. 121-123).

There also has been the view from ancient times that consciousness is the most fundamental and *only* ‘reality.’ This is sometimes interpreted to mean that neither matter nor mind are real. It is associated with the term *Maya*, sometimes interpreted to mean that the entire world is *illusory*—including the individual self, like you or me (Boyer,2008).

Further on the contrast of physical realism and idealism, noted physicist Henry Stapp (2010) asserts that not only does physics need to address these issues, but quantum theory in fact 29 does so:

To...cling to the false precepts of classical mechanics that leave mind and consciousness completely out of the causal loop, seems to be totally irrational. What fascination with the weird and the incredible impels philosophers to adhere, on the one hand, to a known-to-be-false physical theory that implies that *all* of our experiences of our thoughts influencing our actions are *illusions*, and to reject, on the other hand, the offerings of its successor [quantum theory]...fully concordant with our normal intuitions, and can explain how bodily behavior can be influenced by *felt evaluations* that is not adequately conceptualized in terms of the mechanistic notion of bouncing billiard balls....Any conception of reality that cannot explain how our conscious efforts influence our bodily actions is problematic(pp. 104-119).

This strongly suggests that what is ontologically real and how mind causally influences matter are central issues in contemporary physics. To think otherwise is irrational in his view—when proper consideration is given to the laudable progress of physics in the past century.



Subtler Understanding of Space Time

Conceiving of space and time only in terms of conventional notions, the gap between mind and matter has not been bridged; and a logically coherent understanding of deeper levels of nature and the underlying unity remains elusive. In monumental steps of progress, Einstein integrated space with time into spacetime, connecting it to gravity as the curvature of spacetime due to the presence of 'ponderable objects' in the relativistic gravitational spacetime field. But Einstein was not able to resolve whether the spacetime field or 'ponderable objects' in it is the primary level. An important subtler conception is that the spacetime field is *not* a *separate* background from 'ponderable objects' in it. Rather, *objects are made of the field itself*. Relativistic spacetime is an ontologically real substance or medium. 'Independent' ponderable objects in spacetime are built of the medium of spacetime itself. This is consistent with spacetime as not 'empty,' and with 'objects' as fluctuations of their underlying fields in quantum field theory (Boyer, 2018).

Fortunately, we are now at the stage when a more integrated view of the inner mind and the outer natural world can be conceptualized and validated. The further integrating concept of *levels of spacetime* can help (Boyer, 2018). This model accepts that matter and mind are both relatively 'real' at their respective levels of nature. It seems more consistent with the *scientific* approach—which Einstein noted comes from "everyday thinking." Concepts to bridge matter and mind have been viewed as 'category errors' without sufficient consideration of what is ontologically real and how real levels of nature may interact. With more integrated thinking, we can be less awe-struck by the quandaries of quantum theory and more open to linking matter, mind, and consciousness. The links are logically required if all objects, processes, and 'levels of nature' interrelate in a *completely* unified field (Oneness, Unity, Brahman—or whatever we prefer to call *that* 'ultimate reality' beyond any and all words, symbols, and concepts). The model of *three levels of spacetime* outlined here is a conceptual bridge to help cross the mind/body gap and reconcile *realism* and *idealism*. It can be viewed as logically extending the direction of progress in physics into a much more comprehensive—much subtler—understanding of the range of nature. In other words, science is progressing to a deeper understanding of ontology and realism that is no longer restricted to

materialism or physicalism. To clarify how this three-level model advances current physics, we first briefly overview *one* and *two-level* models. Classical physics studied the level of spacetime that relates to ordinary daily experiences of the natural world. This is the deterministic one-level model of ordinary conventional spacetime characterized by Einstein's profound relativistic theories of *local* causal relations within light-speed (sometimes called *materialistic monism*, in addition to the terms *scientific* or *physical realism* described earlier). The chart below depicts this one-level model, along with its commonly identified layers generally accepted in current mainstream physics as a closed causal nexus.

One-level model

- Universe (↑ultra-macroscopic)
- Local environment (within light-speed) (↓ macroscopic)
- Individual and social behavior
- Neural systems/brain (including mind and consciousness)
- Biological systems/body
- Molecular processes (↓ microscopic layers)
- Organic chemical processes
- Non-organic chemical processes
- Basic elements (↓ ultra-microscopic)
- Atomic particles
- Electromagnetic force-particle quantum field
- Weak force-particle quantum field
- Strong force-particle quantum field
- Gravitational force-particle quantum field

In some recent quantum field theories, the relativistic spacetime gravitational field is quantized at the Planck scale; and in some of these theories space itself is similarly quantized, such as in *spacetime foam*. Fluctuations of this underlying spacetime gravitational field express the vast diversity of phenomena throughout the physical universe. This field and everything made of and in it can be defined in terms of the limitations of relativistic gravity, light-speed, for the most part the particle-interaction model of causality, and the Planck scale.

Many physicists assume that space and time break down at the Planck scale. The model of levels of spacetime suggests that what breaks down is just the *conventional notion of spacetime*. The empirical validation of *entanglement* reflects important progress toward subtler conceptions. The fragmenting notion of quantization needs to be combined with empirical entanglement and



interdependence. One approach to this issue is to maintain the distinction between gravity and spacetime—identifying gravity as quantized and spacetime as non-quantized. A value of this view is that gravity then emerges from more fundamental spacetime processes. But it suggests gravity is background *dependent*, deconstructing Einstein's view of background *independent* spacetime in which relativistic spacetime gravity has no substrate.

In recent years, unified field theories have become prominent. These theories can be identified mostly as *two-level* models that add an underlying unified field, from which emerges the four recognized fundamental physical particle-force fields (as in the chart above):

Two-level Model

Physical Level

Unified Field

Typically, unified field theories posit that the fundamental forces begin to emerge from the unified field at the smallest scale of conventional spacetime, the Planck scale. In this two-level model, the universe is built of the four known fundamental physical force-particle fields. These inherently dynamic but non-sentient quantum fields, said to be formed via sequential symmetry-breaking, are frequently posited to be random fluctuations of the most fundamental unified field. However, this two-level model does not include a logically consistent model of real mind with causal efficacy. It focuses on 'objective' levels of nature, but doesn't address 'subjectivity.' Also, it doesn't address inherent order—even assuming *fundamental* randomness and inherent disorder.

However, some interpretations of quantum theory now propose a third level that can account for real efficacious minds. One good example is Bohm and Hiley's *neorealist* interpretation, which includes a subtle level *in between* the ordinary physical level of conventional spacetime and the unified field. They called it the "*Ontological Interpretation*" to emphasize this subtle in-between level as a real additional level that permeates the *physical*. It also has been called *neorealism* because it recovers both the fundamental principle of objectivity independent from the observer and that nature is orderly and determinate—consistent with Einstein's 'hidden variables,' but not limited to *physical local causality* like his theories. The subtle nonlocal level *encompasses* the gross local level,

both encompassed by the 'universal plenum.' In this *three-level* model, the local level is the *explicate order*; the subtle permeating nonlocal level is the *implicate order*; and underlying both is the universal plenum or *super-implicate order*, akin to the unified field (Bohm, 1980; Bohm, Hiley(1993).

Unlike orthodox interpretations of quantum theory, the neorealist interpretation does not include 'quantum wave collapse due to the process of observing.' Rather, it posits a real, nonlocal field that permeates and influences physical matter particles (like other interpretations, however, not worked out in all needed mathematical details). It posits that real local matter particles are guided by real but more abstract nonlocal waves, also called *psi* or *pilot* waves (which means that orthodox quantum theory is incomplete, as Einstein believed). In further contrast to some interpretations, elementary particles are real whether measured or not (in other words, a tree falling in the woods creates a sound whether anyone is there to hear it). To match the behavior of objects according to quantum probability predictions, the *psi* wave must connect every particle in the universe, and also be classically invisible, superluminal, and permeate the *physical*. The causal efficacy of this implicate order means that the presumed closed causal nexus of the *physical* is not completely closed—though it appears to be within the limitations of quantum uncertainty.

The *psi* wave is said to carry 'active information' that reflects the totality of the experimental arrangement. As an 'active' carrier of information, associated with mind, it includes subjectivity. Conscious mind is brought back into the picture via the *psi* wave as an extremely subtle *causally efficacious intention* that permeates and influences the brain and the *physical*. It is both smaller than (permeating) and bigger than (encompassing) the entire physical universe. In other words, gross *matterstuff* is embedded in subtle *mindstuff*. And also, *inner space permeates outer space*. For the first time in modern science, this constitutes a logically consistent model of how your brain, arm, and hands, for example, *really* can be guided by your mental intentions.

In this neorealist interpretation, the gross classical *explicate order* is the familiar world of local interactions of the known fundamental forces within light-speed and billiard ball/particle causality, dominated by the appearance of independent discrete objects. The subtler *implicate*



order is a highly interconnected, entangled, enfolded nonlocal field of much more abstract wave impulses or fluctuations of a subtler spacetime field permeating the *physical*.

Indirect research now goes deeper than the tiniest time and distance scales to nonlocal fields. This additional level makes room for real mental space with real causal efficacy, and real free will. Similar to the relativistic spacetime gravitational field as comprising everything in the *physical*, this additional subtler medium has its own nonlocal fabric of spacetime. And whereas physical space used to be considered *empty*, now it comprises everything in the physical universe, extending relativity theory in classical physics. In turn, the subtle nonlocal level encompasses the gross local level, implicit in quantum physics. And in turn, these levels are encompassed by the universal plenum, super-implicate order, or 'quantum wave of the entire universe,' a key point of unified field physics. The gross explicate level is our familiar relativistic spacetime with object independence (and mind/body duality). The subtle implicate level has both object independence and interdependence—but still finite and relative compared to the infinite eternal level of spacetime of the all-encompassing unified field.

Defining the non-physical, nonlocal level of spacetime requires developing subtler means to probe beyond the tiniest time and distance scale of the *physical* (Planck scale). From the view of conventional space and time, the basic 'metric' is distance (e.g., cm) and duration (e.g., sec). Einstein's relativistic theories interrelated space and time, distance and duration. In these theories, light-speed is a defining limit of all interactions in the *physical*. This characterizes the gross level, explicate order or the relativistic spacetime gravitational field. In the subtle level, an additional 'metric' is needed for the degree of *interconnectedness*. This subtler level would not be directly measurable within limitations of conventional spacetime. It requires subtler means to investigate because of entanglement, interdependence, and non locality—including of mind.

The notion of *subtlety* connotes being more refined or delicate, less tangible, more abstract—sort of a gradient of perceptual abstraction. In some sense, water is subtler than earth (rocks, dirt), fire subtler than water, air subtler than fire, and space subtler than air. Space is the subtlest because it permeates the others. Increasing subtlety also is frequently

associated with smaller time and distance scales and finer-grained layers—cells, molecules, chemicals, elements, atomic particles, sub-atomic particles, and quantized fields—all the way down to the Planck scale.

As proposed in this paper, spacetime can be thought of as a 'substance' or 'medium' with three levels: infinite eternal spacetime, nested within which is subtle, finite, non-physical spacetime, nested within which is gross finite, physical conventional spacetime. As an analogy, the entire physical universe can be likened to an iceberg world in the ocean. The iceberg world (gross, local, physical, explicate order) has emergent local activity as a more restricted, less dynamic level with object independence. This gross level is influenced by the subtler flowing waves and currents of a non-quantized information field (non-local, non-physical implicate order, still finite), ultimately within the unbounded infinite eternal unified field (super-implicate order). The gross iceberg world and the less rigid wave world both exist in the ocean.

From another angle, there is a hierarchy of concentric real fields encompassing, permeating, and comprising grosser fields, like how conventional space permeates objects on the gross sensory level—only much subtler. The unified field level extends the concepts of space to infinity and time to eternity. It is a transcendent field that integrates point and infinity (space) with instantaneity and eternity (time)—what could be called the *ultimate holographic principle*. Subtle nonlocal and gross local spacetime are limitations of infinite eternal spacetime—a *three-level* model.

Three-level model

Local physical level
Nonlocal nonphysical level
Completely Unified field

The final chart here speculates on layers within the three-level model—a nested hierarchy with the gross level permeated by the subtle level that includes levels of mind. It is drawn from ancient *Vedic science* and has been called the holistic 3-in-1 Vedic account (Boyer, 2018).

Vedic Three-level Model

Gross Local Physical Level (akin to explicate order)

Gross sensory environment
Brain/body



- Electrochemical cellular processes
- Atomic/sub-atomic processes
- Quantum force-particle fields
- Electro-weak quantum field (Standard model)
- Strong electro-weak quantum field (Grand unification)
- Quantum gravity (related to 'strings' and 'branes')
- Planck scale (~10-33 cm)
- Information field space (related to 'qubits')
- Subtle Nonlocal Nonphysical Level (implicate order)**
- Subtle sensory environment
- Nonlocal information space
- Nonlocal, non-quantized space
- Sense organs/ Action organs
- Mind (thinking)
- Intellect (discrimination and feeling)
- Individual self/ego
- Transcendent Level (super-implicate order)**
- Completely Unified field/Universal Self (unity of infinitesimal point/infinity)

In this *holistic* account, anything and everything in phenomenal nature remains within the ultimate Oneness or Unity—and is nothing other than it, though it phenomenally appears to beat certain stages. As infinite and eternal, it is the ultimate 'reality'—what we might call pure existence/intelligence, or pure consciousness, or universal Self (though each of these terms have additional subtleties of meaning for certain explanatory purposes). Even just from the perspective of simple logic, that *completely* unified field would include all parts of nature and any conceptual understanding or attempt to define it. It would transcend any mathematical conceptions, forms, properties, and qualities—while also including them. Again, in order to help explain the phenomenal world, the model outlined here identifies three levels of spacetime: infinite eternal *completely* unified level beyond conceptual and experiential gaps, subtle nonlocal non-physical level that includes mind, and our familiar gross local physical level.

The entire diversity of nature *phenomenally emerges* from ultimate unity or wholeness—while remaining within it. The whole does not emerge from its parts; rather, parts phenomenally emerge as partial values within the whole—the *holistic* rather than *reductive* view. That totality, the *completely* unified field, can be said to inherently 'fluctuate' within itself to express phenomenal 'processes' and 'objects' from subtlest interdependent to grossest independent levels. The

ultimate wholeness appears to express itself as increasingly hidden and limited, with the point value increasingly prominent, from interdependence to independent objects in ordinary space and time. The process of cosmic evolution continues as the parts, appearing on the physical level as inert, congeal into stars, galaxies, and planets, subtly guided by inherent laws of nature. Over time, living beings evolve that are complex enough to express conscious intelligence, eventually evolving to direct knowledge of the ultimate wholeness or unity. Parts emerge from the whole, and then through increasing complexity the parts appear to unify—all along guided by the *whole*.

This holistic model, called *phenomenal emergence* (Boyer, 2018), contrasts with *epistemological emergence* and *ontological emergence* approaches to mind and consciousness. In *epistemological emergence*, all things emerge from and, theoretically, are reducible to the physical. However, emergent phenomena such as mind and consciousness *could not* have real causal power over the parts from which they emerge, if entirely due to the underlying parts (*supervenience*). In recent years, *ontological emergence* has become popular. This misnomer refers to mind and consciousness as *not* entirely reducible to their supposed underlying physical parts, and also somehow *having* causal power to direct the underlying parts. It relates to the notion that 'the whole is more than the sum of its parts.' But it would mean that mind and consciousness insert an *additional* ontologically real field into the closed physical causal chain to have the power to control the parts. In this model, new capabilities and behaviors *emerge* when the parts unify into a whole. Complexity increases rapidly with more interactions between parts of a whole unit or integrated system, such as the brain as a system involved in computing and guiding behavior of the individual as a whole—a separate organism or 'self.' At some point, smaller time and distance scales are needed for interaction between the parts, allowing faster and more powerful computational functions, such as in information science and nanotechnology. But conscious minds with causal power over their parts for *intentional* behavior don't magically appear with increasing complexity at finer-grained layers.

Some quantum models now include *additional levels of reality*, which logically could cause changes in the physical causal chain. In the third model of



emergence, described above, *the whole precedes the parts, and the parts emerge from the whole*. This is associated with the *holistic* Vedic account, rather than the *reductive* account in modern science. In this approach, the physical brain emerges from deeper ontologically-real levels of nature (in-between the physical and the unified field, as in the three-level model above) that include efficacious conscious minds. It suggests that the apparent closed causal chain ultimately is *not* closed.

Nonlocal causal waves influence matter. The classical scientific view of the physical world calculated change in terms of mathematical continuously flowing waves (classical wave mechanics). In most areas of modern physics, fields were also conceived as composed of collections of individual particles. In quantum theory, the particles were held to be wave packets of an unlimited number of much tinier ‘units’—quanta. In quantum field theory, these ‘wave packets,’ ‘wavicles,’ or quanta were conceived as fluctuations of fields—inevitably toward increasingly abstract conceptions of the essential nature of the phenomenal world. Whether these mathematical quanta are real was not addressed, even though they are sometimes attributed to have real Planck-scale dimensions in some type of real spacetime field. Described as if they are particle fields, their discrete particle-like nature and their continuous field-like nature have not been reconciled. This relates to the inability so far to unify the three particle-forces (electromagnetic, weak and strong nuclear fields) with gravity into *quantum gravity*. The Standard Model unifies the electromagnetic and weak nuclear fields. The Grand Unification Model attempts to unify these two fields with the strong nuclear field. Quantum gravity models attempt to unify these three fields with gravity in *unified field theory of everything*.

Noted earlier, the current popular belief in mainstream science is that mind is an epiphenomenon of the physical brain/body, with no power to alter the causal chain. However, the causal chain is interpreted only in terms of local physical processes; and now nonlocal, non-physical processes are being added. In this expanding ontology, change in the *physical* is guided by a subtle, underlying real field that includes mind. Because this level is held to be nonlocal and more interdependent, it is more evident that experimental outcomes might well be only probabilistically calculable. Both determinism and probabilism apply due to *unfathomable* complexity,

not *fundamental* randomness. The unified field as having inherent order (super-symmetric), not *fundamentally* random, is consistent with the holistic 3-in-1 Vedic account.

As might be expected for levels of spacetime with different properties, the causal dynamics correspondingly also would differ. On the subtle level, causality can be viewed as more wave-like, *permeating* the grosser particle level and influencing it with spatial and temporal ‘nonlocality.’ The ordinary tangible gross level is held to be influenced by subtler, real, more interdependent *nonlocal causal waves*. As physical objects are manipulated at finer layers of ‘coherence’ and interdependence, more wave-like properties appear. The process of measuring using ‘objective’ experimental methods identifies particle behavior. But wave effects can be inferred also, if not masked by the experimental set-up. Physicists Hiley and Callaghan interpret outcomes of research on Bell’s theorem and nonlocality, for example, in terms of both local particles (explicate order) and nonlocal waves (implicate order) being real at their respective levels.

One way to envision the emergence of Planck-size quanta within a continuous nonlocal field is that when each ‘point’ in the field has an inherent quality of order-producing attraction or gravity, so to speak pulling toward itself from all directions, and ‘points’ of the field are differentiated from each other, then the ‘points’ would pull on each other. When the pull of each ‘point’ with adjacent ‘points’ is practically speaking of infinite extent, then a ‘point’ on one side would pull in the opposite direction of the ‘point’ on the other side, in all directions. This could be understood as establishing each ‘point’ as a specific functional ‘point’ in the continuous field. The mathematical concept of a ‘point’ could be phenomenally *quantized* indiscrete ‘units’ with minimal physical extension, as a phenomenal *compactification* of the field (sort of opposite of compactification in string theory). Its dimensions would be determined by the strength of attraction and other counteracting/repelling forces inherent in the field, imposing a quantized *texture* to the underlying continuous field with the smallest physical dimensions (Planck scale). This links subtle non-Planck scale spacetime to gross physical Planck-scale quantized spacetime, from subtle more abstract to gross more concrete expressions of form (Boyer, 2008, 2018).

This quote from physicist F. David Peat (2016) adds a useful way to envision how nonlocal causal



dynamics could influence the *physical* in order to bridge the subtle and gross levels:

[L]ocality has served physics well, which implies that our hypothetical underlying non-local effects must be extremely subtle.... I suggest that the most promising place to look is in these extraordinarily sensitive non-linear systems that are termed “chaotic” But “chaos” may be a poor term to describe such systems.... Information which is distributed globally...would be hidden within the apparent chaos of a sensitive system.... Local disturbances propagate through a system and are normally assumed to dissipate themselves, becoming lost in the random fluctuations of the medium. But in a world in which events are correlated non-locally...a vanishingly small random fluctuation may...give rise to a large local disturbance....

From the view of physicalism, light particles from the Sun ricochet off a physical object and into our retinas. This triggers neural impulses that activate various brain structures, which may trigger neural output such as to the arm and hands. This model seems complete, because it can be replicated applying only physical mechanics (robotics). It is like data input into a computer that encodes the input, a central processing unit that retrieves information codes from its memory databank to process the input, and then activating output protocols such as triggering a printer. But the details of what happens in the gap between physical sensory input and physical motor output needs to be explained in the case of human life, minds, and consciousness. Filling in that ‘explanatory gap’ involves all levels of nature. All coarse-grained layers of activity have within them finer-grained activity of quantum layers *on the very surface* of the coarse-grained layers. This can be taken all the way down ‘the rabbit hole’ or ‘stack of turtles on turtles’ in some popular analogies to the finest-grained Planck scale—still on the surface. All these layers are physical, and they function deterministically whether expressing particle or quantum properties—though at finer layers so richly interacting as to be *unfathomable* and probabilistic in measuring them.

In the more expanded Vedic account, all the coarse-grained, finer-grained, and finest-grained layers of the physical medium are permeated by the subtle nonphysical medium that includes subtle ‘objects’ and levels of mind. Change on the gross physical level is in terms of gross inert particle-wave causal

mechanics embedded in subtle non-quantized ‘wave-field’ causal dynamics. The dynamics are influenced by real minds, with mental intentions and degrees of free will. However, nonlocal mind does not mean something like group mind with no individuality. As an analogy, a localized individual water molecule is part of a less localized individual wave of water; and an individual wave of water is part of the much less localized expanse of the ocean. The texture of the nonlocal medium has both more specificity and interdependence. It has ontological *substance* and epistemological *structural relations*, with individualized fluctuations or waves. This expanded view has huge implications. Physician/science writer Larry Dossey (1989) notes:

[S]omething vital has been left out of almost all the modern efforts to understand our mental life.... This missing element is the mind’s *nonlocal* nature.... If nonlocal mind is a reality, the world becomes a place of interaction and connection, not one of isolation and disjunction... toward the moral and the ethical, toward the spiritual and the holy (p. 107).

Means to Validate Phenomenal Levels of Spacetime 35

The mainstream scientific view is that consciousness and mind are only at coarse-grained layers of the physical brain. Now, some prominent quantum field theories attribute information, logic, computation, and discriminative ability to the finest grained physical layers. These *mind-like* functions are attributed to *nature itself*—while still believing that individual mind, if existing at all, is *only* at the coarse-grained physical level (Boyer, 2018). A more inclusive ontology is developing. As “physics is inexorably pointing to mind” (Kastrup, 2019), how do we investigate the subtle level of mind theorized to exist *in-between* the *physical* and the unified field?

To summarize modern scientific methodology, observations provide tangible data, evidence, or facts used to develop logical theories describing the data and accurately predicting how natural phenomena behave. The theories must be testable—usually meaning subject to disconfirmation—based on data collected by applying precise experimental methods. If the data support the theory, the theory remains viable; if not, the theory is modified or discarded. This is characterized as a *self-correcting* process, continually improving theories to make them more



accurate and reliable in accounting for empirical data. A hallmark of modern science is mathematical formalisms that allow precise calculable predictions. But smaller time and distance scales area lot more difficult to measure.

One means to validate the subtle, nonlocal level permeating the gross local physical level is through indirect research. Using this approach, interdependent wave dynamics are inferred based on empirical outcomes. However, Vedic science includes an additional systematic means: develop refined perception for direct observation of phenomena in the subtle levels of nature. The primary reason modern science has been locked into a materialistic view of spacetime and mind/body duality is that this is still our common everyday experience in daily life. This experience (which, again, Einstein held to be basic to “ordinary thinking” and to physics) characterizes perception in the ordinary waking state of consciousness. It is the ordinary experience of mind as ‘inside’ and the natural world as ‘outside.’ Einstein seemed not to recognize the ‘state-dependent’ nature of knowledge (Boyer 2008, 2018). Indian sage Nisargadatta Maharaj (1973) makes a profound point about direct empirical experience more fundamental than object/subject duality of the ordinary waking state in which modern science has largely been practiced:

You are taking duality so much for granted, that you do not even notice it.... Truth...is nearer than the mind and the body, nearer than the sense ‘I am’.... You have objectified truth and insist on your standard proofs and tests, which apply only to things and thoughts.... Your true being is...completely free from all self-identification with whatever it may be, gross, subtle, or transcendental (pp. 368-371).

In both ordinary experiences of local gross physical levels and extraordinary experiences of subtle nonlocal non-physical levels, the human sensory-perceptual system naturally gives experiences of *whole objects of experience*—perceptual ‘*gestalts*.’ Direct experience of subtle ‘objects’ of sense may not look like blips of fluctuating probability amplitudes, whirling swarms of atoms, vague dots of random light energy packets, overlapping pulsating waves of energy, or mathematical representations such as diagrams of density matrices. Rather, they may be qualia that look like four-dimensional objects but made of a subtler medium—naturally infused with more meaning and interconnectedness. Historically, attempts have

been made to depict such experiences at the ordinary gross sensory level in religious and spiritual works. Artistic expressions are replete with visual and verbal imagery to depict a fuller range of nature than the ordinary sensory level. Some of these works may be attempts to show what experiences of refined perception associated with phenomenally ‘real’ subtler levels of nature are like. Many of them are very moving and compelling depictions of what may be actual but rare subtle experiences. It is significant that such ‘visionary’ experiences have been reported more frequently in individuals focused on spiritual development and mind/body refinement.

When these subtler experiences became rare, belief in their ‘reality’ was based on ‘religious faith’ rather than direct experience. The unreliability of such rare, unverified experiences led to the *objectification* of nature—kind of starting over to be on more tangible, firmer ground about knowledge by applying ordinary sensory experience of the gross level of nature supported by logical reasoning—the ‘Age of Science.’ Since then, many individuals have been living their lives as if there is nothing more than the material world, while feeling inside that there is much more. This has greatly contributed to a deep tear in the psychosocial fabric of modern civilization. It has separated subtler, more holistic experiences people who report them feel are the most significant in their lives from the more restricted range of knowledge validated through modern scientific methodology. This concerns the gap between modern science and spirituality, directly related to mind/body duality and to the contrast of *physical* realism and *mental* idealism. This suggests that corresponding systematic ‘self-correcting’ *subjective empirical* methods need to be applied in the scientist/observer’s inner mind and self (Boyer, 2008, 2018).

Reconciling Realism and Idealism

In realism, it is reasonable to hold that objects exist independent from the observer. But like-minded observers seem to agree a lot on what the outer objects they experience are. It also is reasonable to hold that some qualities of the objects depend on the observer’s perspective—intuitive insights, paradigms—in line with *idealism*. Qualia don’t inhere in the objects alone, but are products of the contextual interaction of object and observer. Like-minded observers agree on many of these qualia too—if not, how could we function together to ‘do



science?’

Objective and subjective levels match to a fairly high degree across like-minded observers. Both the objective *realist* perspective of objects as independent from observers and the subjective *idealist* perspective of objects dependent on observers have considerable support. From a holistic view, however, ultimately neither has independent existence. The object, the process of observing, and the observer are nothing other than excitations, vibrations, or fluctuations of the unified field. In a *completely* unified field, objective and subjective domains necessarily are ultimately unified.

In Vedic science, the independent existence or ‘objective reality’ of the *observer*—what the observer identifies herself or himself to be—concerns the developmental state of the observer. The assumption of the independence of objects is underlain and accompanied by the experience of individuality (self as distinct from other). With respect to the unified field, ultimately there is no unbridgeable gap of observed and observer, objectivity and subjectivity. The rigorous focus in modern science on ‘objectivity’ has been in partial reaction to the inconsistency of subjective experiences and the unreliability of intuitive-like religious knowledge. This ‘objective’ approach has been quite helpful to gain reliable knowledge of the ‘outer’ physical world. The increased control of the surface level of the nature afforded by this approach has strengthened its acceptance throughout modern civilization. But the view is fundamentally fragmented, and is producing ‘reductive’ technologies that tear apart nature in the attempt to control it. Fortunately, progress is toward more integrative, holistic approaches that include mind with causal efficacy.

In ‘objective’ modern science, *reality* has been attributed only to things that can be measured in terms of the metrics of ordinary duration and distance. In the pursuit of more accurate knowledge, it is now extending into nonphysical fields in nonconventional, nonlocal spacetime. This subtler level is quite difficult to conceptualize how to measure, or even how to retain some form of individuality and substantiality of an independently existing, identifiable object in order to measure it (Boyer, 2013). It has not been widely appreciated that ‘empirical evidence’ depends on the investigator’s level of ability to experience. ‘Empirical’ means ‘experiential.’ There is no third-

person ‘objective’ perspective that is not also more fundamentally a ‘first-person subjective perspective.’ *Inter-subjective* consensual validation that is crucial for ‘objective’ science is based on what individual scientists agree on from their own *intra-subjective* first-person perspective. ‘Objectivity’ is based on, and is a special case of, ‘subjectivity.’

What has been largely overlooked is the developmental context of the scientific investigator. In Vedic science, knowledge depends on the state of consciousness of the investigators/observers and their ability to investigate (process of observing). Not appreciating this point, the *knower* (consciousness) and *process of knowing* (mind) have been quite difficult to comprehend. Developing the ability to experience more of nature involves deeper systematic *self-correcting* processes that reduce the inner noise of accumulated stress and expand mind/body functioning.

Summary and Conclusion

The upshot for *realism* is that the ‘objective’ world is *relatively real* in the sense of phenomenally independent from observers (object/subject *independence*), and *relatively unreal* in the sense that it cannot be known independent from observers (object/subject *dependence*). The upshot for *idealism* is that mind is *relatively real* in the sense that phenomenal experience of the world depends on it, and *relatively unreal* in the sense that mind is not the *Totality*. Because the phenomenal world appears to be ever-changing, relative, and finite, it could be said to be *unreal* compared to the *total unified field as the source of everything* that is infinite and eternal. This is a way to understand the phenomenal world as *Maya*, neither *real* nor *unreal*, and how the natural world and individual mind have been mischaracterized as ‘illusory.’

It seems quite reasonable to suggest that full development of the scientist/investigator is needed in order to validate total knowledge. Without some inner sense of that ultimate *Totality* transcendent to all ‘objects’ and ‘processes,’ intellectual analysis incessantly deals with parts and the essential unity that reconciles the parts—the whole—is quite difficult even to conceptualize. Intellectual conceptions of the full range of nature and its mathematical formalisms are quite helpful, but not fully satisfying validation without ‘direct experience.’ Deeper *self-correcting* processes of settling to inner silence beyond all activity of



thinking and feeling to develop subtler, more integrated mind/body functioning are needed—this is a key aspect of Vedic science, overlooked in recent millennia. It involves systematic first-person inner ‘direct experiences’ of *transcending* the mind/body gap, subject/object duality, and the contrast of idealism and realism. As Vedic scientist and educator Maharishi Mahesh Yogi (1967, p. 444) has stated:

Transcending thought is infinitely more valuable than thinking.

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