

ENLR-M.

## Essay on Nonlocal Reality

A monograph

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### ABSTRACT

This essay presents a non-mathematical review of concepts from quantum physics which necessarily change the prevailing mechanistic world-view of cosmos. The essential point is that a long series of experimental tests of Bell's Theorem, beginning with the Aspect experiments of 1981, has consistently shown that reality is nonlocal. In other words, there are effects, related to the phenomenon of entanglement, that are not subject to limitations of space and time. Despite Einstein's objections to theories of "spooky action at a distance", the experiments yield results which violate the speed limit of light. The present paper speculatively explores the implications for medical practice, for consciousness studies, and for world culture generally of acknowledging that the physical ("local") cosmos is based in abstract "nonlocal" reality.

### KEYWORDS

nonlocal reality; ontology; medical humanities;  
consciousness studies; quantum biology; natural theology

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## INTRODUCTION

### *Healing is a Cosmic Concept*

The twentieth century was a time of pervasive change, quickly and easily experienced by the general public, for it took place well within the reach of the ordinary physical senses.

It was a time at once stressing, distressing, and exhilarating. Yet in a very real sense the twentieth century isn't over—its turbulence continues as a storm to buffet this century, as if a global psyche were reminding us of unfinished business. However that may turn out, the next century will know this as a transforming time for a newly-recognized global culture with many problems still to be solved, at least from the human standpoint.

In the former century there was also a hidden revolution, known at first only to a few adepts, philosopher-physicists who struggled (and still do) with interpretations of findings remotely removed from the range of normal human sensing. This process too promises a revolution, namely a “turning over” of global mind to yield a new world-view.

The interpretation process of that seemingly “secret” knowledge points inevitably toward involvement of all departments of knowledge in the sharing and consolidation of ideas. New findings in quantum physics continue to point in that direction.

Quantum physics is also offering a new direction for approaching the life sciences. Until now we seem to have paused at that threshold which opens into a new view of life, of consciousness, and of cosmos. A textbook for the subject [1] has been published in the UK, and is being prepared for release in US in early 2015. At this point, it seems entirely reasonable to expect that the medicine of the future must correct its vision to encompass an ever-expanding field of view, and see even more clearly its possibilities for contributing to the reconciling—the healing—of the divisions in our culture.

## THE FINITE REALM

Quantum physics challenges our view of Reality. Many interesting questions have been raised by twentieth-century physics, as to the nature of the deepest level of reality. That doesn't sound like a *medical* concern, but it is: In affirming our commitment to evidence-based practice, we assert that we base our work on reality; thus we must revise our opinions about reality as new evidence comes to light. Familiar terms, such as *reality, being, existence*, etc. take on new shades of meaning when dealing with the implications of the new physics.

The subtleties of quantum physics are difficult to grasp by those of us who are not experts, who do not have a solid mathematical background, and we are beholden to those experts who interpret the findings to a general public. However, there is still much in quantum physics which confounds even the experts, for the findings seem to contradict ordinary experience and long-accepted theories of what is real.

In trying to grasp its meaning, surely we can be forgiven for wanting to translate its lessons into non-mathematical descriptive models in the mind which help simplify that which is complex, and which make it easier to correlate concepts of the small and the large, namely our concepts of “the quantum” and “the classical” as separate realms.

The goal of this modeling process is to make friends with quantum concepts which then may no longer seem weird. The process leads toward new ways of thinking about healing, [2] and toward a more coherent worldview, with implications for individuals and for society at large. In doing so, we might realize that in an important technical sense we are also caught up in a *mythopoetic* enterprise, in that reality is showing itself to be nonlinear, many-layered, and even meaningful.

### *The challenge of simplifying complexity*

In writing of a project to model galaxy formation, Boylan-Kolchin presents a dramatic image spanning 150 million parsecs, with nested insets which zoom in, each by a factor of 10,000 : “It is this huge range in scales that makes modeling of galaxy formation such a challenge.” [3] The aim here is simpler: to compress the cosmos into an impressionistic model which, when run as a thought experiment, seems to account intuitively (if only roughly) for the way the

cosmos is seen to work, yet which still allows plenty of room for expanding in any dimension that new evidence may require.

*What is the nature of Ultimate Nature?*

This model begins by defining *cosmos* as the “All that is,” physical and abstract. We generally define *real* (at least in casual speech) as that which is physical, brought into *order* (Greek: *kosmos*) by links of mechanistic causation. We also call this *nature*, and label that view as *naturalistic*. We then relegate any remaining aspects of the “All that is” to the abstract realm of thought. In the light of quantum mechanics (QM), we must include the abstract realm in our concept of cosmos, for that which has effect must be acknowledged to be real. Otherwise, we fall into the trap of construing cosmos as only imaginary. In QM especially, the maths of probabilistic relation are very much a part of the real, and must be included in the concept of cosmos. At that point the physical and the abstract alike emerge from the one reality, Being itself.

*What does it mean to BE ?*

In simplest terms, Being is that quality which distinguishes between something and nothing. Yet “nothing” may not become “something” without Energy, nor may we have Energy divorced from the quality we call Being. Therefore it seems both reasonable and convenient to postulate the equivalence, or at least the complementarity, of Being and Energy. One finds it hard to proceed further without switching (prosaically or not) into a more poetic mode of description: *Being is One. Being is reality, a quality unquantifiable, undefined and without limit, indivisible, inextinguishable. Once Being has appeared non-being can be no more.*

*Being is what IS is, what Existence is made of. Existence is a wrinkle on the bed of Being. Existence twisted into threads must ultimately unravel, but only then can Being cable it with other strands to weave and then re-weave the tapestries of form. [4]*

*What kind of cosmos is this?*

Quantum physics challenges the mechanistic model in important and unexpected ways, especially these:

- 1) there is interaction between “measurement” (consciousness) and physical outcome;
- 2) there is a deep reality which is unlimited by space or time, *i.e.* nonlocal; [5]
- 3) an uncertainty principle (Heisenberg) [6] limits precision of measurements;
- 4) two quantum objects related by *entanglement*, though separated in space, react together instantaneously; the quantum state of entangled objects may not be described separately. [7]

The proper interpretation of quantum experiments is still actively debated, and here we mention only a few theories, especially interesting for our purpose. The “standard model” is that of Bohr, Heisenberg, *et al.*, worked out in Copenhagen in the decade of the 1920s.

Fuchs *et al.* [8] advocate Quantum Bayesianism (or “QBism”), which seeks to account for subjectivism, while denying nonlocality. In 1986 Cramer [9] presented a transactional interpretation which incorporates nonlocality. Ghirardi, Grassi, and Rimini (1989) [10] have presented a continuous reduction model involving gravity. Though the effect is exceedingly weak the proposal is interesting as a possible bridge to a unified theory of quantum gravity. [11]

Various other proposals seek to account for the non-intuitive non-mechanical “weirdness” of the standard model by introducing additional weirdness, as in the multiple universes theory of Everett. [12] These debates center around the “collapse” of the probabilistic wave function, which is also referred to as *reduction* or *decoherence*. These terms refer to the selection of one of a pair of superposed quantum systems only at the point of some interaction (*observation, measurement*) with consciousness. Until observed, the quantum state is predictable only probabilistically. It is not a linear direct mechanistic operation.

This association with consciousness suggests, as Penrose has noted, [13] that we will not have a complete picture of consciousness without also having a satisfactory theory of reality.

Recent experimental findings seem to confirm that the orchestrated objective reduction (OrchOR) theory put forward by Hameroff and Penrose (see below) represents an important step toward such a unified theory of cosmos and consciousness.

There are many implications. Most compelling perhaps is the revealing of an abstract (nonlocal) aspect of cosmos which is not subsidiary to its physical (spacetime) aspect. Behind every physical (spacetime) object there is an abstract “cloud” of energy-information.

*Is Quantum Mechanics a complete theory?*

Einstein, with colleagues Podolsky and Rosen, [14] examined that question in their pivotal EPR paper in 1935. It concluded that QM is not complete, because the theory does not have an element which corresponds to every element of reality. The question was re-examined by John Bell [15] who in 1964 advanced a theorem which opened the way for a physical experiment which could answer the problem: If reality is *local*, a particular quantum experiment (comparing two widely-separated entangled photons) would yield certain inequalities.

Alain Aspect and colleagues [16] performed the experiments in 1981, and reported, “Our results, in excellent agreement with the quantum mechanical predictions, strongly violate the generalized Bell’s inequalities, and rule out the whole class of realistic local theories”. The experiments have been repeated with many variations to rule out possible loopholes in technique, and the effect has been confirmed in open air with source-detector separation of 97 km.[17] Two entangled photons react together instantaneously; there is no speed-of-light delay. Reality is nonlocal.

Note, however, that it is the instantaneous “transfer” of the state which is nonlocal. Establishing the entanglement condition requires a physical relationship. In accordance with Landauer’s principle [18] that *information* is physical, the state cannot be used directly for faster-than-light communications. It does however have application in quantum key cryptography as well as in computation and an increasing number of other fields, medicine included.

## THE BOUNDARY REALM

### *The mystery of infinities*

The concept of an abstract realm confronts us inevitably with infinity:

*... what to do with those endless tails of trailing decimals wafting beyond our sight  
into that nebula of number / where primal chaos still holds sway ...*

Informally speaking, we assign to the abstract realm concepts which are not physical (not “concrete”), that is, those objects of thought which are not analyzable as force or mass, nor can they be positioned in space and time. The “many colors” of infinity include:

- Singularity, as at the Big Bang and in black holes;
- Gödel’s Theorem (non-computability: formally undecidable propositions);
- Cantor’s Dust (the Cantor set of uncountable thirds);
- Hilbert Space (an infinitely dimensioned array);
- Mandelbrot set (fractional dimensions); and most anciently,
- Zeno’s Paradox (an infinitude of halvings in the countdown from one to zero).

### *A practical guide to physical numbers*

An interesting exercise for an idle rainy afternoon is to make a Möbius band ( $\infty$ ) from a narrow strip of paper: make a half-twist and connect the ends to make a continuous surface. At some arbitrary point mark a zero point, then write a positive powers-of-ten number scale, zero to infinity, allowing extra room for detail in the zero to one range; the infinity end will be on the blank side behind the zero. For our purposes now we do not need to fill in the negative number scale on the blank side. Note however that zero and infinity are in effect a complementarity in which each helps define the other.

Near zero, mark “(z)” as a reminder of the indeterminably small numbers in the *Zeno Zone*. The smallest physical numbers we are likely ever to meet are the Planck units: for time,  $10^{-43}$  seconds and for distance,  $10^{-35}$  m. The Planck units mark a boundary between the relativistic spacetime world, and the nonlocal abstract zone of faster than light (FTL) effects, such as the quantum entanglement condition.

The character of the physical world below the nano-zone,  $10^{-9}$  m, remains largely obscure. Small molecules and atoms appear in the  $10^{-10}$  m range, and quarks are  $10^{-16}$  m or so. Below that, physical detail is mostly theoretical, but as Feynman famously said, “There is plenty of room at the bottom.” [19] Quantum gravity and loop and string theory research (with M-theory) are expected by many to help fill in our knowledge about the near-Planck region and its interaction with the abstract world.

*The pulsed nonlocality conjecture*

In asserting the inseparability of Being and Energy we posit Being as a nonlocal continuous function; Energy is construed as waveform, with a frequency of  $10^{43}$  Hz. Here let us interpose a conjectural thought experiment about the boundary of the physical, which quite naturally will look at the boundary problem from its physical aspect.

Imagine a projected lecture slide [20] divided by a single horizontal line of dashes, which separates the whole-cosmos physical realm defined by space and time, from an indefinite abstract realm. Each dash represents a Planck time pulse ( $10^{-43}$  seconds) of energy.

Conveniently, the arrow of time has been paused at NOW, at the interval between two Planck-time ticks:

1. In the succession of energy pulses local states of the whole-cosmos are read and integrated, preserving the relationships among all quantum objects. We will imagine that these data are stored (nonlocally) in Hilbert space; the interval between the ticks (“picks”) represents reduction (decoherence) of the wave function. Being is deemed to persist even while Energy is pulsatile;
2. At the subsequent pick the whole-cosmos is re-created, its energy assigned to mass or force and adjusted for momentum and other properties of each object as recorded in Hilbert space;
3. Personal consciousness arises through integration in the brain of quantum data across many picks, providing a nonlocal *screen* on which is projected *content* processed from sense data at ordinary local neurological scale.

4. This is consistent with the Hameroff-Penrose proposal [11] of orchestrated objective reduction of quantum states in neuronal microtubules (as mentioned below). The frequency of Planck time ticks also sets the speed limit of light, which is one term in the Planck time formula.

By this sequence, abstract (Hilbert) space becomes the observer who *measures* the transaction, sustaining a cosmos which is actualized even in the absence of existing sentient beings. The nature of cosmos is thus “realistic” (naturalistic), yet the actuality of the whole cosmos is both local and nonlocal.

### *Entanglement*

In a 1935 paper, Schrödinger referred to entanglement as “the peculiar situation”. He was describing quantum systems which, after temporary physical interaction, when separated again, cannot then be described in the same way as before:

“I would not call that *one* but rather *the* characteristic trait of quantum mechanics – the one that enforces its entire departure from classical lines of thought. By the interaction the two representatives (or  $\Psi$ -functions) have become entangled.” [22]

In 2007 Horodecki *et al.* [22] wrote of entanglement as “a new resource as real as energy.” More recently, Krenn, and others [23] wrote “Entangled quantum systems have properties that have fundamentally overthrown the classical worldview.” A quantum system may be a photon, quark, cluster of quarks, atom, molecule, *etc.* making one wonder whether cosmos itself should be considered a quantum system, in which there is no true demarcation between “quantum” and “classical”. That distinction is significant only to highlight a difference in the levels of description (the degrees of complexity) between object and observer.

Entanglement is a nonlocal cosmic connecting principle. On reading a “match” of states between interacting quantum systems,  $\Psi$  (here representing whole-cosmos Schrödinger operations) “registers” the entanglement state.

Entanglement is multi-dimensional. In reporting a (100x100)-dimensional entangled quantum system, Krenn *et al.* [23] wrote, “Increasing the complexity of entangled states by expanding their dimensionality allows the implementation of novel fundamental tests of nature, and moreover also enables genuinely new protocols for quantum information processing.” This implies that there are, or at least could be, multiple levels of relationship between quantum systems, for example drawing into coherence and stabilizing relationships at many degrees of complexity throughout the cosmos.

### *Orchestrated objective reduction*

The Hameroff and Penrose theory of consciousness, [11] designated OrchOR, is a multifold theory which treats quantum reduction as an objective physical event, and provides a description of the locus and process by which conscious events are realized in individuals, advanced by a mathematical physicist (P) and an anesthesiologist (H). Diósi [24] and Penrose [11] had done prior work together on objective reduction of the wave function (which *inter alia* resulted in the quantum-gravity link mentioned above). Hameroff had identified brain neuronal microtubules (MT) as the locus of effect by inhaled anesthetics. [25]

Neuronal MT, 24 nanometer in diameter, are present in the cytoskeletal structure of all nucleated cells, but are especially numerous and well-organized in neurons. They consist of an alternating spiral latticework of proteins, alpha and beta tubulin, winding around a central cavity. Electron crystallography studies recently showed a “quantum channel” in tubulin, through which dipoles of “information current” (as I am calling it, informally) can flow to accomplish quantum computation. The Bandyopadhyay physics group [26] in Tsukuba Japan recently demonstrated quantum vibrations in MT, strongly supporting a role in the generation of personal consciousness.

In the OrchOR theory, brain neuronal microtubules in concert (entangled), at sufficient information density, generate discrete events of waking awareness as the basic experience of consciousness. As mentioned above, the pulsed nonlocality conjecture imagines the result (metaphorically) as a mental “screen” of alertness (or partial alertness when dreaming), on which are projected data from the sense organs, integrated within the brain at ordinary neurological scale.

## THE NOETIC REALM

### *Layers (and layers) of Abstraction*

Riding with Einstein on his photon beyond Planck's bound, if we could escape obliteration, we would expect to find ourselves (a felicitous phrase) moving faster than the speed of light, but with no *where* to go. Our assumed "reality" has been broken. A new vocabulary must be devised, to distinguish "local" (physical) phenomena from a deeper and more pervasive (in fact, unlimited) "nonlocal" realm. Seeking a neutral and nonsectarian term for the abstract aspect of the whole cosmos, I have suggested *nuocontinuum*, [27] based on the Greek word *nous*, for mind. It remains an appropriate term, despite its inference of interruption: the "pulsed nonlocality" idea is itself a superposition: whether the "pulsing" is seen as local or nonlocal depends on which side of the Planck boundary an observer chooses to stand. Quantum theory seems weird only when we search for an intuitive description while clinging to a rigid materialistic view. We may not reject the abstract levels of mind-consciousness in the cosmos because intuition is itself an abstract function.

Our capacity for consciousness increasingly opens before us an endlessly entertaining and manifold realm ranging from mind to meaning. Our ideas of reality must continue to unfold as new evidence emerges, for we, too, "are cosmos", a quantum state that especially deserves to be celebrated.

The experiences of humanity, as implied by ancient art (such as at the Lascaux caves), and especially as expressed in writings ancient and contemporary, bespeak a many-layered realm of the Abstract, encompassing mind, mathematics, model-making, mythos, mystery, and meaning; and no doubt, much more, reminiscent of Kantian categories. This string of M-words might well guide us in further exploration of the abstract realm. All of these objects of thought share the characteristic of nonlocality. That is, though the thoughts must be processed in a living brain, the mental product itself cannot be fastened upon coordinates of space and

time, except derivatively through the agency of our physical selves, by methods we ourselves devise. Spengler writes (and the emphasis is his):

*Every atomic theory, therefore, is a myth, not an experience.* [ 28 ]

### *Mind*

If the cosmos were set up in accord with the *pulsed nonlocality conjecture*, we would expect the nonlocal realm to provide a repository of data by which quantum states could “remember” the conditions between one plick and the next. But then it occurs to us that “nonlocality is not local,” and that nonlocality has no means within itself to define or delimit. Yet, data presents to us as collections of strings: datum + datum . . .  $n$ . That is, data’s elements are quintessentially delimited. This bewildering paradox is resolved (to the extent that it may be resolved) by the concept of Hilbert Space as an infinitely-dimensioned mathematical “space” in which the entanglements of its levels (dimensions) includes entanglements with the most fundamental physical objects, newly actualized with each “plick” of the whole-cosmos Energy.

Accepting such a concept allows us to think, metaphorically, that the brain projects onto the *screen* of mind the data it has interpreted from sensory (physical) inputs, as well as data from the brain itself, interpreted as “inner experience”. First, however, quantum processes, evolving, must actualize a brain, a whole body, and a whole scheme of metabolic processes and hierarchies of environments to support them. The mathematical phase space known as Hilbert’s Space is the abstract structure, most easily described as an infinitely-dimensioned array, which is already incorporated into the whole-cosmos aspects of quantum theory.

Here *mind* must be sharply distinguished from the organ which processes it, the *brain*. As consciousness seeks to identify its origins, we still do not yet know in physical terms just how the data inherent in this string of abstract M-words are stored. Perhaps loop quantum gravity theory or the string theories (with the M-theory which seeks to unify them) will provide a better description of “ultimate nature” in a physical sense, [29] but with a new conceptualization of time. [30] For the present argument we suppose that the foundation of the Abstract Realm is the nonlocal reality referenced in the Bell-theorem experiments, and we can use such concepts as the *virtual reality* (in one of its present senses), or *quantum vacuum*,

*quintessence, proto-consciousness, [11] or perhaps, with a slight adaptation of his meaning, a Spenglerian proto-spirituality or proto-soul. [31]*

### *Mathematics*

Mathematics is an abstract system of logical relationships which may be verified both internally and in reference to physical systems (when there is a doable experiment by which to test it). We consign it to the abstract realm since its findings are general, and applicable in any appropriate physical context. For example, the familiar formula  $d = r t$  (distance equals rate times time) is applicable everywhere, but like any thought object may not be positioned in spacetime. Its symbols are arbitrarily chosen: the relationship could be expressed just as well by any other arbitrarily chosen set of symbols ( $\Delta = \text{£ } \text{道}$ ), so long as the interpretation (representation) of the symbols is made clear.

There are other systems too which are based on nonlocal systems of logic, outside the purview of mathematics conventionally defined. Consider the grammars of our languages which specify meanings in various ways: word order, for example, and verb tenses and rules about modifiers of meaning. Consider musical (and dance) systems of notation, which specify pitch, rhythm, movements, etc. and are also “languages” applicable anywhere, among persons trained in the system. Consider philosophy’s use of notation systems to express logical relationships, and of course our systems of computational logic.

### *Model-making*

Model-making, such as we are engaged in here, also qualifies as non-local activity. Though a model properly represents a physical object, there are inevitable (and useful) differences between the object and its representation, such as of scale and function. As in the painting by René Magritte (1898-1967), “This is not a pipe.” The image of the smoker’s pipe is not the pipe itself, nor is the image *local* as such. The image somehow is “in the mind,” thus nonlocal, even though physically it is an arrangement of oils on canvas within a reference frame, the frame of the painting, which can be repositioned within the larger frame of cosmos; and of course, the brain which is “reading” the image is a physical object.

Models within the mind (“myths”, if you prefer) might well be thought of as tool kits useful for normative mental processes, in various contexts, but especially when we try to organize conjectural thoughts about mystery-gaps in “accepted truth.” However, we must expect such tools to be of only temporary usefulness, even as we (humankind together) continue to search for more definitive mathematical models whose outputs consistently agree with empirical findings within the physical and psychological worlds.

### *Mythos*

Of all the sets of experiences of humanity through time, the impact of the set of experiences related to the realm called “spiritual” has been enormous, both in the sense of “vast size” and an older use which hinted also of that which is “ominous.” I hesitated to refer to *spirit*, since understandings of it are so varied and vexed, yet it is always there whatever the culture, supporting those who are aware of it, through days of mourning and other difficulties, as well as in times of celebration, inspiring (in some sense) all human creativity and all of the arts. It engenders our impulses to create religions, and it lies at the heart of impulses to reach out to help and to heal in times of misfortune, misjudgment, and misunderstanding.

Unfortunately it is also active in pathologic and destructive ways, fomenting aggressions of various kinds, and seemingly endless wars. Perhaps the reason that we have so much difficulty with these darker aspects of the “spiritual realm” is that spirituality too is nonlocal. It is not a physical object that is easy to “get a handle on” when problems are created. In such psychologically *activated* situations interventions seem to have even greater uncertainty of outcome than usual, though I am not able to cite evidence for that impression. Obviously, here we have made complete the transition from a paper about modeling an interpretation of quantum physics to one which is (also) a philosophical essay.

By using the term *mythos* I hope to encompass all of the symbol systems which bear on such concerns. As a global culture we have confused the term *reality* with the idea of physical (including historical) actuality, and we have come to denote “myth” as meaning false, fueling fires of EITHER-OR conflicts about science and religion. Here *myth* is defined not according to tests of true versus false, but in terms of psychological efficacy in representing and supporting the meaningfulness of life, and the healthy continuity of human cultures, realizing that the

symbols are speaking in non-literal representational ways. Such an approach encourages us to be as fully in accord as possible with cosmic actualities, physical and abstract.

### *Mystery*

Yet the world of the abstract remains a realm of mystery, heavily laden with turbulent histories, particularly with respect to “spiritual” abstractions. Hoping to side-step unproductive discussions about “your spirituality” versus “my spirituality”, etc., and allowing us to think more dispassionately about abstraction in general, I use a neutral non-secular term for the abstract realm, *nuocontinuum* [2] the multidimensional continuum which (especially by its mathematical content) contains and supports the spacetime continuum, as outlined in the *pulsed nonlocality conjecture*. Would this perspective help analyze the dynamics of abstraction, by which the global culture might hope to react in constructive ways? It will need the awareness and perspectives of many disciplines before it could be accepted as such.

Would *symbolic dynamics* (SD, a math new since 1938) offer some hope? As presented in the foundational paper by Morse and Hedlund, [32] SD was developed from traditional theoretical dynamics, separated at a natural fault line (if I may be permitted to call it that) between differential analysis and “a more abstract symbolic analysis”. Further, SD “involves a characterization of the ordinary dynamical trajectory by an unending sequence of symbols termed “a *symbolic trajectory* ...”. A *symbolic element* (defined as a symbol taken from the trajectory,  $T$ ) is analogous to a line segment used in analyzing for recurrence and transitivity as in traditional analysis, to be applied in information (computational) theory.

A recent paper [33] and a review [34] characterize the recurrence and transitivity of SD as “remembering” and “forgetting”, which hints of a possible approach to the symbolic dynamics of *mythos* and *maths* for analysis of such questions (as in the *Layers* section above) of how quantum states could “remember” quantum states between one plick and the next, and of how Earth’s *mythos* might be influenced toward greater stability. *Mythos* and *maths* are usually treated as non-compatible enterprises, but both are properly classified with the abstract realm, and symbols are symbols, however different their representations may be. One notes too that Schrödinger [7] used the term *representatives* in referring to quantum states  $\Psi$ , implying that he was thinking of the observable quantum state as a *symbol* of some deeper reality of a quantum object (system).

### *Medicine*

In our reductive specialized world it often takes several practitioners to treat an illness, so it is not surprising that affirming a big picture takes observers from many disciplines. Medicine, with healthcare in general, seems eventually to encounter the full spectrum of human concerns, so it is perhaps now easier to bring into perspective Osler's optimistic observation of a century ago that medicine (broadly defined), "forms a remarkable world-unit in the progressive evolution of which there is fuller hope for humanity than in any other direction." [35]

That is a sentiment which was in mind in published correspondence, [36] to the effect that humanity itself is in some sense the patient for contemporary medicine. However, that author, now older and with much more measured optimism would hold that if that is to become so, all disciplines must work together to provide the ever-changing world-view projected from the oculus of the cosmic dome. Could not such a view help bring all human civilization eventually into some sort of healing circle?

### CULTURE IN TRANSITION

Speculative as this essay has been so far, it has sought to respect the operating principle of all good science, that theory must be held close to the existing evidence while structuring hypotheses by which to test new predictions. Now we may seem to be throwing caution to the wind, a spirit-wind no doubt. The "we", of course, consists of the author and his esteemed and essential colleague, you the reader. Here we step (together, I hope) into a less rigorously defined territory, onto a terrace where the marriage of evidence to opinion can be celebrated.

It is still difficult to find experimental evidence for interactions between nonlocal and physical systems outside the physics laboratory. However, since 1998 the Global Consciousness Project has been collecting data from a network of random number generators distributed around the globe. Their outputs are saved in a centrally-archived data base which can be "interrogated" to determine whether particular events, of wide public interest, correlate with periods of statistically significant variations from randomness. Strong variations have been observed during periods of intense public interest, especially on September 11, 2001. [ 37]

Acceptance of such findings has been hampered in part by the lack of widely accepted acknowledgement of the reality of nonlocality. Even so, physical evidence for nonlocality continues to grow. In a more specifically targeted (and more easily controlled) laboratory study, Radin *et al.* [38] report confirmation with several similar prior studies that perturbations in double-slit interference patterns correlate with interactions with consciousness. For an evaluation of first studies of intentions (prayer effects) in medical settings, see my *Foundations of Noetic Medicine*. [2]

### *Cultures Evolving*

The two-volume work by Oswald Spengler, *Decline of the West*, is a monumental study of evolving cultures. It was completed during the period 1914-1918, but was published in Munich in 1922. The C. F. Atkinson translation into English was published in New York in 1928. This fermentative period must have prompted many, surrounded by rubble and remains, to wonder just what civilization had come to. The period overlapped the early attempts to understand and consolidate into theory the surprising new findings of quantum physics, and came not very long after Einstein's "miracle year" of 1905, in which his papers on special relativity, equivalence of energy and mass, photoelectric effect and Brownian motion were published. Spengler was aware of and referred to the then-current physics. [39]

Spengler treats a culture as a monad, a fundamental unit which (in the philosophy of Leibniz), though perhaps consisting of many elements is unified in such a way as to operate and be analyzable as a single and distinct entity. "Cultures are organisms," he writes. [40] One is reminded of a *system* in current biosystems theory.

He distinguishes *being* which is a static state equivalent to being "dead," from the condition of *becoming*, characterized by active transition toward new forms. He identifies eight great civilizations which he treats as monads—cultures from the past which perhaps are still with us in memory or some minor influence, but which are not actively still-becoming entities. After the monads are analyzed according the wide range of a culture's characteristics, he presents us with evolutionary patterns common to all cultures (which may stabilize as civilizations), and are thought to have predictive value for determining our place in the life-cycle of our monad. [41]

He places us near the end of the great “Faustian” monad he refers to as “Christian-Gothic”, spanning the Christendom period, now fading in Europe and America. He points to the apparent beginnings of a ninth monad, a “Russian-Christian” (i.e. Russian Orthodox) period now germinating, but he classifies it as a *pseudomorphosis*, a “false form.” That term is borrowed from geology and refers to the shaping of new crystal formation by harder older more persistent material. However he leaves us with a prediction, and a cosmic experiment which will run its course in what is now this our own new millennium. Let us be content, for now, to leave his conclusion as our question: Will the new era evolve toward religion whose sensibilities are more like those of Dostoyevsky or Tolstoy? [42]

Spengler was writing before the Russian Revolution so he had not then encountered the Soviet empire, but (especially with the fall of the Wall) it is hard now to accept his analysis of “the ninth”. One hopes, in this globalizing era, for something more cosmic which treats Earth as a monad, the home base from which we have only begun to reach out to the stars. [43] Yet we must always be open to the idea of finding meaning “in here”, within ourselves before we can handle encountering a meaning of the cosmos in some physical “out there”.

It seems obvious that Spengler’s model is not a system for predicting space-time events, but it can be seen as an aid to recognizing cultural trends and tendencies. Quite definitely it belongs to the realm of the abstract, and can be taken as (necessarily indirect) evidence of dynamism in the nonlocal realm. Its elements are represented as symbols, perhaps rather like dream symbols, which are associated more with spiritual value than with clinical value by today’s psychotherapies.

### *Seeking Meaning*

The collapse of traditional systems of meaning, widely acknowledged today, leads to a collapse of the models (the myths, the narratives) which can draw the human family together, and it has led to a deafening to the Word, the *Logos*, the *Tao* which invests the literal actualities with a sense of significance, place, and purpose.

Our present monad demonstrates an evolving capacity for complex concepts, as well as evolving preferences for symbolic representations to replace the authoritarian literalisms of the past. It is here we see a close entanglement of modeling with meaning, but Models must be updated regularly as new evidence presents itself. Further, models are environmentally

fragile, in that they must not be allowed to freeze into dogma. Today's expanded capacity and other advances in communications make it easier to become aware of continued cultural interactions, and of how ancient and modern ideas are mixing in our globalizing world.

It has become easier, too, to keep in touch with how symbols appear, change and disappear, but one faces the problem of missing the Meaning in the processes of sorting "details" from the "devils". This account of cosmos makes the traditional dichotomy between sacred and secular a false distinction. We are brought back into touch with primal ideas, such as are traditionally held by the First Nations peoples of the Americas, that it is all sacred, and deserves respect.

Ancient understanding sensed changing actualities as a "spirit" wind. Now we can see *spirit* as the mental (psychological) analog to *energy* in physics, the agent of change in *Kosmos*. Our immediate task is to sense that the breeze is blowing more freshly, and to catch it in our sails so that we may journey across new "meridians of meaning" [44] which are opening before us. We need not be surprised when our models begin to look increasingly like stanzas of an endlessly branching epic *Mahabharata*, within whose infinities are encoded the foundation myths for elaborate and self-renewing cosmic cultures yet to come.

#### *Natural theology*

Natural theology, during my lifetime (and perhaps even more-so, recently), seems to have lost ground to sacred theology. Let me try (*essay*) to state that another way: Interest in philosophical ideas about *God*, based in reason, seems to be waning even as literalistic mega-churches, based in scriptural revelation, are growing. Of course literalism abounds in other theistic traditions, too, and conflicts about traditionalism and fundamentalism are showing up even among Hindus, who have a long tradition of assimilation of alien ideas.

This is indeed a difficult time to discuss sectarianisms. However, I ask you kindly to let me express generic ideas in terms of my own theistic tradition, in a spirit of hope that global divisions might someday be overcome and that these statements might be understood as an embrace of the idea of a truly global, and eventually cosmic, spirituality which will hold up no matter what new sciences may reveal the actualities to Be.

In accord with the model (metaphor, mythos) presented above, my own theological position is perhaps best characterized as a version of panentheism, in which the symbolic name *GOD* (in Hebrew tradition a name too holy to pronounce) represents the All-that-is, the whole **Kosmos**, local and nonlocal, in which “we live and move and have our Being” [45] and in which “all things visible and invisible” [46] exist within the Being-Energy (as in the *Tao Te Ching*), [47] beyond name who does not insist upon our acknowledging any particular dogma or doctrine. Once sensibilities are translated, “local” barriers are transcended.

Such a position values all sources of wisdom rather than one Scripture alone, and its seekers may or may not gather with others in assemblies, hierarchical or not, theistic or not, according to the insights of one’s own findings so far, on a life-long personal Quest. It works toward a common ethic, does not seek to alienate any of the world’s valued traditional religions, but it favors working together—interacting to create communities of tolerance, and to show that their varied symbols may be translated one to the other with the purpose of unifying understandings. Such a position celebrates Truth-Beauty-Virtue wherever it can be found. It finds meaning in consciousness and in life itself.

## *22. Healing*

It is the essence of “salvation”, within whatever tradition, to be brought into awareness of the realm of potential consciousness beyond the current limitations of one’s personal identity-world, the *ego*. Cosmos is not about *ego*, certainly not my own. The best answer we can give at present is that cosmos is about consciousness and about how it evolves within ourselves in this extended epoch [48] in which we are placed for a moment, that epoch which is moving toward an ultimate convergence [49] into a fuller consciousness which so far science knows only dimly, and calls quite tentatively, the nonlocal reality.

*Coda*

*The more widely we do see  
The greater is the mystery,  
Yet more vibrant then  
the Beauty of it All*

*The real M-theory is the  
Universe of Me*

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