World Hypotheses and the Evolution of Integrative Medicine: Combining Categorical Diagnoses and Cause-Effect Interventions with Whole Systems Research and Nonvisualizable (Seemingly "Impossible") Healing

Gary E. Schwartz, PhD[1], and Ernest P. Schloss, PhD[2#]

It has been proposed that to understand (1) the evolution of science and medicine, and (2) the integration of conventional, complementary and alternative medicine, it is essential to consider at least eight universal implicit meta-cognitive hypotheses. It has been suggested that these implicit "world" hypotheses can be applied in every discipline of science. The present paper reviews the eight world hypotheses and proposes an additional hypothesis, termed the nonvisualizable or "Nth" world hypothesis (adopting the mathematical concept of "N"; eg, as in N dimensional space). Drawing on contemporary mathematics and quantum physics, we propose that *certain theories and data–by their inherent nature–can not be visualized, and therefore may seem "unimaginable" and "impossible" (if not "unbelievable"), even though they are real.* Certain seemingly anomalous observations in mind-body and energy medicine, including areas historically labeled as parapsychology or spiritual energy healing, often elicit strongly skeptical and dismissive reactions. We propose that these skeptical and dismissive reactions to purportedly impossible (yet logical) theories and seemingly unbelievable (yet replicable) data can be tempered when the Nth world hypothesis is understood and incorporated. Integrity in evidence-based science and medicine may require that scientists and nonscientists alike develop comfort and humility in accepting the human mind's restricted ability to envision and imagine certain nonvisualizable–yet fundamental and real–concepts and effects, as illustrated in contemporary physics and complementary and alternative medicine.

Key words: CAM, integrative medicine, theories, implicit processes, healing

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Schwartz and Russek[1] and Schwartz and colleagues[2] have developed a conceptual framework for integrating conventional Western medicine with complementary and alternative medicine from both the East and West. This framework, based on the work of philosopher Pepper,[3] posits the development of increasingly more complex and abstract (as well as spiritual) hypotheses, or world hypotheses, about how nature works and evolves.[4]

Buck et al[5] examined the relationship of Pepper's original four world hypotheses to chronic pain and patient healthcare choices. They found that patients who adopted categorical and mechanistic world hypotheses (world hypotheses one and two) tended to choose more conventional interventions, whereas patients who preferred contextual and organismic/systemic world hypotheses (world hypotheses three and four) were more likely to select complementary and alternative medicine interventions. Schwartz and Russek[1] and Schwartz and colleagues[2] expanded the list of world hypotheses to eight (described below).

Building on the earlier framework Schwartz and Russek[1] and Schwartz and colleagues[2] of eight world hypotheses, and drawing upon the established literature in contemporary mathematics and physics, we propose here a ninth world hypothesis, which we call the nonvisualizable (or Nth) world hypothesis. As will become clear, we posit that the Nth world hypothesis is the most challenging and humbling (as well as "mystical") of all possible world hypotheses, and that understanding this implicit world hypothesis is essential to make conceptual sense of some of the most controversial observations and claims for complementary and alternative medicine.

This paper presents (1) an overview to the nonvisualizable world hypothesis, (2) a brief review of the original eight world hypotheses,[1] (3) a discussion of the meta-world hypothesis that inspired the creation of world hypotheses in the first place,[2] and (4) the set of reasons for proposing the Nth hypothesis be added to comprehensively address theories that bridge the most challenging, controversial, and seemingly unimaginable and unbelievable concepts in mathematics, physics, psychology, medicine, and spirituality.

OVERVIEW TO THE NTH WORLD HYPOTHESIS

The Nth world hypothesis proposes that to understand certain phenomena in nature, it is essential to try to "imagine"

1 Departments of Psychology, Medicine, Neurology, Psychiatry, and Surgery, Laboratory for Advances in Consciousness and Health, University of Arizona, Tucson, AZ

2 Administration, University of Arizona College of Medicine, University Medical Center, and University Physicians Healthcare, Tucson, AZ

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Corresponding Author. Address:
PO Box 245017, Tucson, Arizona 85724-5017.
email schloss1@email.arizona.edu

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Table 1. Eight World Hypotheses

World Hypothesis		Description
World Hypotheses of Pepper[3]		
WH 1	Formistic	All structures and functions exist as separate categories
WH 2	Mechanistic	All effects have causes that precede them
WH 3	Contextual	All structures and functions exist in context and are relative
WH 4	Organismic	All structures and functions reflect organizations of interactive relationships—parts interact and become whole systems
World Hypotheses of Schwartz et al		
WH 5	Implicit process	All systems involve invisible processes of information/energy/matter that interact over time
WH 6	Circular causality	All systems involve the circulation of information/energy/matter that interact and change dynamically over time
WH 7	Creative unfolding	All systems reflect flexible orders, express plans, and serve multiple purposes
WH 8	Integrative diversity	All phenomena in nature reflect complex interconnected, integrated orders or harmonies of diverse processes

WH, World Hypothesis.

phenomena that are inherently and ultimately "nonimaginable" (except, to some extent, metaphorically). Consequently, because certain concepts and data are inherently "nonvisualizable," they may seem to be unimaginable, impossible, and unbelievable, and be dismissed, even though they are in fact true.

The necessity for positing and accepting certain nonvisualizable concepts and findings in science and medicine is illustrated by highly abstract theories in contemporary mathematics and physics. For example, the imaginary number I, the square root of −1 (which is actually nonvisualizable) or the existence of 10 or 11 dimensions in superstring theory (which are also known by mathematicians and physicists as nonvisualizable) can be "real" even though they can not be visualized, except in metaphorical (and therefore incomplete) ways.

The most anomalous theories and findings in contemporary psychology, medicine, and spirituality, as reviewed by Cardena et al[6] in *Varieties of Anomalous Experience*, require that an implicit world hypothesis (termed the Nth world hypothesis) be entertained and ultimately accepted as part of reality.

To avoid possible misconceptions at the outset, the reader should appreciate that we are *not* proposing that all things that are unbelievable must be therefore true. That would be both nonsensical and nonscientific.

Instead, what we are proposing is that just because something seems impossible and unbelievable does not necessarily make it unreal. We are proposing that both logic and data lead to the conclusion that certain things that seem quite nonvisualizable and unimaginable–and even seem impossible and unbelievable–may reflect some of the deepest and most foundational qualities of nature and reality.

WORLD HYPOTHESES

World hypotheses are meta-cognitive structures that reflect implicit assumptions about how the world works and evolves. According to Schwartz et al[2]:

> . . . world hypotheses reflect implicit, content-independent assumptions about how nature works, assumptions that shape all aspects of information processing–thinking and feeling, problem solving and creativity, planning and intuition. New hypotheses emerge under the pressure of new experiences and understandings.[2(p6)]

Table 1 shows the eight world hypotheses, the original four proposed by Pepper[3] and the additional four proposed by Schwartz and his colleagues.

World Hypothesis One: Formistic

The first of Pepper's world hypotheses establishes categories of experience or content. The simplest of these is the binary "black" and "white," or "right" or "wrong" view of the world.[1] Classification sciences such as botany, zoology, personality, and pathology reflect the formistic world hypothesis.

World Hypothesis Two: Mechanistic

The mechanistic world hypothesis, the basis of classical Newtonian science, assumes that there is a cause and effect for all events in nature.[1] As Wilber[7] describes it, "if you do this, that will follow." Single cause–single effect models were the basis of classical reductionistic science, from physics (eg, Newtonian) and biology (eg, the germ theory of disease) through psychology (eg, stimulus-response) and ecology (eg, global warming caused solely by the burning of fossil fuels).

World Hypothesis Three: Contextual

The contextual world hypothesis adds relativism and says, "It depends upon the way you look at it." It says that everything exists in a context and that there are always at least two ways of understanding phenomena, based on the context and the point of view of the observer. This formed the basis of Einstein's relativity theory and Heisenberg's uncertainty principle and expresses itself in seeing alternative interpretations for phenomena (eg, disease can be caused by the presence of a pathogen or the resistance of the host's immune system–depending upon the way you look at it.)

World Hypothesis Four: Organismic

The organismic world hypothesis says that everything is related to everything else. This is basic systems theory, where each thing

is both a whole and a part, termed a "holon." This model is also dynamic in that each thing is dependent upon other things in the system. Everything is interconnected to various degrees. This worldview serves as the basis of modern biology and engineering, as well as systemic approaches to health psychology, psychosomatic medicine, and behavioral medicine (eg, disease can best be described as being caused by complex combinations or interactions of processes such as the presence of pathogens interacting with the status of the immune system).

Note that from an organismic/systemic perspective, each world hypothesis (presented in the order above) incorporates and extends the previous hypothesis:

- cause-effect thinking (the second world hypothesis) implicitly requires categorical thinking (the first world hypothesis);
- contextual thinking (the third world hypothesis) involves multiple categorical and cause-effect thinking (the first and second world hypotheses); and
- systemic thinking (the fourth world hypothesis) involves a complex combination of categorical, cause-effect, and contextual thinking (the first, second, and third world hypotheses).

Also note: each hypothesis reflects an evolution in complex information processing—expressed in the evolution of mathematics and science to the evolution of consciousness itself.

World Hypothesis Five: Implicit Process

Schwartz and Russek[1] drew from contemporary theories in science (as well as long standing beliefs in Eastern as well as ancient cultures) to formulate their four additional world hypotheses. The first of Schwartz and Russek's hypotheses posits that there are invisible processes (which are imaginable) that can be understood by science, energy being a good example. Schwartz and Russek say, ". . . a major goal of science is to envision the invisible, discover the invisible, and come to understand the invisible."[1] The sciences of physics and psychology, for example, are both founded on the principle of implicit process thinking: making the implicit explicit by inferring the underlying processes of natural systems from their observable behavior. Neither gravity nor cognitions can be seen. Only their resulting behaviors are observable and measurable. The fifth world hypothesis includes mind-body medicine, energy medicine, and spiritual medicine.

Note that implicit-process hypothesis means "invisible," not nonvisualizable. As will become clear below, some concepts in mathematics and physics are not only implicit (as in invisible yet imaginable—the fifth world hypothesis), but they are literally nonvisualizable (ie, impossible to visualize and therefore are nonimaginable—the Nth world hypothesis, described below).

World Hypothesis Six: Circular Causality

This hypothesis posits that there is a constant circulation of information, energy, and matter in all natural systems.[1] Schwartz and Russek elaborated on this concept is their book, *The Living Energy Universe*,[4] in which they account for memory and learning in all dynamical systems through mutually reinforcing (or learning) feedback loops. In the simplest two-component system, component A sends information to component B, which interprets the information, sending it back to A, which in turn reinterprets the information, sending it back to B, and so on. This hypothesis extends contemporary science to consider anomalous phenomena, from memory in water (homeopathy) and cellular memory in heart transplant patients, to memory in complex biochemicals (eg, DNA). It includes contemporary developments in nonlinear dynamics, complexity theory, and chaos theory.[4]

World Hypothesis Seven: Creative Unfolding

This world hypothesis suggests, ". . . order, especially complex order, does not arise through chance, but emerges from explicit, or implicit intentions or plans."[1] Schwartz and Russek[1] call these programs, the "generic" code (after the term "genetic code") and follow the notion of "implicate order" as postulated by Albert Einstein's distinguished student, David Bohm. Bohm said,

In terms of the implicate order one may say that everything is enfolded into everything. This contrasts with the explicit order now dominant in physics in which things are unfolded in the sense that each thing lies only in its own particular region of space (and time) and outside the regions belonging to other things.[8]

Schwartz and Russek further say, "Trial and error, intention and accident, this is the vision of the creative unfolding hypothesis. From this perspective, things in nature do not occur "by chance," rather they are "given the chance" to occur."[1]

Schwartz and Russek acknowledge at this point that they are entering into the spiritual or mystical realms. "Issues of growth, change, meaning, spirit, soul and love logically follow from the creative unfolding hypothesis. . .."[1] This world hypothesis addresses a subset of anomalous theories and phenomena purported to occur in spiritual energy healing (eg, that a Great Spirit, source, or God can play a role in healing).

World Hypothesis Eight: Integrative Diversity

Schwartz and Russek's final world hypothesis, although they proposed that others might be discovered in the future, is their most "inferential, complex, and spiritual."[1] This is a hypothesis of complete integration, where seemingly contradictory phenomena can exist in the same "soup" as Schwartz and Russek call it.[1] An example of such a theory in physics is complementarity—how light can be both a wave and a particle. It is the search for the grand unifying theories of nature that allow for all possibilities in what may be known to humans only as a mysterious plan. It reflects the physics' dream to create theories of everything, or what Wilber calls integral theories (eg, Wilber[9]). The search for integrative-diversity theories, the latest in physics termed superstring theory, arguably reflects the greatest conceptual (and political) challenge for contemporary science, including integrative psychology and integrative medicine.

"LOVING OPENNESS" AS A META-WORLD HYPOTHESIS

After they developed their eight world hypotheses, Schwartz et al[2] discovered that underlying their effort to posit implicit world hypotheses was a deeper implicit question, "Why formulate the world hypotheses in the first place?" Their conclusion was that

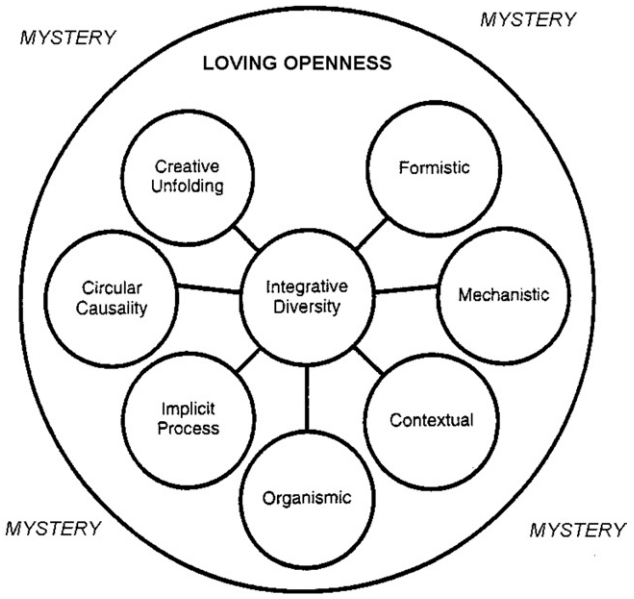

Figure 1. World hypothesis model revised to include the Nth world hypothesis, Mystery.

additional implicit world hypotheses were needed to facilitate discovery in nature, not merely describe it. To account for this facilitation, they further expanded their model by adding a "mother of all meta-hypotheses"–a "meta-meta hypothesis" (since world hypotheses are themselves meta-hypotheses), termed "loving openness."

Loving openness has a twofold purpose according to Schwartz et al: "1) to foster creativity (including freedom and flexibility); and 2) to foster caring (including honesty, sharing, and generosity)." Combining "openness" and "loving" captures the "relentless search for truth."[2] The model of Schwartz et al[2] is shown in Figure 1 (the Nth world hypothesis entitled "Mystery" has been added to this diagram).

The positing of a ninth world hypothesis requires the adoption of the loving-openness meta-world hypothesis and the first eight world hypotheses.

THE NTH WORLD HYPOTHESIS: POSITING AND ACCEPTING NONVISUALIZABLE PHENOMENA AND MECHANISMS

The Nth world hypothesis posits that *certain theories and data–by their inherent nature–can not be visualized (are not imaginable, except metaphorically) and therefore may seem impossible (if not unbelievable) even though they are real.* The inspiration for recognizing the need to posit a ninth world hypothesis occurred while G.E.S. was reading Nadeau and Kafatos's book, titled *The Non-Local Universe: the New Physics and Matters of the Mind.*[10] In the process of reviewing theories and data supporting the concept of nonlocal phenomena in contemporary postmodern physics, the authors proposed the profound distinction between:

- those concepts and processes that are abstract but can be imagined (in the sense of being capable of being visualized, eg, most fifth world hypothesis concepts, like the form of an invisible wave), and
- those concepts and processes that were inherently nonvisualizable (in the sense of being impossible to visualize) and could only be described approximately through metaphor (for example, the form of infinity).

The title of chapter 2, Leaving the Realm of the Visualizable: Waves, Quanta, and the Rise of Quantum Theory,[10]of Nadeau and Kafatos's book initiated this fundamental appreciation in G.E.S., and this controversial implicit world hypothesis was discussed at some length with E.P.S. The phrase "leaving the realm of the visualizable" speaks to the shift from the visualizable (eg, the wave) to the nonvisualizable (eg, quantum entanglement).

We came to appreciate that certain well accepted abstract mathematical concepts (such as the number I, n dimensional space, and infinities of infinities, to list a few) as well as certain contemporary concepts in quantum physics (including Heisenberg's uncertainty principle and Bell's nonlocality theory) were inherently and unavoidably nonvisualizable. Such concepts could be labeled with words, and even sometimes be described metaphorically. However, the actual concepts themselves were beyond complete verbal or visual description. Their understanding was both abstract and intuitive.

This is why certain theories and findings in quantum physics seem so "weird." Physicists playfully label this observation "quantum weirdness."

This is the crux of the distinction between the fifth and the Nth world hypotheses. The fifth world hypothesis deals with invisible phenomena such as gravity, yet these phenomena remain "capable of being visualized"[11] in that one can imagine that gravity is a wave, stream, or some other construct based on the five senses. The Nth world hypothesis, however, addresses those concepts that are inherently invisible *and* nonvisualizable, of which the mathematical concepts noted above are examples. Quotations about the visualization problem in modern physics are cited under the entry "visualizable" in the *Oxford English Dictionary*.[11] On this basis, nonvisualizable concepts may seem impossible or unbelievable to those who cannot visualize them.

We came to recognize that the well-known phrase "these are the kind of data I wouldn't believe, even if they were true" (spoken often about empirical findings in parapsychology including research on telepathy, remote viewing, mind-machine interactions, and mediumship–eg, Radin,[12] Schwartz and Russek,[4] Cardena et al,[6] and Schwartz and Simon[13]–speaks to the common feelings of impossibility and unbelievability about certain concepts and observations in nature and the universe as a whole.

While we were completing this paper, we discovered an article published in the *USA Weekend Magazine* that discussed organ transplants and the controversy surrounding cellular memory (a prediction from the sixth world hypothesis).[14] The article quoted Stanford University cardiologist John Schroeder as saying, "The idea that transplanting organs transfers the coding of life experiences is unimaginable. . . . Most scientists believe psychological experience is stored in the brain. This is just not something the [medical transplant world] accepts." We interpret his statement to mean that because he could not imagine it

(though in this instance it is actually visualizable), he simply presumed it was impossible.

In discussing the need for a ninth world hypothesis with E.P.S, the latter pointed out that this was the heart of spiritual experiences typically described as mystical. Mystics throughout recorded history have described this in terms of the "mystery."

E.P.S. proposed that calling the proposed nonvisualizable (yet real) world hypothesis the ninth world hypothesis was insufficient to express its ultimate meaning for the world hypothesis framework as a whole (since other more specific world hypotheses might be discovered in the future). Following a detailed discussion of the nonvisualizability of n dimensional space (ie, beyond four dimensions of three-dimensional space plus time), and in keeping with the generic mathematical concept of "n," E.P.S. proposed the label, the Nth world hypothesis.

Note that positing the Nth world hypothesis immediately speaks to the experience of most scientists (regardless of their degree of openness to anomalous phenomena in psychology and medicine) that certain contemporary theories and findings are impossible and unbelievable. For example, despite the findings of double-blind distant intentionality studies documenting that prayer can be associated with measurable and significant healing (eg, Dossey[15]), the conclusion that "double-blind prayer can heal" still seems impossible.

In current laboratory research with research mediums, Schwartz et al,[16] and Schwartz and Simon[13] have repeatedly witnessed phenomena (replicated and captured on video tape) that seem impossible and unbelievable, yet clearly has happened. Some of the observations go beyond anything posited by the eight world hypotheses (note, predictions from hypotheses five to eight often seem unimaginable and unbelievable to individuals who only adopt hypotheses one to four).

Often when data seem unbelievable, we search for explanations to explain (or explain away) the findings–including statistical accident (ie, the findings are due to chance), possible experimenter error or bias, and even potential experimenter fraud. However, some observations turn out not due to these common "causes" (the second world hypothesis), or even a combination of them (hypotheses one to four, or more).

Here is how Sri Aurobindo, the great Indian scholar and mystic (cited in Dalal,[17] described how people respond to claims of mind not only influencing matter (as documented in 20 years of research in Princeton University's Princeton Engineering Anomalies Research Laboratory in the Department of Electrical Engineering[18]), but mind existing in matter itself:

The consciousness of Matter, of the inert form, is difficult indeed for us to understand or imagine, and *what we find it difficult to understand or imagine we consider it our right to deny* (italics added).[17]

The temptation to dismiss data we find impossible to believe can be tempered once we recognize, and accept, that contemporary mathematics and physics require that we go beyond what we can visualize and imagine in four dimensional space-time. We propose that these mathematicians and physicists are implicitly adopting an implicit meta-cognitive hypothesis into realms that can not be visualized.

In his book *Mysterious Flame: Conscious Minds in a Material World,* McGinn terms this "Mysterianism."[19] Schloss simply terms it "the mystery [E.P.S.]." The principle is the same– being open to McGinn's statement of the possibility that "our intelligence is wrongly designed for understanding consciousness,"[19] (and we would add, many other things).

If mind-body medicine in particular, and psychology and medicine more broadly, wish to consider themselves to be "logic-based" sciences as well as "evidence-based" sciences, it seems necessary that researchers and clinicians seriously consider adopting some version of an Nth world hypothesis.

We propose that it may be time for science and medicine to expand its implicit world hypotheses and that we come to recognize that certain concepts and observations in the physical, chemical, biological, behavioral, social, and ecological sciences require that we open our minds beyond our current ability to visualize. Furthermore, it may be time for us to accept, with humility, that a subset of theories and findings may always remain beyond what can be imagined by the human mind, which is constrained in space and time. (Of course, in principle one should remain open to the possibility that what is nonvisualizable today may become the normal science of the future.)

There was a time, not so long ago, that our everyday experience of a flat earth and a geocentric universe led many scientists and nonscientists alike to refuse to journey out to sea or look through the telescope. Refusal to look at data continues to this day. For example, some of Schwartz's most skeptical colleagues exercise their right to refuse to look at raw video tapes of research mediums in controlled laboratory conditions, engaged in replicable anomalous information retrieval.

The Nth world hypothesis also reminds us that it is unlikely that we will ever find an ultimate world hypothesis or a final theory of everything. Zimmerman says:

Far more likely is a future of changing science, changing societies, changing language and cognitive structures, and changing brains. And these transformations undoubtedly will be associated with new and more highly developed scientific theories ensuing from extended human contact with objective events.[20]

Or, as Traub says:

. . . what is unknowable to one generation is another generation's mere technical challenge: To Aristotelians in the Middle Ages, the regions beyond the moon were celestial spheres reaching to heaven, as unapproachable as whatever might have come before the big bang seems to cosmologists today (p. 40).[21]

As the history of science reminds us, in order to conduct empirical research (as well as perform clinical practice) with integrity, it is prudent that we resist the temptation to exercise our "right to deny" theories and observations (especially replicable observations) that we can not understand or imagine. The purpose of considering and implementing world hypotheses, especially the Nth world hypothesis, is to assist the process of evolving a comprehensive integrative medicine and caring integral vision of health and healthcare. This is the deep meaning of evidence-based medicine.

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