Guest Editorial

Novel Approaches to Genomic Science: Retrieval & Curation

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ABSTRACT

From 2000-2006 Emergent Mind published the open-source, nonprofit and peer-reviewed *Journal of Nonlocality and Remote Mental Interactions*. This journal was founded by Lian Sidorov, PhD, who served as the Executive Editor, with Iona Miller and Leane Roffey Line serving as Assistant Editors. It mapped the frontiers of consciousness and mind-matter interaction. Sidorov is a physicist and put together a superb global team of researchers. The aim was to create a road map for the future of mind-body research and energy medicine, genetic architecture and regulation, studies in consciousness-related anomalies, and experiments in a comprehensive academic psi research program to provide critical references.

Dr. Sidorov continues working under the International Consciousness Research Laboratories (ICRL) umbrella, which proposes the establishment of a world-wide, cross-disciplinary network of researchers, technical experts and volunteers committed to a sustained, active participation in this exploratory effort. They propose the creation of an open, searchable database of article pre-prints (including experimental proposals and reports, case studies and testable hypotheses). Both the ICRL and Quantum Dream, Inc. projects support conceptual and infrastructural platforms of open-source scientific inclusion, among novel approaches for the representation and assessment of scientific knowledge in modeling, experimentation and education.

Key Words: genomic science, novel approach, retrieval, curation, JNRM, ICRL, heuristics, consciousness, hermeneutics, mind-body mapping, meta-narrative, pandisciplinary, epigenetics, wave genetics, meta-genetics, biophysics, paradigm shift, archetypes, gene expression.

> *Heuristic passion is ...the mainspring of originality --the force which impels us to abandon an accepted framework of interpretation and commit ourselves, by the crossing of a logical gap, to the use of a new framework. . . . Having made a discovery, I shall never see the world again as before. My eyes have become different; I have made myself into a person seeing and thinking differently. I have crossed a gap, the heuristic gap, which lies between problem and discovery.* -- (Polyani, 1962, cited in Moustakis, 1990)

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Introduction

Owing to the lack of conclusive evidence, this editorial proposes likely hypotheses, not definitive solutions. Heuristic inquiry requires that we remain open, receptive, attuned to all facets of experience of a phenomenon. Intuition facilitates perception of wholes, an essential characteristic of seeking knowledge. All heuristic inquiry begins with the internal search to discover, a passionate desire to know, a devotion and commitment to pursue a well-posed question.

Six phases of heuristic research guide unfolding investigations, comprising the basic research design. They include: the initial engagement, immersion into the topic and question, incubation, illumination, explication, and culmination of the research in a creative synthesis. (Moustakis)

Over a hundred years have passed since quantum physics proved that consciousness cannot be separated from a complete view of reality. Such pioneering efforts require archiving and curation, much as takes place in the arts. McNiff (1998) points out that "art-based research expands heuristic research by introducing the materials of creative expression to the experimental process". All maps of reality are filtering systems. Research is problem solving that also awakens self-knowledge.

To correlate data accumulating within the field, many extraordinary theorists were included in *JNLRMI*, some of whom have unfortunately passed since that time, while others continue to inspire the mind-body sphere of research, genetics and complementary medicine. The forum included an archive of innovative papers by recognized experts in physics, biology, parapsychology, cognitive science, and noetics: Bohm, Penrose, Laszlo, Sarfatti, Popp, Goswami, Pitkanin, Sedlak, Varela, Hameroff, Stapp, Freeman, Oschman, Rubik, Grof, Chouinard, Beichler, Beal, Tiller, Targ, and more. JNLRMI published eight issues, featuring Sidorov, Pitkanin, Kaivarainen, Gariaev, Miller, Miller & Webb, Benford, and more, with interviews of parapsychology pioneers Joseph McMoneagle, Roger Nelson, Stanley Krippner, Fred Alan Wolf, Jim Tucker, Gerry Zeitlin, Chris King, Mark Germine, etc.

The dormant *JNLRMI* can still be found at emergentmind.com. The *Journal of Nonlocality* looks forward to a re-launch as a purely experimental publication (only experimental proposals and reports).

In an open letter on their "Mind-Matter Mapping Project", Sidorov, et al (2012) from the International Consciousness Research Laboratories summarize the current research climate: (Appendix A)

Bending an existing paradigm to accommodate new facts has always been a process fraught with inertia, higher-than-justified resistance and violent rebounds. To say that the study of nonlocal, consciousness-related phenomena faces a similar challenge today is an understatement. Although many prominent scientists would agree that simple reductionism has failed to produce an adequate explanation for some of our most important questions, such as the hard problem of consciousness or the foundations of quantum mechanics, few of these scientists are ready to

accept a change in our set of axioms, particularly the possibility that consciousness may be an elemental, rather than emergent component of reality.

As a result, researchers in the field of mind-matter interactions find that they not only need to struggle with the limitations of our current scientific tools to make sense of their data, but also to fight for the legitimization of this data with a mainstream science community that is unwilling to accept its conceptual challenges. And yet, as daunting as this position seems at the moment, it is also an exhilarating one – for rarely in the history of science have we been faced with such unknowns. From ever-expanding entangled systems to remote perception and fieldREG effects, the evidence for nonlocality and mind-matter interactions keeps flooding in; but if this data cannot be plotted within our current system of coordinates, how do we begin to find our way toward a new one?

Among other remedies, they recommend the following, which is very much within the research goals of the Quantum Dream, Inc. research group:

We propose the establishment of a world-wide, cross-disciplinary network of researchers, technical experts and volunteers committed to a sustained, active participation in this exploratory effort. The goal of this collaborative project would be to index relevant questions and research leads; create a searchable roster listing each member's background, interests, technical expertise and access to laboratory resources; to develop new experimental models; share expertise and equipment resources; mentor on and critique study methodology; make inroads into mainstream applications; and publish all such developments in one centralized, searchable database which would be highly visible and readily accessible online. Given the scarcity of funding and resources available for mind-matter projects, we must try to do less with more. The ability to capture ideas, connect experimental proposals to available resources and create a formal venue for the publication of such proposals would ensure that no good ideas remain stillborn for lack of opportunity and that proposed studies can be critiqued and methodologically strengthened at the earliest possible stage.

Outreach to mainstream science is another goal of the project. However, academia is often accused of stunting creativity and progress in the name of the status quo:

Creativity enhances life. It enables the great thinkers, artists, and leaders of our world to continually push forward new concepts, new forms of expression and new ways to improve every facet of our existence. The creative impulse is of particular importance to scientific research. Without it, the same obstacles, ailments, and solutions would occur repeatedly because no one stepped back and reflected to gain a new perspective.

Unfortunately, in the academic world—where much of today's scientific innovation takes place—researchers are encouraged to maintain the status quo and not "rock the boat." This mentality is pervasive, affecting all aspects of scientific research from idea generation to funding to the training of the next generation of scientists. (Southwick, 2012)

Digital Curation

The collection and re-contextualization of the artifacts and pioneering articles of any scientific field is as important as art curation. Both art-based research and science involve the use of systematic experimentation with the goal of gaining knowledge about life. Digital curation is the selection, preservation, maintenance, collection and archiving of digital and print assets. The web is a user-curated platform but subject to link-rot and site-rot.

Curation of meaningful works helps those new to any interdisciplinary field retain a sense of the whole field and its arc of development. In art, a more naïve rendering is rarely considered less valuable than the latest style or approach. To the contrary, it may be seen as foundational; proto- is not confounded with pseudo- anything. The joy of research and discovery is an inherent part of the creative process.

Content curation selects what will be remembered in the history of any discipline. Some important notions arise in unrelated and even esoteric worldviews. That is, metaphysical concepts often precede solid scientific modeling. Armchair theoretics aside, even self-described "scientific papers" by recognized experts may sound uncritical in retrospect.

Still such works introduce fundamental issues, such as 'resonance', 'intentionality', 'holism', and a host of ideas once thought irrelevant to the core science of physics. So, whether such papers read as "dated" or of their own era, the best deserve to be retained in the literature. Each field must preserve such archives or lose the developmental thread from courageous colleagues.

Because of its exclusion from conventional reportage, frontier science is often relegated to a disjointed series of small journals and obscure publications that limit its exposure in the arena of ideas and inspirations. Curation is further compounded by cyberculture, and the scattered online musings of self-styled and genuinely worthy independent scholars.

We generally resolve this cognitive dissonance by doubling-down on our own prejudices in opposition to those with whom we disagree. We tend to pathologize and demonize the other. We frame these conflicts as zero-sum and negative-sum competitions.

Yet, if we take a more artful approach to science, we can maintain an open attitude as well as the rigor demanded by best practice. Theoretics uses creative thought, disciplined logic, and the current knowledge base to develop credible scientific theory. Experimental support emerges from such approaches, distinguishing concept from reality.

When we experience new events, the brain encodes a memory of it by altering the connections between neurons. This requires turning on many genes in those neurons. Neuroscientists at MIT's McGovern Institute for Brain Research identified a master gene -- Npas4 -- that controls this complex process in the hippocampus, a brain structure known to be critical in forming long-term memories. (Kurzweil, 2011)

Ideas advance, in part, because of their popularity among stakeholders in the theories of by-gone eras. Conversely, some ideas are actively suppressed for security and financial interests. It holds true from cosmology to micro-physics and micro-biology. Competing metanarratives shape our theories, lives and identities. The philosophy of interpretation can help us dig our way out of this relativistic mess, an entangled web of worldviews.

Yet, science is rooted in prediction and a keen eye for the future of technology. In art, the visionary is rewarded; in science, often spurned, even when the motivation is to inspire others to greater heights of human experience and understanding. Even in nature, growth occurs at the very edge of creativity. Speculation is an inherent part of the process in which we argue many sides of the nature of reality.

Too frequently, such "blue sky" speculation is withheld from the academic or pandisciplinary arena where its relative value can be more accurately assessed, literally or metaphorically. Pierre Teilhard de Chardin saw an emerging sphere of consciousness encircling the planet. In his view, recognizing this new reality and living in that awareness was essential to solving the major problems of humanity.

A cultural retrieval is undoubtedly a fundamental aspect of the process of cultural transformation. Marshall McLuhan created a cultural geography where "space" is the master trope. He introduced the Tetrad Concept, a notion of process that includes enhancement, obsolescence, retrieval, and reversal. This tetrad of the effects of technologies is not sequential, but rather simultaneous. All four aspects are inherent from the start, and all four aspects are complementary.

Even while technology extends or enhances our sensory perception, it numbs or diminishes other areas of experience. Every form pushed to its limits reverses its characteristics. Retrieval implies that older notions may contain important overlooked information.

Thus, we find that the nature of "nothing", the vacuum of absolute space, once spurned as irrelevant to the explication of force and form is arguably the most important aspect of 21st century physics. The void of space has become a plenum. Rather than an artifact of obsolete thinking, it has become one of the potentially most fruitful areas of investigation, more fundamental than the minute building blocks of particle physics, even though it remains a perennial Mystery.

Hermeneutics

Developments in micro-biology at the threshold of molecular biology and wave-genetics imply a necessary retrieval of "hermeneutics". If DNA can be read as a "text", as Gariaev and others suggest, then that text necessarily requires decoding, translation and interpretation, compounding our exploration.

Our attitude toward the text is shaped by whether we approach it skeptically or sympathetically. We all have a finite amount of time and attention, so these pre-filters are not insignificant. The text itself is not disconnected from the historical as well as biological context.

Perhaps, in some metaphorical sense, we are moving so fast, time is just the holographic blur of superpositions we cannot "read" or see with our multi-sensory sampling. If we have no place for certain notions in our maps of reality, they can be prematurely discarded as irrelevant.

Only the curating of such heterodox ideas, including them in the acceptable literature, keeps them relevant. Naturally, this does not mean every old idea will bear new fruit, but often we firm up our own ideas by disagreeing with unproven notions which inspire through the gaps in such theories.

Critical theory applies psychological, sociological, philological, literary, historical, and philosophical theories to the text. Critical frameworks are like lenses through which we discover new insights.

A new interpretation can emerge, based on a close, critical reading of the text, with a deeper understanding. Reading the text again, our understanding can be enriched by previous readings.

The challenge, then, is to imagine the prospect of standing outside a tradition or ideology as an objective observer of the text using multiple methodologies and critical theories. The suspension of judgment, experimental reconfiguration, and shifting of standpoint are the keys to turning interpretation into a dynamic hermeneutical spiral.

Naturally, not all retrievals will yield scientific gold from the alchemical ore of literature and experimentation. Yet, virtually any discourse or theory has the potential to stimulate original thought, experiments and vision.

Both literally and figuratively, hermeneutics can reverse the relationship between text and reader. Instead of reading a "passive" text, we should allow an "active" text to read us, informing and transforming our world with new insights and understandings.

In this sense, DNA is arguably the best "read" currently available. There may be many correct readings of the intra-textual "information", more or less available to "truth seekers" within the limited field of possible constructions.

Genomics

Genomics is the study of all the genes of a cell, or tissue, at the DNA (genotype), mRNA (transcriptome), or protein (proteome) levels, DNA sequencing and fine-scale genetic mapping. Even though great progress has been made in biology and medicine, when it comes to such areas as genetic genealogy results remain wide open to interpretation, often requiring other disciplines

to read meaningful findings. Meta-genomics has revealed that the vast majority of microbial biodiversity was missed by cultivation-based methods.

In its relatively short history, the unfolding science of DNA deciphering has already produced surprises and revisions in the forms of epi- and meta-genetics, strongly suggesting we need a socio-scientific dark-adapted eye for our explorations of the nature of ourselves and reality.

As epigeneticist Bruce Lipton explains in *The Biology of Belief*, Dr. Temin, who was "originally ridiculed for his 'heresy'," subsequently "won a Nobel prize for describing reverse transcriptase, the molecular mechanism by which RNA can rewrite the genetic code." Dr. Lipton hypothesizes that proteins also must have the ability, despite the prevailing genetic theory, to "buck the predicted flow of information."

Logically, this must be the case, "since protein antibodies in immune cells are involved with changing the DNA in the cells that synthesize them." There are, however, "tight restrictions on the reverse flow of information, a design that would prevent radical changes in the cell's genome." Similarly, Lipton describes epigenetics as the science of how genes can be modified "without changing their basic blueprint."

These two quotes provide clues as to what lies beyond the reach of epigenetics and nurture. The latter function with "tight restrictions" on the way our own localized consciousness, in response to environmental signals, can flow in reverse and rescript our "basic blueprint".

Specific epigenetic processes include paramutation, bookmarking, imprinting, gene silencing, X chromosome inactivation, position effect, reprogramming, transvection, maternal effects, the progress of carcinogenesis, many effects of teratogens, regulation of histone modifications and heterochromatin, and technical limitations affecting parthenogenesis and cloning.

Epigenetics is incapable of explaining evolution because it provides no mechanism allowing DNA to be rewritten, spontaneously, sufficiently to create "radical changes in the cell's genome" that transform a species into a new one. Transcending both genetics and epigenetics, meta-genetics concludes that the origin and evolution of species are driven neither by coding DNA nor by regulatory proteins in cell membranes. Rather, meta-genetics establishes that these two basically similar phenomena are controlled, via potential DNA, by what might be called a life-wave, or wave genetics.

Today, meta-genetics encompasses a group of related fields including quantum biohology, genetic linguistics, and wave-genetics. The discovery of gene-expression transcended the nature/nurture dichotomy. The life-wave is described as a potentially infinite series of waves, much as an ocean has an endless number of waves but remains a single body of water. The ocean is analogous to the "torsion," Source Field, vacuum potential, or hyperdimensional sound domain of absolute space, where individual waves act as sonic carrier waves for the genetic blueprints of past, present and future species.

Potential DNA serves as the principal connection point between manifest and unmanifest form. In other words, potential DNA, far from being inactive, constitutes the hyperdimensional interface between the sound and light domains. The existence of the genetic sound-light translation mechanism indicates that the flow of information, or conscious bioenergy, through DNA is a two-way street. Light becomes sound, and sound becomes light.

Biophotonic light is stored in the cells of the organism - more precisely, in the DNA molecules of their nuclei. A dynamic web of light is constantly released and absorbed by the DNA and may connect cell organelles, cells, tissues, and organs within the body and serve as the organism's main communication network and as the principal regulator for all life processes.

DNA acts as a holographic projector of acoustic and EM information which contains the informational quintessence of the biohologram. In the meta-genetic model, potential DNA is both a form and function of the life-wave. In both cases, potential DNA can be theorized to exist as a consciousness blueprint.

Fundamentally, we are not in any way separate from our environment, locally and cosmically. Fractal science has shown that nature is self-similar at all scales, including those which escape observation at any given time. DNA is an expressive potential.

A unified understanding of science and history requires that many facts of science from diverse disciplines be organized by level of observation, chronology of emergence, the scale of size, and thresholds of complexity realized. The challenge is to use the Book of Nature as a common reality-based reference in our debates.

Genomics has psycho-social dimensions. Ernest Rossi, M.D. reveals his Jungian approach, stating, “Nothing, it seems turns on gene expression and brain plasticity as much as the presence of others of the same species!” Jung suggested that "Individual consciousness is only the flower and the fruit of a season, sprung from the perennial rhizome beneath the earth; and it would find itself in better accord with the truth if it took the existence of the rhizome into its calculations. For the root matter is the mother of all things."

The Nature of Consciousness

Consciousness remains the “hard problem” of frontier science and the elusive target of Consciousness Studies – though many experts admit we are no closer to solutions than we were some forty years ago. Neurology has made some tantalizing suggestions, but often fails to separate ‘consciousness’ from simple ‘awareness’ or self-direction. The nature of consciousness is recursive, self-similar, self-referential, and self-reflexive. It is as weird as the quantum world.

Meta-genetics recognizes the primacy of consciousness over environment and molecular biology. Consciousness is connected with one unity. Findings from new sciences provide external validation for the new biopsychosocial perspective and offer important insights into the

manifold means by which socioenvironmental experiences influence neurobiological structure and function across the life course.

According to Csíkszentmihályi, flow is completely focused motivation. It is a single-minded immersion and represents perhaps the ultimate in harnessing the emotions in the service of performing and learning. In flow, the emotions are not just contained and channeled, but positive, energized, and aligned with the task at hand. Openness is essential.

From ancient times, people have described an ecstatic experience of the connectedness of all things as the pinnacle of human emotions. Different religious traditions have different words for this state: "enlightenment" -- "ecstasy" -- "being one with the Tao", Vision Quest, -- "religious transport." In the language of contemporary science, self-actualization is famously at the top of Maslow's Hierarchy of Needs.

In process therapy, flow means parareception: "access" to the depths of the psyche with the doors of perception wide open. Areas of extrasensory perception or anomalous cognition include (1) Telepathy; (2) Clairvoyance; and (3) Retrocognition/Precognition. Recent research by Xiao-song Ma, et al suggests the entanglement of two intimately-connected particles implies a future decision can affect the past states of the particles. (Moskowitz)

DNA is the universal information transducer, the hidden intelligence or "hidden fire" within us. This vast archive of information is passed along through a replicating process that involves the copying and encoding of genetic information from DNA to RNA (Ribonucleic acid). The original DNA that is housed within the nucleus of our cells programs instructions for the production of enzymes and proteins. These DNA instructions are not directly converted into proteins, but are copied into RNA. This ensures that the information contained in the DNA does not become tainted, thus preserving the archive.

RNA polymerase attaches to the DNA at a specific area called the promoter region. The DNA strand opens and allows RNA polymerase to transcribe only a single strand of DNA into a single stranded RNA polymer called messenger RNA. The messenger RNA carries the information to the sites of protein synthesis (ribosome), thereby creating a replica of the original DNA. In this manner the genetic code is passed from cell to cell, mother to child.

Vision (future memory) relates to precognition; healing is a form of creativity, and gnosis is an access state – self-realization. Self realization demands unlocking knowledge by direct experience. The Greek word "Gnosis" means direct experiential knowledge.

Stories of distance healing, a form of PK or psychokinesis (mind over matter), require another article of their own to do them justice. It may be easier to model virtual information transfer than mind over matter. "Spooky action at a distance" requires even stronger evidence than sensing at a distance. But is "distance" here really a factor or an illusion in a holographic simply-connected or nonlocal universe? The paradox of spacetime and relativity presents itself in psi as psycho-retrocognition, or time-reversed PK.

Though these experiences of knowing at a distance are called "extra-sensory," they often appear "as if" received by conventional sensory or mental means, for how else can we "know what we know"? It is a holistic psychophysical experience, affecting the whole self, physically, emotionally, mentally and often spiritually. The impediments of distance and time seem to dissolve; the barriers of spacetime are mysteriously overcome. The information is 'just there' in one form or another, whether spontaneous or facilitated.

However it occurs, information becomes available to consciousness through imagery, sensation and awareness. Cellular and soul memory might also include some ancestral dread. Gnosis is an immediate experience -- a psychosensory gestalt, ranging from the "a-ha!" experience to peaking in the cognitive orgasm of illumination.

The blueprint for our future memory as a species may be encoded in our seemingly dormant DNA material. Perhaps the evolutionary instructions for humanity's future development contained within the DNA material rest in a dormant state, waiting to be activated. Information gleaned not only from our genetic past, but our environment's collective past -- Earth's cumulative organic database -- is available on a cellular level to all species within the bio-system. A planetary intelligence, the universally consistent DNA coding system is potentially capable of passing information throughout the biosphere.

Quantum Coherence & Entanglement

Our biophysics is bioelectronic, electrochemical, biomagnetic, biophotonic and quantum. The energy body or field body is linked directly to the creative plenum. We refresh ourselves from it in the gaps between our breaths.

Dr. Mae-Wan Ho is a world renowned geneticist & biophysicist. She is a life-long critic of neo-Darwinism and genetic engineering and pioneer of a physics of organisms. She proposes that quantum coherence is the basis of living organization and can also account for key features of conscious experience. They include the "unity of intentionality", our inner identity of the singular "I", the simultaneous binding and segmentation of features in the perceptive act, the distributed, holographic nature of memory, and the distinctive quality of each experienced occasion.

Further, a thoroughly organicist way of thinking transcends both conventional thermodynamics and quantum theory. Quantum coherence and nonlocal intercommunication are the expression of the radical wholeness of the organism, where global and local are mutually entangled, and every part is as much in control as it is sensitive and responsive.

The life cycle, with its complex of coupled cyclic processes, forms a heterogeneous, multidimensional and entangled space-time which structures experience. In the ideal, it is a quantum superposition of coherent space-time modes, constituting a pure state that maximizes both local freedom and global cohesion in accordance with the factorizability of the quantum coherent state.

Quantum coherence gives rise to correlations between subsystems which resolves neatly into products of the self-correlations so that the sub-systems behave as though they are independent of one another. One can also picture the organism as a coherent quantum electrodynamical field of many modes, with an uncertainty relationship between energy and phase.

If quantum coherence is characteristic of the organism as conscious being, then the conscious being will possess something like a macroscopic wave-function. This wave function is ever evolving, entangling its environment, transforming and creating itself anew. In Bohm and Hiley's ontological interpretation of quantum theory there is no collapse of the wave function. With quantum potential playing the role of active information to guide the trajectories of particles, the wave function simply changes after interaction to become a new one.

The possibility remains that there is no resolution of the wave functions of the quantum objects after interacting. So one may remain entangled and indeed, delocalized over past experiences (i.e., in Lazlo's ambient field). Some interactions may have time scales that are extremely long, so that the wave function of interacting parties may take a correspondingly long time to become resolved, and large scale nonlocal connectivity may be maintained.

The wave function may look like an intricate supramolecular orbital of multidimensional standing waves of complex quantum amplitudes. It would be rather like a beautiful, exotic flower, flickering in and out of many dimensions simultaneously. That would constitute our quantum holographic self, created from the entanglements of past and future experiences, the memory of all we have suffered and celebrated -- the totality of our anxieties and fears, our hopes and dreams. (Ho, 1997)).

Gene-Expression

Gene expression is the cellular process that decodes the genetic information in DNA and converts it into proteins. It is regulated at many levels: when messenger RNA is transcribed from DNA; when mRNA is translated into proteins; and at the epigenetic level, when the structure of chromatin, coils of DNA wound around histone proteins, is altered. Although most discussion of gene expression focuses on the regulation of transcription, the other components of the process are also crucial. Yet little is known about how they are integrated. (Rossi, 2010)

Work by Tom Misteli at the National Cancer Institute in Bethesda, Maryland, and his team provides a striking example of the integration of seemingly disparate components in gene-expression regulation (Luco et al., 2010). They describe how patterns of alternative splicing of newly made RNA, a key regulatory mechanism, can themselves be regulated by specific chemical modifications in the chromatin. They also found that a given set of modifications to histones predicts patterns of RNA splicing. The authors conservatively estimate that this mechanism occurs in dozens to hundreds of genes in the human genome.

This remarkable study makes a connection between a quintessential transcription-regulation mechanism, histone modification, and a post-transcriptional process, alternative splicing. It shows that chromatin can regulate not only how much of a protein, but also which protein, is made in a cell. We have seen a surge of intriguing studies suggesting that molecules that were thought to regulate transcription also direct epigenetic modifications, modify alternative-splicing patterns and participate in the intracellular transport of RNA.

Synaptic connections underlie associative learning. Psychological, social, and cultural signals modulate gene expression. Psychosocial Genomics measures changes in the deep psychobiological process of "activity or experience-dependent gene expression and brain plasticity" associated with creativity and healing. Psychosocial genomics produces long-term changes in behavior, vision and worldview, through learning and morphological changes in gene expression that alter the strength of synaptic connections. Structural changes alter the anatomical pattern of interconnections between nerve cells of the brain. Stated simply, the regulation of gene expression by social factors makes all bodily functions, including all functions of the brain, susceptible to social influences. (Rossi)

Neuro-gnosis

Neurognostic structures organize experience and cognition, and correspond somewhat to Carl Jung's archetypes. Jung was ambiguous about the ontological status of the archetypes and the collective unconscious, because of the inadequacy of the science of his day. Modern developments in the neurosciences and quantum physics - especially the new physics of the vacuum - allow us to develop Jung's understanding of the archetypes further. Direct neurophysiological-quantum coupling suggests how neural processing and quantum events may interpenetrate.

He insisted that the archetype is not merely another word for the physiology of the image or thought. While it included the physiological basis of knowledge, the concept was intended to run deeper - deep into the instincts and beyond, outward into the universal ground of existence. Archetypes form the total ground - the collective unconscious – upon which conscious cultural and personal experience develops. These structures are the products of natural selection, and are the impressions left by recurrent experiences of the species upon the nervous systems of individuals.

They generate (or "cause") an endless variety of transformations that are experienced as images and ideas had in dreams, fantasies and visions. These images and ideas bear the mark of personal and cultural conditioning, and the archetypes themselves are involved in the development of consciousness. The archetypes produce all of the universal material in myth and ritual drama. Archetypal experiences tend to be numinous and transpersonal in their impact upon personal development, for they are the eruption of archaic and timeless meaning into the personal world of the ego.

The archetype exists as the intersection of spirit and matter. We are now beginning to understand in a scientific way how this intersection might be possible, if by "spirit" we mean the order of the quantum sea. Human experience becomes the localized instantiation of the universal - the transcendental - through the medium of neurognosis. And neurognosis is precisely the local embodiment of the structure of the sea, and at the same time the structures mediating consciousness.

When Michael Persinger suggests in his book, *Neuropsychological Bases of God Beliefs* (1987), that certain experiences of unity with the Godhead may be mediated by structures in the temporal lobes, such an analysis need not imply a reduction of transpersonal experiences to neurophysiology. Among other things, to reduce these experiences to their neurophysiological foundations begs such questions as the profundity of insight, or the causation-at-a-distance that may accompany such experiences.

Neurognostic or archetypal structures in the brain may transduce insights pertaining to the universal structure of the quantum sea. Each human brain may indeed prove to be a microcosm that contains, like the proverbial mustard seed, or the more modem hologram - all the wisdom of the ages, requiring only the optimal conditions of development for each person to individuate into a sage. (Miller, 2008).

Rossi reports that neurogenesis can occur in the motor cortex simply through the act of imagining playing the piano (Pascual-Leone, Amedi, Fregni, & Merabet, 2005). Similarly, taxicab drivers develop the areas of their brains involved in spatial relationships by memorizing the labyrinthine streets and avenues of the cities in which they work (Maguire et al., 2000). Although the underlying mechanisms are different, neuroplasticity research suggests that challenging learning experiences can lead to the development of brain tissue in a manner analogous to the ways that physical exercise can lead to the development of muscle tissue.

One area of research that has found significant evidence of mental training leading to neuroplastic modifications in brain activity focuses on the study of meditation. Meditation, although greatly varying in technique and purpose across the diverse spiritual and cultural traditions in which it is used, may be generally defined as the intentional practice whereby one grasps "the handle of cognition" to cultivate a competent use of one's own mental capacities, gaining agency over thought and emotion (Depraz, Várela, & Vermersch, 2003). Such intentional mental training has been shown to induce functional neurobiological changes.

Jung's reference to the essential unknowability of the archetypes-in-themselves also applies to neurognostic structures. Neurognosis may also refer to the functioning of these neural structures in producing either experience or some other activity unconscious to the individual. This usage is similar to Jung's reference to archetypal imagery, ideas, and activities that emerge into and are active in consciousness. This includes ancestral / genetic memory. In the inward experience the connection between the psyche and the outward image or creed is first revealed as a resonance, relationship or correspondence.

Jung's genius was in holding the tension of opposites of mind-body dualism - that is, between experiential relativism on the one hand and physical reductionism on the other. It was clear to Jung that an individual's experience is both structured by processes universal to the human psyche, and the manifestation of individuation.

Holding the tension of the opposites, one transcends them. Holding a divine "tension" allows a new consciousness to unfold. As hybrid "spirit-matter" beings, we must realize it is appropriate for us to be living in two worlds at once -- the world of the ego and the world of the soul. We do not become one watered-down nondescript composite: we each bring forth our entire way of being -- as a very rich and inviting way to live.

You can't wait to discover something without knowing how it is going to happen. Expectancy and surprise in the neuro-psycho-physiology generate detectable changes in the dynamics of gene expression and neurotransmission. Regulation of the priming step of the neurotransmitter release has important consequences for memory, learning, problem solving, and behavior change at the synaptic level. A synaptic protein called RIM, among others, is involved in a key regulatory step of synaptic plasticity facilitated by priming the synaptic vesicles between neurons to release their neurotransmitters.

The molecular messengers generated by stress, injury, and disease can activate immediate early genes within stem cells so that they then signal the target genes required to synthesize the proteins that will transform (differentiate) stem cells into mature well-functioning tissues. Such activity-dependent gene expression and its consequent activity-dependent neurogenesis and stem cell healing is proposed as the molecular-genomic-cellular basis of rehabilitative medicine, physical, and occupational therapy as well as the many alternative and complementary approaches to mind-body healing.

The therapeutic replaying of enriching life experiences that evoke the novelty-numinosum-neurogenesis effect during creative moments of art, music, dance, drama, humor, literature, poetry, and spirituality, as well as cultural rituals of life transitions (birth, puberty, marriage, illness, healing, and death) can optimize consciousness, personal relationships, and healing in a manner that has much in common with the psychogenomic foundations of naturalistic and complementary medicine.

The entire history of alternative and complementary approaches to healing is consistent with this new neuroscience world view about the role of psychological arousal and fascination in modulating gene expression, neurogenesis, and healing via the psychosocial and cultural rites of human societies. (Rossi, 2003).

A single genotype, the genetic blueprint of an organism, can be expressed in a multiplicity of distinct physiological and behavioral forms, known as phenotypes. The mechanisms by which such different phenotypes are expressed are just beginning to be understood, but they appear to involve the regulatory effect of internal and external environmental signals on stress hormones, which in turn modify gene transcription processes (Rossi, 2004).

Experiences modulate gene expression. In turn, experience-dependent modifications to neural tissue may be driven by epigenetic processes (that is, changes in gene expression produced by environmental determinants) .The human environment is constantly conditioned by social experiences, which, when transduced by the nervous system into electrochemical signals, may modulate protein synthesis in the nuclei of nerve cells, ultimately leading to changes in the replication and growth of neurons. Social experience can change gene expression, leading to the restructuring of the brain through neuroplasticity.

Thought, emotion, and action trigger neural activity, which can lead to a reorganization of the brain, shaping future psychosocial experience. From this perspective, we are not the passive products of neurophysiology and heredity; rather, through our behavior in the social environment, we become active agents in the construction of our own neurobiology and, ultimately, our own lives. We have the power to transcend and transform their limitations into opportunities for growth and well-being.

Paradigm Shift

Novel approaches to genomic as well as other sciences take place in the context of three primary paradigms of Separation, Connection and Wholeness, reflected in genomics as molecular, epi- and meta-genetics (wave genetics):

a) The Hierarchical Paradigm: Searching for Connection and Wholeness
b) The Transformation Paradigm: Inner Wisdom and Relational Understanding
c) The Synthesis Paradigm: Integration

Orthodox vs. Heterodox Models

The Hierarchical Paradigm exerts control to impose a form of limitation to define and understand, manipulating the status quo of science and belief systems with a containing and controlling effect of relative truths on culture. It represents diverse interests, perceptions of reality, and motives of action, containing intuitive abilities, and perhaps emphasizing preservation of the conventional over creativity.

Arguably, hierarchy has trapped itself in vested specialization and in the limiting aspects of diversity that prevent it from evolving from an arduous ladder of evolution to a joyous pursuit. Fragmented science focuses on the part not the whole. It might be served better by removing rigid boundaries and barriers to exploration in a way that recognizes consciousness rather than detours from the road to expanded consciousness. Externally oriented, it supports subgroups linking energies of independent branches.

Transdisciplinary Models

Transformative and Integrative paradigms express novel approaches to the collective potential of all life in the universe and a grand connective vision, while maintaining scientific rigor. Our awareness is directly connected to the very borders of discovery.

The roots of the hierarchical tree are bound in the soil of genetic memory, subconscious instincts, and orthodox beliefs and institutions. Evolution shifts positions within the hierarchy. The transformation paradigm initiates accelerated, independent pathways that bypass the hierarchy and expand creativity, accessed through direct experience, including transformation and novel access to authentic information and healing of fragmentation.

Pandisciplinary Models

Synthesis is integration of the dominant paradigm of the hierarchy with the transformation paradigm – recognizing the integral manifestation of the wholeness. The next step is to integrate the time-based incremental model of evolutionary progress with the realization-based model of the transformation paradigm and recognition of the multidimensional universe.

The process goal is to transmit this future experience into communication symbols and life principles that facilitate the bridging of the two paradigms. Such catalysts focus on developing new communication symbols through various art and science forms that facilitate detachment from the controlling aspects of the hierarchy. These people also demonstrate the natural ease of interweaving the two primary strands of existence into a synthesis paradigm.

The foundational plan of life's original source and ultimate destiny reintegrates itself into timelessness by following it back into the very foundation from which all things arise and return. Novel approaches to genomics are part of this integrative process of energy and patterns of information and relationship.

Bioinformatics was applied in the creation and maintenance of a database to store biological information at the beginning of the "genomic revolution", such as nucleotide sequences and amino acid sequences. Development of this type of database involved not only design issues but the development of complex interfaces whereby researchers could access existing data as well as submit new or revised data. The primary goal of bioinformatics remains to increase the understanding, analysis and interpretation of biological processes.

Discussion

There is a lack of exposition on interdisciplinary and innovative methods of data mining, visualization and multiscale modeling for biodata and mind-matter mapping. An interdisciplinary set of novel pandisciplinary techniques from pure science and engineering, pattern recognition, and ontological data mining fields are applicable to genomics and consciousness studies.

Consciousness is a reciprocal function of resilience and energy transducing tensegrity structures (Southwick & Miller). Full and unqualified interest informs determination to extend our understanding and knowledge of experience. We are not separate from that, and need only hark back to the injunction of the ancient Oracle of Delphi to "Know Thyself".

The phenomenological heuristic research mode outlined by Moustakas is a way of knowing that involves self-search, self dialogue and self-discovery by focusing on experience and trusting one's self awareness and understanding. The primary task of heuristic research is acknowledging the fundamental awareness that exists in the researcher's consciousness -- "to receive and accept it, and then to dwell on its nature and the possible meanings" (p. 11). The researcher adheres to the strict six phase methodology:

1) Initial Engagement: the researcher formulates a question from engagement with a topic of deep personal significance or interest.
2) Immersion: the process of becoming one with the question or study topic – all aspects of the researcher's life are addressed within the context of the question.
3) Incubation: Removal of oneself from the intense involvement of the immersion phase in order to provide room for unconscious understanding.
4) Illumination: New meaning is discovered or old understandings corrected or modified.
5) Explication: The researcher's understanding is sharpened through concentrated attention.
6) Creative Synthesis: The culmination of the process, in which themes are discerned and connections made; the researcher is open to receiving a better understanding of the question through intuition and tacit knowing.

While it has been suggested (Lau) that "[tyrannical] peer review may stifle novel approaches" to developmental methodologies, it remains a valuable part of scientific discourse. Alternative or complementary approaches to traditional peer review can be included in research evaluation (Birukau et al), since no single system can suit all stakeholders in various communities.

The problem becomes not one of how to know something radically new, but how to learn something radically new. How can we know or describe anything about the changes we have not yet experienced, change that by universal consensus takes us beyond the realm of everyday reality, for which our words and concepts have been fashioned?

In *The Holographic Paradigm*, Weber says that, "Psychological death occurs when consciousness keeps step with the ever-moving and self-renewing present, allowing no part of itself to become caught or fixated as residual energy. It is residual energy that furnishes the framework for what will become the thinker, who consists of undigested experience, memory, habit-patterns, identification, desire, aversion, projection and image-making. This is not a purely personal process but the energy of aeons of such processes sclerosed through time, persisting on both personal and collective levels. Ego-death dismantles this superstructure..."

As Zukav's (1979) virtual energy-exchanges show, during all of these transactions new particle-wave patterns are being re-created as virtual-energy "vapor-trails", instantaneously recycled into other energy fields -- the eventual material manifestations of which our entire observable and experiential universe is composed.

Bohm suggested that we transform as eternity unfolds in us, but that eternity may also transform, as it returns to itself enriched by our participation. In this theory, knowledge consists of the process of tuning in on the manifestation (phenomenon) of the nonmanifest in order to make it accessible, through a state of consciousness which lies outside the barriers of the finite senses. Bohm maintains that this capacity exists in the universe, not in us strictly speaking.

Conclusion

Spinoza called our greatest pleasure the union of the mind with nature. Nick Herbert poetically wonders, "When will physicists expand their craft by daring to suppose a more creative kind of measurement -- the "greatest pleasure" of Spinoza?" David Bohm suggested psychological "atom-smashing" as a way of radically destructuring the ego, opening it to wider experience of the undivided whole.

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Appendix A

THE MIND-MATTER MAPPING PROJECT

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OPEN LETTER

Bending an existing paradigm to accommodate new facts has always been a process fraught with inertia, higher-than-justified resistance and violent rebounds. To say that the study of nonlocal, consciousness-related phenomena faces a similar challenge today is an understatement. Although many prominent scientists would agree that simple reductionism has failed to produce an adequate explanation for some of our most important questions, such as the hard problem of consciousness or the foundations of quantum mechanics, few of these scientists are ready to accept a change in our set of axioms, particularly the possibility that consciousness may be an elemental, rather than emergent component of reality.

As a result, researchers in the field of mind-matter interactions find that they not only need to struggle with the limitations of our current scientific tools to make sense of their data, but also to fight for the legitimization of this data with a mainstream science community that is unwilling to accept its conceptual challenges. And yet, as daunting as this position seems at the moment, it is also an exhilarating one – for rarely in the history of science have we been faced with such unknowns. From ever-expanding entangled systems to remote perception and fieldREG effects, the evidence for nonlocality and mind-matter interactions keeps flooding in; but if this data

cannot be plotted within our current system of coordinates, how do we begin to find our way toward a new one?

CURRENT PROBLEMS FACED BY EXPERIMENTAL PARAPSYCHOLOGY

1. Lack of visibility in the mainstream scientific community, which results in a limited expertise field funneling ideas and resources into our research program

2. Severely curtailed financial and technical resources

3. A significant credibility issue, which is reinforced by publication bias, institutional politics and social and scientific conceptual frameworks which are too narrow to accommodate these empirical findings. It is easier to sweep the data under a proverbial rug of pseudo-skepticism than to deal with the conceptual upheavals that it its acceptance would require.

4. Fear. The psychological, social and intellectual repercussions of accepting these empirical facts are overwhelming for vast numbers of people, which means that an experiential, rather than a purely intellectual approach may be necessary in order to cross this barrier and modify the existing paradigm.

PROPOSED APPROACHES

1. Connect ideas with technical resources and experimental volunteer pools (**Research Network**). Identify most promising research directions based on **Idea Futures Market** (see http://hanson.gmu.edu/ideafutures.html) and help to funnel funding toward these projects through membership dues or other pools set aside for such purposes on a voluntary basis.

2. A **Mind-Matter arXiv-like database** of experimental proposals and pre-prints extending the typical spectrum of parapsychology literature to include developments in areas such as biophoton research, genetic regulatory systems, qigong and other intent-based healing techniques, placebo effects, entanglement and foundations of physics research.

3. Using **Semantic Web analytical techniques** and smart search engines to automatically identify patterns and correlations across related subfields. Indexing existing mind-matter literature to generate standardized vocabularies and databases of **nano-citations** that integrate seamlessly with new mainstream search engines, eliminating previous publication filters and increasing the visibility of this research.

4. A sustained outreach effort to engage the broader science community based on research and **applications that resonate with mainstream interests**

PROJECT COMPONENTS

1. RESEARCH NETWORK

We propose the establishment of a world-wide, cross-disciplinary network of researchers, technical experts and volunteers committed to a sustained, active participation in this exploratory effort. The goal of this collaborative project would be to index relevant questions and research leads; create a searchable roster listing each member's background, interests, technical expertise and access to laboratory resources; to develop new experimental models; share expertise and equipment resources; mentor on and critique study methodology; make inroads into mainstream applications; and publish all such developments in one centralized, searchable database which would be highly visible and readily accessible online. Given the scarcity of funding and resources available for mind-matter projects, we must try to do less with more. **The ability to capture ideas, connect experimental proposals to available resources and create a formal venue for the publication of such proposals** would ensure that no good ideas remain stillborn for lack of opportunity and that proposed studies can be critiqued and methodologically strengthened at the earliest possible stage.

Advantages:

1. Faster, nimbler, task-oriented working groups sifting through empirical data to identify potential patterns across various mind-matter phenomena and design new testable hypotheses, experimental models or applications.

2. Establishment of skills/expertise networks so that proposed experiments can be carried out by those with the capability to do so.

3. Allow interested mainstream scientists to participate under pseudonym, without fear of professional consequences.

4. Team members will be known to each other, develop ideas in password-secured "virtual labs" and publish their proposals collectively in the Journal of Nonlocality and other ICRL Technical Bulletins, which will be posted regularly.

As an additional incentive, we have created the Mind-Matter Mapping Prize, to be awarded yearly to the best experimental proposal, as voted by our project members.

Membership Structure

- Membership will be by invitation or application review (to demonstrate relevant background and level of interest). Member profiles including publications, interests, technical expertise and equipment access will be searchable on our website in order to facilitate collaborative efforts, mentorship and peer feedback.

- Teams will be organized to develop semantic web vocabularies in order to enable smart search and data mining algorithms (nano-publication model); collect and index relevant literature according to these new semantic web criteria; develop new exploratory directions and experimental models; and establish working contacts with mainstream groups sharing possible interests in this research

- All members must commit to active participation in the project and sign on to one of several teams. Teams will be anchored by coordinators whose job is to collect and post submitted references and ideas, moderate their Group Forum section and steer new proposals/experiments toward publication in the ICRL bulletin. Multiple coordinators may anchor any given group, in order to minimize the individual burden but maximize the expertise.

- To maintain membership one must contribute a minimum of four indexed literature references per month. This is a minimum degree of involvement designed to keep the information flow and discussion active within the group, and to keep members in touch with their project. In addition, members are encouraged to participate as volunteers when needed for online or other proposed experiments, so that we can generate data promptly and efficiently.

We suggest that the Mind Matter Mapping Project should maintain a **multi-platform Web presence**, possibly structured in the following way:

1. A cloud-based **project website** with open access to the Journal of Nonlocality, existing research resources, Member Profiles and announcements.

2. Password-restricted w**orking forums** where smaller units of researchers can develop their experimental proposals in private, prior to publication (the equivalent of virtual labs).

3. An **open access Groups forum**, where the general mandate and organization of the project are presented, with an opportunity for anyone to post ideas, questions and references. This would allow the broadest funneling of input and potential membership without diluting the searchable field of information on the project website. Valuable contributions can be filtered by group moderators onto the appropriate Project website pages and participants who show promise/expertise could be invited to become members.

2. NEW PUBLICATION AND DATA MINING MODELS

We propose the creation of an open, searchable database of article pre-prints (including experimental proposals and reports, case studies and testable hypotheses) modeled on the existing arXiv.org but dedicated to nonlocality, mind-matter interactions and relevant mainstream fields. Examples of such mainstream topics include (but are not limited to) work in quantum entanglement and computation, foundations of physics, biophysics, genetic regulatory mechanisms, placebo effects, intent-based complementary and alternative medicine, neuroimaging and scientific studies of internally-deployed attention states such as meditation. In addition, an open repository of planned experiments, their methodology and results could be created as proposed by Jonathan Schooler (NY Times, Jan 7, 2011) to increase transparency and the ease of replication.

As with arXiv, there would be no peer-review assumption – only open critique. However, this would **allow researchers anywhere in the world to post their proposals and data rapidly, in a visible and centralized forum**, allowing us to expand the current empirical funnel to a much broader spectrum of research sources. **Since it typically takes years between the inception of an experimental idea and the completion of the study (with most ideas likely abandoned due to lack of time, training, funding or opportunity), we feel that being able to claim authorship of an experimental model** despite other practical limitations **would encourage scientists to develop and discuss new approaches - thus enhancing transparency and the rapid dissemination of new empirical data and concepts,** accelerating the pace of development far beyond the current peer-review system.

One final but critical question remains, which is of course assigning validity to the citations included in our database. In the absence of peer review and adequate replications, the benefits of such an approach may be obscured by its inherent limitations. To circumvent this objection we recommend implementing a **ranking system where each citation is assigned a validity code** based on its source – from peer reviewed specialty journals to individual, anecdotal and case study reports, even "community confidence level" that can be voted on/earned after a certain number of forum contributions. In this manner, a search query return could easily be filtered according to the strength of evidence desired.

3. REACHING OUT TO MAINSTREAM SCIENCE

We will make a sustained effort to reach out to the broader science community through projects that resonate with mainstream research questions and applications, that may assist with providing answers to these questions and that will hopefully stimulate individual scientists to learn more about the techniques and theoretical frameworks we are proposing.

Examples

Remote Viewing:

- Develop specialized training /vocabularies geared to particular fields of research in order to sensitize viewers to the perception of processes and features particular to their area of investigation

- Create a pool of intractable questions in science - assign these as targets to a group of expert remote viewers then openly post the RV data. The hope is that enough currently verifiable information will be produced to generate an interest among those mainstream scientists focused on these questions to persuade them that there may be an "insight advantage" to learning RV.

Placebo/ Healing Effects:

- Look into biophysical models of genetic regulation, correlations between subject EEG/physiological markers of meditative states and the biophoton profiles of in-vitro targets; explore long-term physiological changes with qigong and meditation; use in-vitro sample biofeedback to test the effectiveness of different visualization techniques on biological targets and find ways to technologically enhance these effects.

Working groups will be assembled around a number of basic cross-disciplinary questions, as follows (more research directions to be defined later):

1. Probing the role of Meaning in mind-matter interactions (target ID in remote viewing; issues of displacement; strength of PK effect). Use the tools of parapsychology to probe the foundations of Quantum Mechanics (measurement problem).

2. Becoming proficient in the language of the interface (creating applications-specific abstract vocabularies; data integration: context, meme complexes and tasking intent; other tools of RV navigation)

3. Intersecting Minds: multiple observers and consensus reality. How does the intent of multiple participants align to create a target identity in remote perception or skew probabilistic processes in remote perturbation? The effect of bonding, weighted influence (i.e. are some participants more heavily invested and how does that compute in the overall effect); expectation; decline; sheep and goats; data fingerprinting; error propagation; which way does the information flow?

4. Physiological and psychological remodeling (strengthening psi - long term effects of meditation, belief filters, biofeedback technologies, types of visualization etc)

5. Possible signatures of entanglement (biophotons/EM pulses; physiologic and metabolic markers)

6. The genetic interface: organism coherence, biophotons and their role in genetic/physiologic regulation; biological transducers of remote intent; cracking the placebo code

7. Positioning intent in time: synchronicity, expectation, delayed effects and causal flow. Is psi always goal-oriented? Finding the best fulcrum point to apply intent

8. Analytical methods in remote perception data processing: multiple operators, fuzzy set theory and other approaches

9. Mass threshold effects (see Rupert Sheldrake's studies and the Global Consciousness Project); designing large scale experiments

10. Methodological mine fields: causal loops, blindness, expectation and other rabbit holes.

If interested in becoming a member, volunteering for administrative positions (including IT projects) or submitting material for publication in the Journal of Nonlocality, please contact Lian Sidorov (liansidorov@gmail.com). Your feedback is critical to the success of this effort, so we look forward to all your suggestions.