

The Locked-in Syndrome of Panpsychism: Integrated Information Theory, Orch-OR, TGD and the Search for the Right Experimental Model

2017 JNL Panel Questions and Discussion

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Section I: Background

"Given a particular brain, with its neurons and axons, dendrites and synapses, one can, in principle, accurately compute the extent to which this brain is integrated. From this calculation, the theory derives a single number, ϕ (pronounced "fi"). Measured in bits, ϕ denotes the size of the conscious repertoire associated with any network of causally interacting parts. Think of ϕ as the synergy of the system. The more integrated the system is, the more synergy it has, the more conscious it is. [...] One unavoidable consequence of IIT is that all systems that are sufficiently integrated and differentiated will have some minimal consciousness associated with them: not only our beloved dogs and cats but also mice, squid, bees and worms. Indeed, the theory is blind to synapses and to all-or-none pulses of nervous systems. At least in principle, the incredibly complex molecular interactions within a single cell have nonzero ϕ . In the limit, a single hydrogen ion, a proton made up of three quarks, will have a tiny amount of synergy, of ϕ . In this sense, IIT is a scientific version of panpsychism, the ancient and widespread belief that all matter, all things, animate or not, are conscious to some extent"

Christof Koch *A "Complex" Theory of Consciousness: Is complexity the secret to sentience, to a panpsychic view of consciousness?* *Scientific American* July 1, 2009

<http://www.scientificamerican.com/article/a-theory-of-consciousness/>

"in recent years, functional quantum biology has been recognized at ambient temperatures in photosynthesis, bird navigation, olfaction, and in microtubules. Single, isolated microtubules and bundles of microtubules inside active neurons have been shown to have quantum resonant vibrations in megahertz and kilohertz frequencies (Ghosh et al., 2014; Sahu, Ghosh, Ghosh, et al., 2013; Sahu, Ghosh, Hirata, Fujita, & Bandyopadhyay, 2013). Orch OR further suggests microtubule vibrations (e.g., in megahertz) interfere to cause music-like (electrophysiological) "beats" seen as EEG rhythms (Hameroff & Penrose, 2014). Indeed, microtubule resonant vibrations, and consciousness, have been said to resemble music more than computation (Ghosh et al., 2014; Hameroff, 2015). Recent evidence also shows that anesthetics (which selectively erase consciousness) act on microtubules rather than membrane receptors as is generally assumed (Emerson et al., 2013). The maverick Orch OR theory has far more supportive evidence than any mainstream approaches to consciousness"

Stuart Hameroff *"Change the Music+: Psychotherapy and Brain Vibrations"*

<http://www.consciousness.arizona.edu/documents/neuropsychotherapist-2.pdf>

"The quantum mobility theory suggests that consciousness arises from quantum processes in non-polar, hydrophobic 'pi stack' regions in subunit proteins of brain microtubules. These 'quantum-friendly' regions appear to align and link between tubulins to extend in mesoscopic and macroscopic helical pathways in brain microtubules. Several possible modes of quantum processes, including quantum dipole coupling, resonance energy transfer, electron mobility and superposition, and 'orchestrated objective reduction', are included in QMT. Treatments such as megahertz-based transcranial ultrasound, and non-polar, hydrophobic drugs, aimed at vibrations of brain microtubules will be beneficial in mental, cognitive and neurological disorders. [...] . This work requires experimental validation at the level of individual neurons and we hope that this can be achieved soon with the use of modern technology such as laser scattering that has been so successful in detecting quantum correlations in photosynthetic systems."

Travis J.A., Craddock, Stuart R. Hameroff, Ahmed T. Ayoub, Mariusz Klobukowski and Jack A. Tuszyński "Anesthetics Act in Quantum Channels in Brain Microtubules to Prevent Consciousness" *Current Topics in Medicinal Chemistry* 2015, 15, 523-533
<http://www.consciousness.arizona.edu/documents/CTMCms-2-2-2-2-2.pdf>

"I ended up with my own proposal about TGD Universe as topological quantum computer (TQC) around 2002 [K13] [...] The proposal is that the braiding of magnetic flux tubes associated with the magnetic bodies of biomolecules - and probably also much larger structures - makes possible TQC like activities basic aspect of living systems. For instance, braids connecting DNA and nuclear and cellular membranes could make possible automatic construction of memories as space-like braidings of magnetic flux tubes induced by time like braiding generated by the liquid flow around cell and nuclear membrane [K2] [...] I have proposed that microtubule acts as quantum antenna [K8] emitting radiation with frequencies $f_n = nc/L$, where L is the length of MT. The variation of the length of microtubule would predict frequency modulation of the radiation coding for potentially conscious information. The model for nerve pulse and EEG makes similar prediction [K10, K1]. Josephson frequency for cell membrane as Josephson junction is proportional to membrane voltage and the variations of membrane voltages due to oscillations and nerve pulse activity are coded to EEG via frequency modulation. [...] If microtubules talk, the most natural language would be based on frequency modulation."

Pitkanen, Matti. "New results about microtubules as quantum systems." *Journal of Nonlocality* 3.1 (2014)
<http://journals.sfu.ca/jnonlocality/index.php/jnonlocality/article/view/51>

"At sufficiently deep levels of spacetime geometry, consciousness may conceivably exist without biology and remain unified by entanglement, supporting possibilities for telepathy, so-called out-of-body experiences, and even afterlife and reincarnation."

Hameroff, Stuart "Is your brain really a computer, or is it a quantum orchestra tuned to the universe?" *Interalia Magazine* 2015
<http://www.interaliamag.org/articles/stuart-hameroff-is-your-brain-really-a-computer-or-is-it-a-quantum-orchestra-tuned-to-the-universe/>

“Indeed, there are multiple studies showing that the biophoton emissions of remote organisms mentally targeted by a healer, sibling or partner (Kokubo et al, 2012; Dotta et al 2011; Persinger and Lavallee, 2010; Shealy et al, 2000; Kawano et al 2001; Tanaka et al 2001) fluctuate to a statistically significant degree during the windows of intent transmission. Similar remote biophoton fluctuations took place even between lower organisms, when one of two cell cultures was exposed to flashes of light, while both cultures were sharing the same configurations of magnetic fields rotating around the plates (Dotta et al., 2011). Additional experimental evidence of biophoton mediated cell-to-cell signaling is provided by Fels (2009), (2012) and Gurwitsch (Tafur et al, 2010), where typically cell populations isolated by glass or quartz were able to influence each other’s cell division, energy uptake and population growth. Given the ubiquitous correlation of biophoton emissions with all these biological and mental phenomena, we believe the time has come to take a closer look at their role in living processes: are these electromagnetic quanta a universal currency of entanglement and information/energy transfer, both within and across the mind-matter boundary, or are they simply a waste product of metabolic activity? And if it turns out that endogenously generated biophotons can indeed regulate important genetic and physiologic processes, then can we learn to effectively modulate them through the practice of meditation?”

Bajpai, Rajendra, et al. "Tinkering with the unbearable lightness of being: Meditation, mind-body medicine and placebo in the quantum biology age." *Journal of Nonlocality* 2.2 (2013).
<http://journals.sfu.ca/jnonlocality/index.php/jnonlocality/article/view/44>

“Experiments analyzing photon emissions during REG output have been performed. The analysis indicates that the most extreme photon bursts occur during the production of the most deviant events in the REG output (# of 1’s/200), these events had a mean +/- 14 bits away from chance expectations.”

Bajpai, Rajendra, et al. "Tinkering with the unbearable lightness of being: Meditation, mind-body medicine and placebo in the quantum biology age." *Journal of Nonlocality* 2.2 (2013).
<http://journals.sfu.ca/jnonlocality/index.php/jnonlocality/article/view/44>

“the convergence of photobiology and qigong experimental research indicates that specific brainwave patterns correlate with specific biophoton emission frequencies, microtubule conformational states and biological effects, both at the level of the operator’s body and in remote targets. Of greatest clinical interest is the ability of focused intent to produce target-specific, directional effects, while leaving control samples unaffected – a feature that has been documented by over a hundred in vitro and in vivo controlled qigong experiments and corroborated by several hundred Random Event Generator (REG) studies conducted at Princeton and other university labs. [...] If cancer is “a disease of geometry” due to a “misregulation of the field of information that orchestrates individual cells’ activities towards normal anatomy”, as Chernet and Levin argue [Chernet and Levin, J Clin Exp Oncol 2013, S1], could we find a way to design and calibrate specific meditation forms to predictably achieve intended electromagnetic effects at a biological target (such as a tumor)?”

Sidorov, Lian. "Toward disease-specific therapies in mind-body cancer research: reverse engineering, epigenetic feedback and in vitro/in vivo combination protocols." *Journal of Nonlocality* 3.1 (2014).
<http://journals.sfu.ca/jnonlocality/index.php/jnonlocality/article/view/49>

“Concerning the questions about meditation, mind-body medicine and placebo, the key concept is that of

magnetic body. Usually organism and environment are seen as members of an interacting pair: organism receives sensory data from environment and controls it. Now magnetic body appears as a third party, "intentional agent" using biological body as a kind of interface between magnetic body and environment. Various "motor actions" of the magnetic body are highly relevant for both consciousness and biochemistry. The pairs formed by various information molecules and corresponding receptors could define plug-ins to Indra's net (or Internet) defined by the magnetic bodies; and Josephson radiation emitted by Josephson currents assignable to receptors would propagate along flux tubes. [...] If dark photons are involved with the communications to and from the magnetic body, then also BPEs as dark photon leakage would reflect this change in genetic expression. [...] The TGD expectation differs from the usual view. Dark photons is what is relevant for remote mental interactions and sending and receiving of dark photons involves leakage as biophotons, which are ordinary photons. Various correlations between biophoton emissions at sending and receiving ends could serve as signature for the presence of remote mental interactions, say remote viewing and healing, say correlations of temporal patterns, correlations between energies of biophotons, and the frequencies of dark photons manifesting as EEG frequencies. Optimistically one could even expect that the ratios of peak EEG frequencies are same as those of peak biophoton frequencies. Healing involves visualization and this might imply that also remote viewing is induced as a side product"

Bajpai, Rajendra, et al. "Tinkering with the unbearable lightness of being: Meditation, mind-body medicine and placebo in the quantum biology age." *Journal of Nonlocality* 2.2 (2013).

<http://journals.sfu.ca/jnonlocality/index.php/jnonlocality/article/view/44>

"The need of quantum considerations is felt at all levels of description used for comprehending a living system i.e. an object endowed with 'life'. Human being, the most widely investigated living system, is no exception. The microscopic or lowest level description of living system is in terms of biomolecules while higher level descriptions are in terms of organelles, cells, tissues, organs and organism. The microscopic description is essentially in the quantum framework but the descriptions at higher levels are in the classical and semi classical frameworks. The higher level descriptions invariably contain a few incomprehensible features and ad-hoc ingredients, which are ascribed to quantum hanky-panky. The main hurdle in understanding these features and sources of ingredients is the lack of framework for describing a composite quantum system of many players. The phenomenon of biophoton emission provides a framework for the quantum description of living system at the highest level of organism."

Bajpai, Rajendra, et al. "Tinkering with the unbearable lightness of being: Meditation, mind-body medicine and placebo in the quantum biology age." *Journal of Nonlocality* 2.2 (2013).

<http://journals.sfu.ca/jnonlocality/index.php/jnonlocality/article/view/44>

The search to understand Consciousness is not just another physiology exercise; its deepest thrill comes not from the promise of a new miracle drug or the resolution of a philosophical argument, but from the sense that in breaking this last great frontier we may be able to alter the direction of our evolution. Our selves are tied into what we perceive and imagine about the world, and the extent to which we can interact with that world; and, to paraphrase Teilhard de Chardin, the limits of that experience, and of the creative energies hidden within it, are reinforced only by lack of intellectual courage and moral vision. Our scientific community is not exempt from the historical forces converging to push our society ever closer to the point

of irreversible crisis – political, economic and environmental. On the contrary, its members are charged with the all-important task of charting our large-scale trajectory, our voyage of discovery and self-preservation in the face of all external and internal threats. And choosing *which* questions are critical to our survival in such a moment may have to extend beyond conventional bounds - from “What is consciousness” to “How do we use its full potential?”, if necessary bypassing a complete theoretical representation in order to focus on practical applications, as we have done with quantum mechanics, if a historical need demands it.

For much too long progress in this field has been blocked by distracting, emotionally charged straw arguments and psychological discomfort with the data. It is time to give this matter a hard, rational look – driven by curiosity, not by prejudice, and looking forward to opportunity, not fear. If there is one constant to human evolution it is that Science has again and again upended our comforting, anthropocentric, small-scale models of reality to reveal much grander patterns – at once exhilarating and deeply disquieting. It is the very nature of scientific (and religious) awe to gradually expand our vision, our grasp of Nature’s profound symmetries; but in that momentary tearing of our former limits, and in the reconstitution of a new, expanded insight, it is our very selves that expand, that take new shape. We become what we know and what we believe.

If consciousness is an intrinsic property of matter, as Koch, Tononi (2012) and Tegmark axiomatically claim, then the "Hard Problem" becomes relatively trivial - as an increase in material complexity and feedback loops (Φ) leads to a parallel, emergent complexity of awareness, or consciousness *in its most common definition*.

But while we are starting to see corroborating neurologic evidence for IIT based on TMS/hd-EEG (Massimini et al. 2009) experiments, the keystone of their increasingly abstract mathematical construct remains unaddressed, leading to inconsistencies like that pointed out by Scott Aaronson in a truly delightful (and relatively unbiased) argument (see “Why I am not an Integrated Information Theorist” <http://www.scottaaronson.com/blog/?p=1799> and “Quantifying the Rise and Fall of Complexity in Closed Systems: The Coffee Automaton CCC’s Declaration of Independence” <http://www.scottaaronson.com/blog/?p=1823> as well as Jim Horgan’s “Can Integrated Information Theory Explain Consciousness?”, Sci Am Dec 1, 2015 <http://blogs.scientificamerican.com/cross-check/can-integrated-information-theory-explain-consciousness/>) It would appear, in this observer’s humble opinion, that the move toward a mathematical elaboration of the theory while leaving its foundational assumption as a “self-evident” postulate represents a capitulation on any claim to legitimately solve the Hard Problem of consciousness. Such a course of action may very well lead to breakthroughs in AI and neuroscience - but it will not touch the more ambitious question its authors had set out to address. As Aaronson correctly points out, you cannot apply a double standard to the cerebellum and a two-dimensional grid of XOR gates: if consciousness in non-living structures is defined by a different set of criteria than consciousness in a human (can the cerebellum not contain, or generate, a type of awareness that we may not recognize behaviorally yet “is there”, just like the presumed consciousness of Scott’s grid?) then where is our falsifiable theory - or rather, how deep does it go? The introduction of a new axiom requires overwhelming *evidence* to make it inevitable - and despite the consistency of Chalmers’ argument or the persistence of the Quantum Measurement enigma, it appears unlikely that the scientific community is prepared to accept an axiomatic resolution to the Hard Problem and the billion dollar projects it has launched. Indeed what is needed are the empirical data and experimental tools to build testable hypotheses of panpsychism - but do we have anything in the vast store rooms of Science that can be used or adapted to suit such questions?

The purpose of this panel discussion is to see if we can begin to patch together a more concrete

experimental approach to the fundamental premise of Integrated Information Theory (Tononi), Orch-OR (Penrose-Hameroff) and Topological Geometrodynamics (Pitkanen) - all of which posit that consciousness is not fundamentally bound to neuronal or even biological matter, but is in fact intrinsic to the structure of the universe - in a hierarchy ranging from proto-consciousness in elementary particles to highly differentiated and integrated experiences in complex biological structures like the human brain.

It is beyond the scope of this present discussion to review the various classes of experiments, the great methodological debates and ever tighter, mostly blind protocols used to probe mind-mind and mind-machine interactions at labs such as the Princeton Engineering Anomalies Research lab, Cornell, University of Amsterdam, University of Gothenburg, Utrecht and Edinburgh University, along with other academic centers in Europe and Asia. These studies and meta-analyses have been reviewed, along with the controversies and rebuttals swirling around them for almost a century, in books like Radin's *Entangled Minds* (2006) and *The Conscious Universe* (1989), Carter's *Parapsychology and the Skeptics* (2007), Jahn and Dunne's *Margins of Reality* and *The Role of Consciousness in the Physical World* (2009) and others. What they demonstrate with an extremely high degree of statistical significance is that human consciousness can not only extract detailed, extensive information from remote physical targets that are part of a controlled remote viewing protocol, connecting the intent of multiple participants with the hidden target (see McMoneagle 1997, 2000, 2002; Buchanan 2003; Warcollier 1927, 1958, 2001; Smith 2005) but also that it can somehow influence the behavior of isolated physical systems ranging from random event generators (REG), magnetometers, interferometers and photomultipliers to plants, cell cultures, extracted DNA and other humans' brains or physiologic responses (see Benor, Backster, Carter, Jahn and Dunne, Radin and Tressoldi references). By far the greatest database consists of effects on random event generators - indeed in 1987 a meta-analysis of 832 such mind-machine interaction studies, conducted by 68 different investigators, was published by Roger Nelson and Dean Radin in *Foundations of Physics*. The odds against chance were more than a trillion to one, with a replication rate "as good as that found in exemplary experiments in psychology and physics" (Radin, 1997, p 140; Carter, 2007, p 46). In addition, the Global Consciousness Project (<http://global-mind.org/>) which monitors a network of 70 random event generators distributed across the globe has accumulated over 15 years of data (and 480 studies) showing with a cumulative probability of over a trillion to one that the output of these isolated REG's shifts toward synchronized deviations from expectancy during "periods of global mental coherence in the wake of major events attracting world-wide news coverage", suggesting that somehow our collective focus on these major events can influence machine behavior. "We can conclude that there really are effects of consciousness in the world, unexpected correlations in our network of random devices. Something is going on, and the most likely conclusion is that there is an interconnection of consciousness at deeply hidden levels between people and among people across the globe. [...] What we see in the global consciousness correlations may be some very faint version of Teilhard's noosphere", says Roger Nelson, who was the Research Coordinator of the Princeton University PEAR Lab from 1980 to 2002 and has directed the Global Consciousness Project since its start in 1997 (see [http://global-mind.org/papers/pdf/Connected Consciousness Samson-WFS-Futurist-29sept2014.pdf](http://global-mind.org/papers/pdf/Connected%20Consciousness%20Samson-WFS-Futurist-29sept2014.pdf))

There is no doubt that current Brain Mapping efforts represent a vast and highly successful cartography of functional correlations between sensory inputs, conscious integration and perception of these inputs, emotional circuits and motor pathways - essential data if what we are after are novel therapeutic approaches to address major mental and neurological disorders like depression, Alzheimer's dementia or schizophrenia.

But is there anything of practical value to be learned from the other body of data - the one investigating nonlocal conscious phenomena? Rather than having to choose between a synaptic and a microtubule-based computational system, could it be that our brain uses both in a superposition of classical and quantum processes, with automatic, organism-level "zombie-like" responses driven by synaptic gating, while nonlocal events like telepathy, remote viewing, mind-machine interactions (and perhaps qualia, intent and pure consciousness itself) are mediated by perturbations and "music-like" harmonic entrainment in a quantum-level substrate, like the one described by Penrose/Hameroff?

Intuitively, such a picture appears to make more sense, or at least fill in some of the modeling gaps - for while all three theoretical approaches claim a "panpsychist" pedigree, seeing consciousness as a fundamental property of the universe and its geometry, it is difficult to see where the undeniable complex functional architecture of our brain fits in the Orch-OR model - while on the IIT side, there is no mechanism in place currently that makes any attempt to account for the existing data on nonlocal mental interactions - whether between two humans, or between human and non-living targets like Random Event Generators. Only Topological Geometrostatics (TGD) makes an effort to construct a more detailed view of such a global dynamic, including the possible biophoton signature of nonlocal entanglement (which appears to have some preliminary experimental backing from Tressoldi and a few other studies). But the stark reality is that the few experimental results cited by the proponents of all three models are merely circumstantial - they offer tantalizing support for specific aspects of the theory, but no definitive insight to help us choose one model over the other. If Orch-OR accounts for proto-consciousness in even the smallest scales of physical reality, how, specifically, does complex physical organization (especially highly self-referential structures as posited by IIT, or the coherence-promoting MT architecture) contribute to a higher level of awareness - and what does that mean in terms of "wavefunction collapse" or spacetime topology? What is the significance of "intent" in Orch-OR, IIT and TGD - how does "intent" drive information propagation in the brain and in brain-to-brain or brain-REG networks? And why are meditation and sleep more conducive to nonlocal mental phenomena like telepathy or precognition - if these nonlocal effects are mediated by microtubules, as Orch-OR purports, can we identify changes in MT configuration or electrical properties that are common to both meditation and sleep, or is it simply a matter of reduced input from synaptic computation, making nonlocal information processes more salient to our awareness?

These are not merely philosophical questions - beside the ontological implications there are practical applications that need to be considered - for it is here, in this intersection of consciousness research and medicine that questions such as the nature of free will and intent become particularly acute. What exactly is "intent"? Given its central role, target specific and directional effects in remote mental interactions, it seems essential to more precisely characterize this aspect of consciousness - perhaps THE key feature of consciousness. While sensory integration, information propagation and motor response across Global Workspace canvasses could in principle still be seen as "zombie" behavior (to use the term popularized by Chalmers), intent (seen in its most spartan definition as the willful application of attention on a specific object or idea) appears to be a critical element in our ability to "converse" across the mind-matter and local boundaries of our universe, including perhaps the very mystery of the Quantum Measurement problem. Could the classic synaptic processing responsible for sensory integration, associative thinking and response (which forms the bulk of current Brain Mapping efforts) represent in fact automatic "zombie-like behavior" in the absence of quantum-level (possibly MT-mediated) attention/intent? And if so, at what level do they interact - what is the quantum/classical interface of our brain - not to mention other living species in which purposeful behavior is observed in the absence of this magnificently complex organ?

The "Call for an open, informed study of all aspects of consciousness" (Cardena 2014) could not be more pertinent to our present efforts to unlock the "brain code" and its connection to so many chronic diseases. If "intent" is MT-mediated, and if microtubules are indeed capable of information transmission and large-scale intra-and inter-organism quantum coherence and entanglement effects, then many of the mind-body medicine and other biomedical research applications we have discussed in previous *JNL* articles become intelligible on the basis of intent-driven MT frequency modulation. Rather than focus exclusively on molecular therapies, our Brain Mapping projects could lay the foundation to an entirely new branch of medicine, targeting such biomodulation therapies in a collaborative effort between biotechnology researchers and experienced qigong practitioners (see *"Tinkering with the unbearable lightness of being: meditation, mind-body medicine and placebo in the quantum biology age"* and *"Toward disease-specific therapies in mind-body cancer research: reverse engineering, epigenetic feedback and in vitro/in vivo combination protocols"*).

But to identify the deep, quantum-level footprint of "intent" will be far more difficult than mapping sensory and motor pathways. It is for this reason, I believe, that we need to introduce remote mental interactions into our mainstream consciousness research program - as the only *distinct* language of panpsychism, able to isolate the signature of intent and perhaps other fundamental aspects of consciousness from the noise of biological processes.

Tononi states that consciousness is NOT the neural activity of the brain, but "shapes in qualia space" created by specific causal relationships and configurations, whether based on biological or non-living matter; and that you need material structures *organized in a certain way* in order to give rise to conscious experience; also that an assembly of conscious entities like you and me does not necessarily form a superstructure which is conscious – so our "selves" would also have to be organized in this specific way in order to fuse into a hierarchically superior type of consciousness (see Reference links 1 through 5)

So let's look at RV data emergence: it is low-streaming information propagation across a distributed network, it is perceived and integrated by the RV operator's brain or by multiple participants in a group telepathy study, but does not create a "super-consciousness" as far as we can tell.

But what happens during GCP events? Why does the focus of millions of minds on a particular event create something that perturbs an entire global network of REGs, while under routine circumstances where the same millions focus intently on their own individual affairs this does not happen (GCP baseline)? What this suggest is that the ad-hoc organization of these millions of brains under the specific conditions of focused global attention (intent) changes – as does its causal relationship to other physical systems with which they may become entangled via experimental intent (see Millar's "Forensic Parapsychology" or "Tip of the Iceberg" panel discussion). So in this "qualia space" one may be able to create a "super-consciousness" by restructuring its connectome – and that restructuring can be engineered via focused intent; furthermore – the way in which this super-consciousness interacts with targeted physical systems can also be sculpted by using particularly apt operators or experimental set-ups – which raises the question of other potential applications (see end of this discussion for medical, quantum computing and climate considerations).

Tononi (1-5) gives the example of dreamless sleep – in which the cortex is still active, but the different parts of the brain are not communicating across a significant spatial range, and the experience of consciousness is therefore not present. Scaling this up to nonlocal mental interactions – could we see our awake consciousness (which is highly active with a narrow local focus), as the reverse process, in which sleep brings about loss of local consciousness/ individual selves, while a global computational reconfiguration

opening long-range dynamics leads to the emergence of another, higher-level consciousness – our “global mind”, of which universal myths and dreams are but poorly understood trickles of awareness? If, as Tononi asserts in “Is Consciousness Irreducible?” and “Anything Non-physical about the Mind?” “meaning” resides in understanding the fundamental, conceptual, “intrinsic shapes” of reality and promoting the emergence of an even more complex such geometry of consciousness (in a perspective echoing the basic vision of Topological Geometrostatics and its Negentropy Maximization Principle), then what greater imperative is there but to explore how our minds can actively, collectively construct such a Noosphere and perhaps break down further topological/ cognitive boundaries between living and non-living systems? It may be that scientific intuition itself, and our ability to understand the deep aspects of quantum mechanics, will one day depend on this direct experience – of which current remote viewing applications are but a faint prefiguration.

It is obvious to anyone who has followed the arguments over Orch-OR, IIT and other candidates for a comprehensive theory of Mind, that what the field desperately needs are new experimental models able to address the deep and essential questions at the core of these theories in a clear, compelling way. At this point it is difficult to envision the kind of breakthrough experiments that will take us one step further toward understanding the fundamental nature of consciousness in personal and transpersonal scales. But several observations may help define our guiding principles as we search for a new experimental paradigm.

First, it is interesting to note that ***much of the information integration and propagation architecture we see in Global Workspace-type models of the brain appears to be mirrored at a nonlocal scale***, in remote viewing and group telepathy networks (see Warcollier, McMoneagle, Sidorov 2003, 2013). So one useful approach might be to use this apparent symmetry between brain-based and nonlocal mental interactions to gain additional insight into the kind of dynamics that might be testable. If there is indeed some ***fundamental fractal symmetry in the architecture of consciousness***, as both TGD (in great detail) and on a more general level Orch-OR describe, then engineering networks of operators and targets specifically configured to test information integration and propagation under various conditions, entanglement signatures or biological and non-biological processing gates (such as microtubules and other, nonliving complex organizational structures highly conducive to quantum coherence) might help us fill in the missing pieces in the various scales we are looking at.

Secondly, from an Integrated Information Theory perspective, a system's Phi (purported measure of consciousness) is very difficult to quantify - however we can ***engineer networks of identical elements with identical Phi values, and configure them into subsystems that allow us to calculate their Relative Phi (RP) , the effect of different gating methods and other controlled variables on the overall output***. This can be applied to any class of objects, from neural networks to Random Event Generators (REGs) to human subjects. Information integration, connectivity and propagation are functions that are relevant to the brain but also to intra-organism cellular signaling (Popp), intra- and inter-species communication (see Sheldrake, Benor, Radin, Backster) and mind to mind / mind-machine interactions (see Jahn and Dunne, Nelson) - therefore taking this experimental path may shed light not only on "intent" but possibly on other, organism- and species-level organizational principles such as morphogenesis.

Third, as we have proposed before (see Sidorov 2012) a split-beam approach to remote mental interactions may be a practical way to deal with the intrinsic irreducibility of input conditions in mind-mind and mind-matter studies (for further experimental discussions see question #4 below).

Finally, it is worth considering that from an evolutionary perspective the most likely and effective application of remote mental interactions may lie not in individual but in group/ network protocols, because of the statistical nature of the phenomenon: can we learn to harness these small effect sizes into more powerful and more predictable effects, with application to medicine (see Dossey and Schwartz, Benor), social engineering, quantum computing and perhaps even some degree of climate modulation, if it turns out that large nonlinear systems are also susceptible to mind-matter effects? Recent results from UCSB demonstrate that “chaos and entanglement are really very strongly and clearly related” and that entanglement is “the driving force behind thermalization” – in other words, that the “regions of entanglement in the quantum map resemble the regions of chaos on the classical map” (see Neill 2016, Fernandez 2016). It is not inconceivable that as we approach critical thresholds in climate change and face the prospect of these intensified chaotic systems (such as coastal hurricanes) vastly surpassing the scale of our existing technology, there may be some interest in studying the possibility of using collective consciousness weather apps to subtly alter the high entanglement regions and early course of developing storms away from densely populated areas – a proposal that will surely provide amused satisfaction to the camps of skeptics seeing nothing more than superstition behind any attempts to investigate nonlocal mental interactions. Remembering Clarke’s famous adage that “any sufficiently advanced technology is indistinguishable from magic”, it remains to be seen whether human consciousness can be used to stabilize quantum coherence and entanglement and whether the first such applications will be developed with respect to quantum computers, medical interventions or weather systems.

While nonlocal conscious phenomena have been the subject of tremendous scientific controversy and anyone daring to address them from a position of less than card-carrying intolerance risks significant professional fallout (see Carter 2007), the reintroduction of panpsychist axioms into a mainstream model of physics and consciousness, as John Wheeler did toward the end of his life, is certainly bringing us one step closer to understanding how such phenomena could possibly occur. But to stop here, content with such “explanations” for remote mental interactions, with an increasingly abstract evolution of IIT or a narrow focus on microtubules and consciousness, is to miss a tremendous opportunity. If consciousness has indeed a panpsychist substrate, then IIT, Orch-OR and TGD need to boldly move into a broader experimental arena and test consciousness on a nonlocal scale, which crosses individual brain and mind-matter boundaries and takes advantage of sophisticated methodological tools developed under the pressures of a century of unparalleled scrutiny. Is this a gamble? Certainly. But it is also very likely that only through such a gamble can panpsychist consciousness models become the foundation of a new physics, as they aspire to do, instead of remaining just another exploratory chapter in the next Neuroscience textbook.

Section II: Questions and Proposals

Q1 (LS): Correlates of consciousness in non-living systems (CCNLS): Responsiveness

“In my view, IIT fails to solve the Pretty-Hard Problem because it unavoidably predicts vast amounts of consciousness in physical systems that no sane person would regard as particularly “conscious” at all: indeed, systems that do nothing but apply a low-density parity-check code, or other simple transformations of their input data. Moreover, IIT predicts not merely that these systems are “slightly”

conscious (which would be fine), but that they can be unboundedly more conscious than humans are."

(Aaronson, Scott "Why I am not an Integrated Information Theorist"
<http://www.scottaaronson.com/blog/?p=1799>)

How do we define consciousness phenomenologically? In "Confessions", Koch discusses neural and behavioral correlates of consciousness, but recognizes that as we move away from the realm of humans and higher animals, it becomes increasingly more difficult to define what consciousness would feel or manifest like. Scott Aaronson's argument is driven by an instinctive rejection of the idea that inanimate objects, no matter how complex, could possibly possess consciousness. But is there a reason for which the outward manifestations of awareness should be the same in living and non-living structures? Before dismissing this question as another "angels on the head of a pin" exercise, it serves to remember that locked-in patients appear outwardly almost as inert as the devices Scott offers for counter-examples - and yet with modern imaging technology and ingenious probing we can now recognize that their brains are engaged in conscious activity, and can even communicate with them.

However, there is another field of empirical evidence that is much more relevant to this discussion, both because of its sheer volume of controlled experimental studies, methodological refinements and meta-analyses; and because the questions that it has grappled with over the past century, as a result of the paradoxical findings encountered in dozens of university labs by engineers, physicists, neuroscientists, experimental psychologists and scores of other highly trained, discriminating and initially very skeptical investigators, have come face to face with the same fundamental challenge: is there something about physical matter that can interact with and respond directly to human consciousness, and if so how do we rigorously investigate the properties of this interface in order to integrate it with the rest of our scientific architecture? What is the substrate that makes possible these mind-machine interactions? And how do we begin to study this "extraordinary evidence" in a way that yields actual quantifiable insights, rather than philosophical pronouncements and excommunications?

Getting back to Scott's challenge - how do we unequivocally recognize consciousness in inanimate systems, in a way that neutralizes his circuit board objection?

One possible such "correlate of consciousness" in non-living systems (CCNLS) might be **responsiveness** – a PK equivalent of Behavioral Correlates: specifically in a typical bench-top mind-RNG experiment, such as the thousands of trials run at Princeton and elsewhere, can we expect a greater PK effect size in more complex, more highly integrated REG systems? In a previous article ("A Split Beam Approach to Remote Mental Interactions") we provided a rationale for using such an intrinsic-control methodological strategy in the case of mind-matter interactions, where input conditions are notoriously irreproducible. Could we then engineer REGs with different degrees of Phi and see if there is a consistent difference in their response to the same PK or GCP-type stimulus?

Q2 (LS) CCNLS: Network Perturbation

The other way to demonstrate self-integration/ functionally conscious Phi in severely brain-injured, locked-in patients is imaging – such as the **perturbational approach** described in Massimini 2009, which should theoretically (based on IIT) demonstrate much broader stimulus propagation, as detected by hdEEG, in response to transcranial magnetic stimulation in a conscious than an unconscious patient.

Translating that to our non-living system - what would happen if instead of the current GCP network, with

70 host sites distributed throughout the world, RNG's were embedded in everyone's cell phone, as the Collective Consciousness app proposed by Adam Curry? (see <https://www.indiegogo.com/projects/collective-consciousness-consciousness-technology-in-a-radical-new-app#/>) Since there is a high degree of connectivity on many different levels ("tracts") among the humans using these phones on a daily basis, and an inordinate attachment we all have for these devices, would the data collected from such extended RNG-App networks in response to major global events exceed the correlations seen in the modest, 70-node GCP – even if the RNG's themselves have no direct or programmed communication with each other?

Q3(LS) CCNLS: Integration

The Axioms of IIT (from Giulio Tononi, Christof Koch "Consciousness: here, there and everywhere?" Philosophical Transactions of the Royal Society Published 30 March 2015. <http://rstb.royalsocietypublishing.org/content/370/1668/20140167>)

(ii) Composition

Consciousness is structured: each experience is composed of many phenomenological distinctions, elementary or higher order, which also exist. Within the same experience, for example, I may distinguish a book, a blue colour, a blue book and so on.

(iv) Integration

Consciousness is unified: each experience is irreducible to non-interdependent subsets of phenomenal distinctions.[...]. Similarly, seeing a blue book is irreducible to seeing a grey book plus the disembodied colour blue.

The phenomenological experience described above is indeed characteristic of both awake and dream consciousness - however, as anyone who has trained in and practiced Coordinate Remote Viewing (RV) protocols can attest, the "perception" of a remote target is a profoundly different type of conscious experience (see complete version of the Coordinate Remote Viewing Manual, by Maj. Paul H. Smith, at <http://www.remoteviewed.com/files/CRV%20manual%20full.pdf>)

The way RV data emerges into the consciousness of the viewer focusing on an alpha-numeric target coordinate is typically as a series of disconnected, scrambled sensory and conceptual bits of information (i.e. man-made, solid, sharp, blue, metallic, rapidly moving, not real, recording apparatus, etc) which with repeated application of focus gradually coalesce into a more integrated percept (sword-like object, camera, movie set, Gladiator) that *might* contain an impression of orientation, scale, purpose or emotional significance - however this is neither directed internal imagery nor the unitary sensory experience through which we normally perceive the world or the landscape of our dreams. It may take minutes to an hour or more of persistent, structured probing of the target, sometimes using specific cues (temperature? sound? texture?) to obtain a somewhat detailed, somewhat coherent impression of the target, which is however almost never characterized by the same richness of sensory data and associative connotations as the percepts of our normal conscious experience, but closer to dream impressions. And almost always, mixed with that "percept", are false impressions and associations - even when the result is an unmistakable "hit"

(see McMoneagle, Buchanan and Warcollier references for much more detailed discussion on this topic; <https://hrvg.org/sessions.php> or http://rviewer.com/SG_Sessions.html for examples of session transcripts; or see "Entanglement and Decoherence in Remote Viewing", [http://www.emergentmind.org/SidorovII\(1\).htm](http://www.emergentmind.org/SidorovII(1).htm) for some preliminary comparisons with quantum computing and Topological Geometrodynamic modeling).

Based on this consistent presentation, one could surmise the following: 1. that whatever "RV signal" stimulates the brain's canvas in response to the repeated application of focus ("spotlight of attention") on the target coordinate, it reaches across the entire brain, not just specific modules; however, that the response is extremely faint, barely perceivable behind the stronger activity of our normal consciousness. 2. that with repeated application of attention/ injection of power, the existing feedback loops responsible for the typical contents of our consciousness fade out relative to this new resonant pattern, and the RV cortical response begins to propagate ("winner takes all coalition" - Baars 2013), unifying these disparate sensory and conceptual perceptions, but also possibly picking up incorrect associations based solely on the stimulation of preexisting cognitive basins ("analytic overlay", in RV terminology). 3. that a feedback loop may eventually form between the viewer and the target, via the abstract coordinate, and that by propagation it may engage other viewers focused on the same target (see Warcollier's "contagion of errors" in group telepathy experiments, or Eisenbud's report of inadvertent telepathy between two individuals who had no other connection except for being patients of the same psychoanalyst - Ullman and Krippner 1973).

Where does Remote Viewing perception fall on the spectrum of consciousness? Where does intent/ target focus fit in this AIM (Hobson) / IIT (Tononi) phase space and what kind of influence does it exert on the state of consciousness? The natural assumption would be a gradual closure of external input gates (see typical reports of sensory blocking in deep meditation or focus) – but that is also coupled with high activation and persistent re-application of attention in both RV and PK experiments, which may act to gradually increase the power and propagation of this initial "coalition" of resonant neurons to other barely discernible qualia neurons corresponding to target traits. (It is perhaps for a similar reason that emotional content seems to play such an important role in spontaneous telepathy, group-REG and GCP experiments – by activating a broadly connected area of the brain and thus adding power to the emerging resonant network.)

Finally, when considering historically reported phenomena like spontaneous telepathy between family members, the "contagion of errors" reported by Warcollier and many others (see "Entanglement and Decoherence") or controlled studies of remote EEG correlations between sender/receiver pairs (Radin 2006), could we be talking about a scaled-up version of reciprocal connections as not "neural correlates" but "global correlates" of consciousness - the minimum degree of activation required for nonlocal mental interactions?

Q4 (LS) La Bête

Why are spontaneous nonlocal conscious phenomena such as telepathy and precognition (anecdotally reported throughout history and more recently documented by Jung, Eisenbud, Ullman and Krippner, etc) more commonly reported in certain states like meditation and dreaming? Indeed, one could look at such information transmission as the scaled-up version of IIT stimulus propagation/ resonant loops at the level of our highly-integrated species consciousness. It is conceivable that the phase space these two states share (high activation, input-output gates closed, low aminergic state in Hobson's AIM model) create favorable conditions for the detection, propagation and conscious processing of such remote signals. But *what* is it that propagates – what *is* the signal? Does a panpsychist physics make this question less of a taboo – and

easier to tackle through mechanism-oriented experimental models? *Can we test the IIT hypothesis on a nonlocal scale - and thus break free of the neuro-centric definition of consciousness?*

PRELIMINARIES

In *Entangled Minds* (2006) Dean Radin summarizes a series of experiments investigating EEG correlations between pairs of human subjects isolated from each other, one of them acting as a "sender", the other as the "receiver". In the typical protocol, the sender's brain was excited randomly by simple stimuli such as a flash of light or a sound, or by randomly projecting the receiver's image on a video screen in front of the sender - then the researchers looked at the receiver's EEG to see if it registered a response at the same time. Of the first set of experiments and independent replications, started in the 1960's, eight out of ten studies found a statistically significant correlation between the stimulus and the receiver's response - despite the fact that the receiver was isolated in a distant part of the building from the sender. It is also worth noting that out of these 10 initial studies (one of which involved identical twins), three were published in highly respectable journals (*Science*, *Nature* and *Behavioral Neuroscience*).

Other series of conceptual replications followed in the coming decades, some published in *Physics Essays*, *Neuroscience Letters* and *Alternative Therapies in Health and Medicine*. A variation on this experiment using fMRI found that the area of the receiver's brain showing increased activation when a flash of light was presented to the distant sender corresponded to the area of the visual cortex stimulated at the sender's end, as if the two brains were mirroring each other - with odds against chance of 14,000 to 1. Several successful replications were subsequently conducted by the same team, including one involving 30 pairs of trained meditators; in this last study, published in the *Journal of Complementary and Alternative Medicine*, Standish and her group found real EEG correlations, with odds against chance of 2,000 to 1. Finally, in a related experiment conducted by Radin, his team showed that the receiver's EEG peaked within milliseconds of the sender's visual evoked potential peak, with odds against chance of 5000 to 1 (Radin 2006, p136- 141).

(Interestingly enough, similar reactions have been repeatedly demonstrated by polygraph recordings in plants and cell cultures in response to thoughts or stimuli experienced by another living creature that was in close proximity or with which there was a previous bond - see Backster, 2003)

EXPERIMENTAL PROTOCOL

With this preliminary data in mind, it is worth testing the notion that in a group of experimental subjects that are "bonded" by certain mental or physical shared experiences, the density and complexity of those shared experiences will be proportional to the potential for reciprocal activation, even when one of the subjects is isolated from both the experimental stimulus and the other subject - the activation in effect propagating across a distributed "qualia network" analogous to populations of brain cells firing together. Taking the EEG-correlation studies described by Radin as a conceptual departure point, we could use optogenetically modified mice* in various binding configurations to stimulate a particular functional circuit, then see the hdEEG (high definition EEG) response in isolated mice with which the experimental subjects have a common history. Such an experimental model could let us test a number of hypotheses:

I. Complexity

Let A, B, C, D, E and F be genetically identical mice with distinctly different color markings so they are easily identifiable from any angle. Using the "optogenetic binding" procedure described above, let their experience associate the following:

A: stimulation of fear circuit/ image of CAT/ presence of mouse B (through video camera projection)

A: stimulation of fear circuit/ image of CAT/ presence of mouse C (one way)

B: stimulation of fear circuit/ image of CAT/ presence of mouse A (one way)

C: stimulation of fear circuit/ image of CAT/ presence of mouse A (one way)/plus film of CAT chasing A / small painful stimulus as cat closes in on A (complex causal loops)

C: image of CAT / presence of E

E: stimulation of fear circuit/ presence of C (one way)

E: stimulation of fear circuit/ presence of B (one way)

F: no familiarity with the other mice, no exposure to fear or CAT image

A and D should also be familiarized with each other, but without any simultaneous fear activation

What is likely to happen across this network if the mice are now all isolated from each other and the experimental stimulus applied to A (and repeated multiple times) is activation of the fear circuit + CAT image presentation? Will there be a correlated EEG activation of the fear areas at B, C and E - suggesting that the fear/CAT association at A propagates and entrains other elements in this *associative basin across the network*? Will there be some activation at D, but less than in B and C, with no activation in F - corresponding to lower, respectively no qualia connectivity? Will the response at C be greater than B, possibly indicating the activation of a greater associative basin?

What if the experimental stimulus (video of C) is applied at E - will A respond and respond faster than when a B video stimulus is applied to E, given that any activation of C will entrain more complex feedback loops?

* by *optogenetically modified* we mean mice in which certain certain circuits (fear, pleasure) are optogenetically triggered in association with the presentation of specific stimuli, such as the image of cat, so that these two experiences eventually become bound

II. Power Amplification

Given that in a typical RV session it is necessary to repeatedly cue the target coordinates over extended periods of time, with more detailed and integrated information gradually emerging into consciousness, one could hypothesize that this is a matter of injecting additional power into the resonant associative network comprised of target, other experimental participants and one's own brain perceptual response neural coalitions - such as the association of blue color with movement, sharp, metallic, etc. In the scenario above, then, will repeated application of the experimental stimulus increase/ broaden the activation at the receiver's end?

III. A replica of Remote Viewing

If placing attention on the Right peripheral visual field is optogenetically bound to stimulation of the pleasure circuit, there is a significant probability that mouse A will eventually keep refocusing on that

particular area, somewhat analogous to a viewer repeatedly cueing his/her RV target coordinate. If a black box were then placed at that visual field location, containing mouse B, would mouse A's fear circuit eventually light up, suggesting that the target characteristics are gradually emerging through repeated focus on the masked target? What if mouse C was instead placed in that black box - would there be faster or increased activation of fear and other areas at A, given that mouse C is a more "complex target" with more feedback connections to A?

IV. Is sleep more conducive to nonlocal network activation?

A similar experiment could be run with any dreaming mammals to test the effect of particular brain states on facilitation/ inhibition of these nonlocal resonant loops and the ability of the ensuing "dynamic coalition of adaptively resonant populations of neurons" to reach conscious dominance (Baars p14) Would activation of fear at the "sender mouse" while the receiver is in various sleep stages (nREM S2, S3-4, REM) result in more rapid/ more powerful activation at the receiver' end?

Q5 (LS) Is Phi dependent on the brain's phase space - can the brain alternate between classic and quantum computational modes?

What role do you think microtubules play in gating and reshaping brain computational patterns? Brian Millar has suggested that the brain contains both classic and quantum computational functions. The fact that nonlocal conscious interactions may and do occur superimposed on routine diurnal consciousness (the operator in a typical RV session is a perfect example of such a superimposition of rapidly alternating states or computations activities; spontaneous telepathy has been reported in both nocturnal and diurnal contexts; and studies of distant mental interactions with living systems, including human receivers, do not require the target to achieve any particular mental states, although many operators find it more effective to go through a cool-down or meditative phase at the beginning of the session) suggests that both of these computational processes occur simultaneously – however, in the highly competitive environment of brain activity, it may be that the power of such alternative (possibly MT-mediated) resonant circuits may remain below the threshold of awareness under most circumstances, being brought into the spotlight only by deliberate suppression of classic neuronal activity, coupled with the power amplification derived from persistent target focus.

Could there be a connection between the effects of slow wave sleep and meditation on the global gating configuration of the brain - perhaps leading to a reshuffling and eventually more favorable, more "sensitive" quantum computational state - whether based on MTs or another interface (Millar's quantum brain)? Could circadian rhythms play a role in such a daily balance between classical and quantum brain computational modes?

Q6 (LS) Phi and Uber-Phi

How do you see the interplay between the consciousness of Self and the ability to participate in such nonlocal conscious phenomena in terms of Phi?

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