A Funny Thing Happened on the Way to G.U.T.

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Is the increasingly common decline effect seen in mainstream sciences like medicine and biology a sign of wide-spread flaws across the research/publication continuum, or a harbinger of deeper structural shifts in our interface with nature? Are biological systems primed for nonlocal communication and sustained quantum entanglement, as the evidence from quantum biology and experimental parapsychology seems to suggest? This discussion reviews the current data and outlines several mind-matter modeling candidates, together with the promising research venues they open.

When the New Yorker magazine published Jonah Lehrer's piece on the decline effect in late 2010 ("The truth wears off", December 13, 2010), the author quickly found himself on the defensive, accused of encouraging anti-scientific arguments and playing in the hands of those challenging the evidence for evolution or climate change. Lehrer immediately went on record to explain that his remarks were misinterpreted (Horgan, 2010), but the article had touched a raw nerve: over the next couple of years, the story was picked up again and again by mainstream media ranging from Nature and Scientific American to NPR and Wired Magazine, as the so-called "decline effect" became a fashionable, albeit still impolitic subject among researchers, science bloggers and their followers.

Coined by Duke psychologist J. B. Rhine in the earlier part of the last century, the term describes a phenomenon in which effects that demonstrate a high statistical significance in initial experiments begin to gradually diminish with subsequent replications. In a 2005 JAMA article John Ioannidis, an epidemiologist at Stanford University, looked at the 49 most cited clinical research trials in three major medical journals; out of the 34 claims that had been subject to replication studies, 41% were disproved or showed significantly weaker statistical evidence than originally reported (Ioannidis, 2005a; Lehrer 2010a). Many of these major randomized controlled studies had significant impact on the development of new treatment guidelines, so their questionable validity status, according to Ioannidis, meant that we could "waste a lot of money treating millions of patients and doing lots of follow-up studies on other themes based on results that are misleading" (Lehrer, 2010a). A separate review by Ioannidis, looking at genetic studies reporting differences in disease risk between men and women, showed that out of 432 claims, only one was consistently confirmed in subsequent replications (see Lehrer, 2010a; Ioannidis 2005b). While Ioannidis concluded that many of these studies were just poorly designed, the percentage of failed replications in a field as well funded and carefully scrutinized as medicine is quite staggering.

But the decline effect has turned up in other fields as well: a 2001 study by Michael Jennions, a biologist at the Australian National University, looked at 41 meta-analyses comprising hundreds of experiments in ecology and evolutionary biology and reported that over time, there was a consistent reduction in statistical evidence with subsequent replications, even when multiple variables were accounted for – often

resulting in a rejection of the main hypothesis as early as one year following initial publication. Even in hard sciences like physics there are indications that something odd is going on: the weak coupling ratio of decaying neutrons has apparently shrunk by more than ten standard deviations between 1969 and 2001 (Lehrer, 2010a). In psychology Johanthan Schooler, whose studies on verbal overshadowing have sparked an entire subfield of applications and propelled him to academic celebrity status, found his results harder and harder to reproduce over time: a first replication showed a 30% drop in effect size, and subsequent trials continued the downward trend (NPR On the Media, 2102).

But nowhere is the decline effect more spectacular than in the field of pharmacology: from second-generation antipsychotics to anti-depressants, the therapeutic effect of many blockbuster medications has been consistently diminishing, relative to placebo, since the 1990's. As Jonah Lehrer observes in a recent NPR interview (NPR On the Media, 2012), "the effects of the drugs have gotten weaker, but the placebo effect has also gotten stronger." According to Lehrer, an industry insider commented to him that this unusual rise in the placebo effect coincided with the beginning of drug advertisements by the pharmaceutical companies in the late 1990's.

At this point, it is perhaps time to disclose that the experiments which led Rhine to describe the original decline effect were studies in extra-sensory perception.

Are all these replication failures simply the embarrassing proof of wide-spread methodological flaws across multiple disciplines, as Ioannides seems to imply in his 2005 PLOS critique (and as critics of experimental parapsychology have been maintaining for almost a century)? In Michael Jennion's words, "this is a very sensitive issue for scientists. […] We're supposed to be dealing with hard facts, the stuff that's supposed to stand the test of time. But when you see these trends you become a little more skeptical of things" (Lehrer, 2010a). For researchers like Jonathan Schooler, these findings are neither accidental nor trivial. Unlike his colleagues, who've shrugged off the question and urged him to move on, he is profoundly intrigued by this phenomenon – and his analysis leads him to a conclusion that even he is highly reluctant to entertain.

The reason for which the decline effect is spoken of in hushed tones is that it carries within it the seeds of a major conceptual upheaval. While both "regression to the mean" and "publication bias" have been offered as orthodox explanations for this phenomenon, both have been recognized as insufficient to account for the full impact of the decline: regression to the mean is not adequate to explain why the decline is a *gradual* one , instead of simply hovering around the mean; and publication bias does not account for Schooler's (and others') inability to replicate their own results (for more detailed arguments, see Lehrer, 2010a and NPR On the Media, 2012)

This leaves us with a problematic alternative: in the apologetic, tongue-in-cheek words of Jonathan Schooler, "we can't rule out the possibility that there could be some way in which the active observation is actually changing the nature of reality" (NPR, 2012). Paul Davies, a physicist directing the Center for Fundamental Concepts in Science at Arizona State University, notes that the immutability of the laws of nature is merely a scientific assumption (Schooler, 2011) , which would leave open the possibility that our collective acts of observation could have an impact on physical reality, as some interpretations of quantum mechanics maintain.

But such macroscopic, human-scale effects are of course anathema to our current working models, which draw a clear causal line between the objective, quantifiable reality that is the subject of Physics and the fuzzy internal states that form the domain of Psychology and other subjective disciplines. As it currently stands, Mind and Matter are non-overlapping magisteria – and given the insurmountable "hard problem of consciousness", that causal barrier places all brain activity firmly in the latter domain, with little hope for

reconciliation. While we have made significant progress in charting physiological correlates of mental states and emotions (such as through the study of meditation or stress-related psychoneuroimmunological cascades; see Malinkovski, 2013; Murphy and Donovan, 1997; Lin, 2003), our working definition of Consciousness remains effectively constrained to an epiphenomenon of the brain, subject to the same local limitations as the biochemical processes supposedly giving rise to it.

This works remarkably well when it comes to cleaning up house and getting rid of thousand-year old superstitions, insanitary health practices, dusty eschatological talismans and other such "opiates of the people"; but when all is said and done, we find ourselves with a crateful of leftover data - odds and ends that don't fit anywhere in our bright and carefully redesigned home – and with the challenge of hiding them as inconspicuously as possible. As long as the data consisted of Rhine's ESP and subsequent Ganzfeld experiments, or the hundreds of PK studies on random event generators (see Carter 2007; Radin 1997, 2006 for the "great Ganzfeld debate" and REG meta-analysis published in *Foundations of Physics*), that was easy enough to do: no amount of statistical debate or evidence ultimately matters when uncomfortable results can be classified as peripheral, hence irrelevant to the day-to-day business of science; studies published in *Nature*, *Science* and *Physics Essays* on EEG correlations between distant sender/receiver (Radin 2006), and hundreds of experiments with distant mental influence on living systems (DMILS) were later tossed in the same INTELLECTUAL WASTE box, despite cumulative odds against chance of over a trillion to one (Radin 1997; Benor, 2001; Chen et. al., 2005; Rein G and McCraty R, 1994; Chen and Yeung, 2002); 24 years of government research and operational work in remote viewing, involving thousands of intelligence projects from agencies like the CIA, FBI, DIA, Air Force and half a dozen others (McMoneagle, 2002; Buchanan, 2003; Radin, 2006; Radin, 1997; Smith and Swann, 1998; IRVA *Brief Timeline of Remote Viewing*) followed the same trajectory; a seven-sigma result from 15 years of accumulating Global Consciousness Project data (GCP Results; http://noosphere.princeton.edu/; Nelson 2011, 2012) is quietly trickling into the same generous container provided by the skeptic establishment. The day has arrived, apparently, in which we need to make room for one more piece of "fringe" science: the hundreds of irreproducible mainstream studies identified by Ioannides and Jennions, not to mention a growing segment of pharmaceutical clinical research (Silberman, 2009). Should we perhaps start worrying whether the foundation will hold? And can we realistically talk about a Grand Unified Theory (GUT) while leaving out everything that has by now piled into this troubling, incomprehensible data set?

The challenge of mind-matter and mind-to-mind interactions (Psi) is that we must account for both nonlocality and target/intent specificity (see Dossey, 2013); we must think in very concrete and quantitative ways about phenomena that are unpredictable, protean and only indirectly measurable. But unless we commit to such an effort, there is no hope for a meaningful and functional theory of consciousness to be incorporated into our overall physical model of reality.

Is this goal achievable? Can the richly descriptive archaeology of the mind that has informed psychoanalysis, semiotics or comparative mythology (see Aragno, 2013) be imported into a quantitative, mathematically rigorous experimental program designed to integrate the internal laws of the mind with those of physical reality? The data put forth by our round table participants (JNL Panel#2, 2013) suggests a very strong correlation between internal states (focused intent coupled with belief biases, emotional impact, interpersonal dynamics, etc) and observable effects on targeted remote physical devices or other

conscious operators. But how do we bridge this modeling gap – how do we go about asking the right questions and obtaining the data that will illuminate the necessary connections?

The Global Consciousness Project is the first large scale experiment that allows us to study psi network interference effects with a high degree of statistical sensitivity, although its extraordinary potential remains to be further tapped by probing questions such as those raised by Millar and Nelson, should the necessary resources become available (see JNL Panel #2, 2013; Millar, 2012). Much of the conceptual work and smaller-scale but incisive experimental approaches have already paved the way, as the discussions in this current colloquium demonstrate. The PEAR lab's studies on field-REG and operator pairs' effect on random event generators, showing a seven-fold increase in effect size with emotional bonding (Jahn and Dunne 2005, 2011, 2012); Braud, Watt and Edge's experiments on remote facilitation of attention (Schmidt, 2012); Warcollier (2001), Ullman and Kripnner's (1973) group telepathy studies; Sheldrake's mass broadcast figure-recognition experiments (Gilman, 1985); as well as the thousands of studies on distant mental interactions with living systems, biophoton emission changes with meditation/qigong states, and bidirectional effects of intent/EM radiation windows on biological targets (see JNL Panel #2, 2013; Yan 2010, 2012; Haraguchi et al., 2001; Nakanura et al., 2000; Chen et al., 2002; Kokubo et al., 2008; Mayburov, 2011*;* Sun et al., 2010; Meyl 2011; Takeda et al., 2004; Popp and Jinzhu 2000*;* Ooi 2013, Shao et. al 2009, Sidorov and Chen 2006; Chen et. al, 2005; Bengston and Moga, 2007) all point to the possibility of a quantifiable science of mind-mater interactions, based on biophysical correlates and cognitive interference dynamics according to specific laws yet to be discovered. Jahn and Dunne's daring interpretation of quantum laws in terms of subjective, mental experimental variables, as discussed in "Quirks of the Quantum Mind"; Millar's 2012 quantitative tests for dissecting out experimenter expectation from positive psi outcomes; and Pitkanen's topological unification of physics with biological and mental processes (see Pitkanen 2012, 2013) allow us to hope that falsifiable models of psi are at last within reach and that perhaps the time is near when yesterday's "anomalies" become the impetus for today's mainstream breakthroughs.

In a follow-up to his incisive 2012 paper Millar (2012; JNL Panel #2, 2013) suggests that conscious feedback acts on the brain of the remote viewer (seen as a "Random Mentation Generator") in much the same way in which it can retroactively affect the output of a REG in Schmidt's classic retro-pk studies (Bierman, 1996, 1998; Radin, 2000; Carter, 2007). In this model feedback does not have to reside with the viewer, but it refers to the first act of entanglement between the measurement (RV effort) and the *conscious meaning* attributed to it. If Millar's Observational Theory of Psi is correct, then one could see telepathic overlay and experimenter expectation (JNL Panel #2, 2013) as functionally equivalent. However, based on our Panel discussion, it is worth noting that both the RV and the PK aspects of these "observational effects" on physical targets appear to be dependent on a particular combination of variables, including intent, ability to focus, experimenter/tasker expectation and relationship between network participants. In a series of recent experiments Radin et al. asked a group of meditators to imagine that they could intuitively perceive a low-intensity laser beam in a distant, shielded Michelson interferometer. In theory, a change in the pattern of light produced by the interferometer would mean that nonlocal observation was achieved, collapsing the photons' wave function. The hypothesis was confirmed for the nine session in which experienced meditators were used, with odds against chance of over 100,000 to 1. However, the results for the other nine sessions, which used non- or beginning meditators, were not significant (Radin 2007, Radin, 2007, 2008, 2009, 2012). Is the increased RV/PK effectiveness of such "purposeful observation" in experienced practitioners strictly a matter of more sustained concentration, or should we look for additional, physiological changes that might occur with long-term meditation and contribute to the effect size? Considering that so far we have been unable to pinpoint any specific brain imaging signatures to clearly correlate with psi function, should we perhaps focus on other, less complex correlates, such as the molecular conformation/EM field coherence changes discussed elsewhere (see Rein and McCraty, 1994, Sidorov and Chen, 2006)?

Underlying all such considerations, however, is a basic question that at first sight seems to present an insurmountable counter-argument to all quantum-based psi modeling attempts: how can we account for such macroscopic nonlocal entanglement and for the information transfer characterizing Psi, when both seem to be prohibited by our current understanding of QM laws? One promising line of research is quantum biology, where Vlatko Vedral, Elizabeth Rieper and others (Arndt et al., 2009; Rieper 2010; Fassioli and Olaya-Castro, 2010; Hameroff et al., 2002; Hameroff, 2004a,b; Josephson and Pallikari-Viras, 1991; Karafyllidis, 2008; Salari et al., 2011; Scholes, 2010) have shown that quantum entanglement is not only possible in warm and noisy living systems, but its decoherence time far exceeds that of isolated subatomic particle systems (Vedral, 2011). Such quantum biological effects have been indentified in photosynthesis, birds's eye magnetic field detectors and DNA (Vedral 2011, Rieper 2010, Gauger 2011). According to Vedral (2011), "the fact that quantum mechanics applies on all scales forces us to confront the theory's deepest mysteries. We cannot simply write them off as mere details that matter only on the very smallest scales." "Could it be that life does not just keep its entropy low, but rather, also aims to keep its quantum entanglement high?", he wonders in a recent (2010) Nature article. Along with other physicists, Vedral has argued (2011) that if we understood the basis for the robustness of quantum entanglement in biological systems, we might be able to apply those insights to design a viable quantum computer.

The data gathered by our panel suggests that we could take that assumption one step further: if we understood the connection between conscious intent and the quasi-stable entanglement characterizing mind-to-mind and mind-matter interactions, (compared to that of simple subatomic particles) we might indeed be able to come one step closer to the hypothesized technological singularity threshold, where a human-computer symbiosis becomes possible, by using human consciousness specifically targeted to stabilize computer quantum processes based on both physical and biological hardware, via conscious intent – a conceptual leap that Rhine could have never imagined a hundred years ago.

Biological processes are an unusual topic in standard quantum mechanics, but they occupy a key position in Topological Geometrodynamics (Pitkanen 1986, 2000, 2001) - one of the G.U.T. candidates in which the notion of quantum computation is generalized to topological operations between real and p-adic spacetime sheets, and where the nondissipative flow of dark photons along magnetic flux tubes (corresponding to entanglement bridges) is responsible for control and communication between isolated subsystems, subsequently decaying to the biophoton signatures measured at the "sender" and "receiver" ends of the flux tubes (Pitkanen, 2013a). In TGD, life resides at the intersection of real (physical) and p-adic (cognitive) domains – and therefore plays a critical role in the transferring or mirroring of information between the two. It is beyond the scope of this article to go into the full details of this powerful and prediction-rich model, except to say that many of its features have found empirical support in recent data emerging from fields that range from neuroscience and genetics to cosmology and bioelectromagnetics. (for current developments and relevant applications see Pitkanen 2012, 2013b,c). What is of significance to the present discussion is that TGD proposes a vision in which the subjective contents of consciousness (memories, intentions, emotions, sensory qualia, imagination and other symbolic representations) have a geometrical equivalent as p-adic spacetime sheets in a highly structured, fractal hierarchy of "mental images" and psychic complexes that parallel the Eastern, Buddhist concept of Self (or its illusion) in the mathematical language of Western science; and in which p-adic entanglement is sought and stabilized by the Negentropy Maximization Principle driving the dynamics of the system. The complex transformations connecting Mind and Matter / information and energy in this geometrical representation of reality give rise to specific, quantifiable predictions that could allow us to test its truth value – a feat rarely accomplished by theories of consciousness.

In particular, we know from dozens of biophysics studies available through the Qigong and Energy Medicine Database (http://www.qigonginstitute.org/shopping/search.php) and now increasingly Pubmed, that fluctuations in biophoton emission spectra correlate not only with organisms' physiological states but also with meditative states, visual imagery, healing intent, and, at the target, with the specific intent windows of the remote healer (Popp and Beloussov, 2010; Popp 1984, 2009; Kokubo 2011, 2013; van Wijk et al., 2006; Bokkon et al., 2008, 2009, 2010; Dotta et. al, 2012; Brizhik 2008; Mayburov, 2009; 1011; Sidorov and Chen 2006; Sun et al., 2010; Haraguchi et al., 2001; Nakanura et al., 2000; Chen et al., 2002; Kokubo et al., 2008; Mayburov, 2011; Sun et al., 2010; Meyl 2011; Takeda et al., 2004; Popp and Jinzhu 2000). In Pitkanen's Topological Geometrodynamics, biophotons represent critical signatures of entanglement at the sender and target (see Pitkanen, 2013a), with specific frequencies corresponding to particular sensory / motor actions and correlating with EEG spectra. Could biophotons represent for consciousness research what "black body radiation" was to quantum mechanics a hundred years ago? It is certainly conceivable that a properly designed study of sender / receiver biophoton spectra in conjunction with DMILS effects would yield valuable information about the quantitative relationships governing these operations.

What emerges out of this rich but still nebulous field is a tentative blueprint of reality behaving in ways that are highly reminiscent of a quantum computer – with information spread throughout the system, yet exerting local physical effects according to weighted correlations and probabilistic laws; with entanglement operations constantly initiated and remodeled between physically separated modules, apparently under the influence of conscious intent and emotional bonds; and with life processes as the functional interface between Mind and physical reality – with software (intent, belief, memory, emotions) acting on the hardware of CNS/genetic material/biophysical circuits and other, nonbiological components like REGs – to effect the transformations that we are familiar with (normal sensory and motor action, metabolic processes, etc) as well as those currently classified as "anomalous". It may be that the latter are simply a threshold phenomenon, requiring us to become more familiar with the utilization of our own mental resources – and that once we do, such remote effects will no longer seem out of the ordinary but part of the same universal motor action-sensory mechanism, as TGD suggests. Indeed, there is overwhelming evidence from the RV and qigong literature that proper training can enhance ordinary operators' healing and ESP abilities at least to some degree. How we choose to integrate these advances into our current technological and medical practices is a question fraught with dilemmas, but also opportunities.

If the data reviewed in this issue (and in many other publications like the Radin, Carter and Jahn/Dunne references listed above) is valid, then we are faced with the challenge of thinking about conscious intent (including experimental intent) in a much wider context: we may no longer be able to assume a one-to-one correspondence between subject and target, or between study variable and output; instead, we need to think of blindness barriers as porous to conscious and subconscious information; of association basins, weighted influence and correlations; of gating and overall probabilities: in other words, of a global network of conscious and subconscious information in which outputs are determined more according to the principles of quantum computing than to the classical algorithms of our current scientific model. Viewed in this new framework, many of the baffling phenomena discussed on these pages begin to make sense – such as the statistically significant but intractably unpredictable Ganzfeld, RV and PK experiments that have fuelled the "psi wars" of the past century. More importantly, however, we need to ask ourselves to what extent this radical paradigm change is an actual necessity. Can we afford to adopt it? Can we afford not to? And how do we move from paradigm to a functional, quantitative model of reality?

As mentioned in our panel discussion (see JNL Panel #2, Question 9), Moddel's 2-REG study is a pure example of experimenter expectation and experimenter-driven decline effect. Can we extrapolate from

this innovative one study to a large-scale design that could shed light on the placebo phenomenon? Large scale experimental set-ups like the GCP network (or indeed its biological equivalents) could be assembled or repurposed to yield valuable information about consciousness network interference phenomena, based on the known empirical observations discussed by our panel participants. It remains to be seen if the scientific community has any interest in following Schooler's example and gets behind his effort to understand the basis of the widespread decline effect; or if we continue to push ahead with disregard to these warning signs, committing vast resources to data that appears increasingly questionable, until we can no longer ignore the fundamental question it raises.

Does the study of nonlocal mental interactions deserve the resources allocated to a major science or is it, in this era of shrinking academic budgets, a luxury on par with other fringe or fossil sciences that are increasingly being pulled from the curriculum? The recent severe curtailing of academic support and recognition for consciousness anomalies research (see Parker, 2013) would indicate the latter. But as our panel discussion suggests, that may be the equivalent of putting our head in the sand as the storm approaches. In an age ever more dominated by information and communication, the nonlocal foundations of reality may become increasingly apparent, with the growing placebo crisis perhaps being the first manifestation of these large structural strains. So far the collective unconscious had been something we went in search for, something elective and easily sequestrated from our working model of reality. But with XXIst century man on his way to becoming a networked quasi-cyberspecies, what if we have passed the critical information-connectivity point – and that sequestration is no longer possible?

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