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Tinkering with the Unbearable Lightness of Being: Meditation, Mind-Body Medicine and Placebo in the Quantum Biology Age

My suspicion is that, as we look closer into the action of biological systems, we'll find that it is 'quantum hanky panky' all the way down.

“Quantum Life”

Seth Lloyd, Perimeter Institute Public Lecture Series

03/11/2010

<http://www.kurzweilai.net/seth-lloyd-on-quantum-life>

The results shown in Figure 3 indicate that two of the DNA samples were indeed changed to different degrees while the third sample was unaffected relative to a control sample. This ability to simultaneously direct specific intentions to different DNA molecules suggests that the information communicated between the individual and the DNA is very specific and is not simply an amorphous energy field.

**Modulation of DNA Conformation by Heart-Focused Intention,
Rollin McCraty, Ph.D. Mike Atkinson, and Dana Tomasino, B.A.**

Abstract: There are empirical indications that mind-body therapies have a nonlocal quantum component, in addition to the psychoneuroimmunological pathways that have been the focus of the predominant experimental paradigm. The discussion below addresses the evidence and proposed theoretical mechanisms supporting this conclusion, and makes the case that there should be a convergence of research agendas between mind-body interventions (including placebo), photomedicine and quantum biology. Specifically, the role of endogenously generated biophotons in the regulation of genetic expression and the apparent ability of mental intent to direct biophoton emissions to specifically targeted tissues needs to be further evaluated from the perspective of photobiomodulation mechanisms, with a special focus on the spectroscopy and dosimetry of these emissions. Finally, the possible role of long-term meditation in enhancing quantum biological effects has to be further investigated at the level of cellular and macromolecular remodeling, both in the brain and the body.

Keywords: meditation, physiological correlates, plasticity, epigenetics, low level laser therapy, biophotons, dosimetry, methodology, external qigong, remote metabolism, entanglement

PANEL PARTICIPANTS

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Supervised by Dr. Michael Persinger; this dynamic research group has a history comprised of many individuals spanning multiple decades, investigating multiple disciplines. The NRG 2013-2014 members contributing include:

- **Trevor Carniello:** quantitative electrodynamics of living and non-living systems, EM-mediated non-local interactions on biological systems, neuroquantology.
- **Nicolas Rouleau:** interested in identifying electromagnetic signatures of the human brain in non-human, physical-chemical systems and spatiotemporal non-local processes.
- **Lyndon Juden-Kelly:** studying consciousness within human development and psychology. Primary research topic of interest is the consciousness related mechanisms associated with shifting Random Event Generator (REG) output away from chance expectations.
- **Joseph Caswell:** consciousness, potential mechanisms and enhancement of 'psi' phenomena, Geophysics and space weather, nonlinear machine learning, and heliobiology.
- **Ryan Burke:** strong interest in the area of epidemiology. Specifically interested in nutritional influences on major illnesses such as cancer and heart disease
- **David Vares:** thought intention and precognitive entropic representation within external quantum processes. Geophysics, space weather, and random quantum fluctuations.
- **Mandy A. Scott:** meditator and consciousness researcher specializing in the neurobehavioural correlates of spiritual and psychic development.
- **Lucas Tessaro:** research areas focused primarily on the biological interactions of magnetic fields at all levels of discourse from the organism to the molecule.
- **Kevin Saroka:** interested in electroencephalographic and electromagnetic correlates of consciousness.
- **Dr. Blake Dotta:** electromagnetic radiation from biological systems: coupling to molecular pathways, applied EMF, and potential non-locality.
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**Tinkering with the Unbearable Lightness of Being:
Meditation, Mind-Body Medicine and Placebo in the Quantum Biology Age**

[Appendix 1](#): Larry Dossey

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INTRODUCTION

The catchy little phrase that MIT professor Seth Lloyd uttered as part of his 2010 lecture at the prestigious Perimeter Institute took no time to echo around the scientific community – it has by now been quoted by thousands of papers, books and web pages, undoubtedly eliciting the same uneasy laughter with every audience. It is indeed a far cry from the prevailing belief that dominated much of the XXth century, with its reassurance that we lived in a respectable state of macroscopic classicism, impervious to the bizarre behavior of the subatomic world. In only a few short years, physicists have found experimental proof that nontrivial quantum effects are responsible for a growing number of life processes, from the surprisingly efficient harvesting of light energy in photosynthesis to avian navigation and the mechanisms through which we discriminate between thousands of different smells; according to Elisabeth Rieper of the National University of Singapore and her colleagues, there are also theoretical arguments supporting the idea that the DNA helix itself is held in place by quantum mechanical effects (Ananthaswami, 2010; Lambert et al, 2012; MIT Technology Review June 28, 2010; Vedral 2010, 2011). But what remains unsaid in all the excitement about the clever evolutionary tricks evolved by Mother Nature, or our quantum computing biomimicry attempts, is that if quantum dynamics are at the bottom of living systems' organization, then fundamental aspects of human identity, information transfer and control may not be as locally circumscribed as previously assumed.

By a strange “coincidence”, the infiltration of subversive quantum elements into our comfortably classical, macroscopic *lebensraum* is only one of the two major problems faced by modern biology; the other is the persistent debate about the fundamental nature of consciousness, the way it interfaces with physical reality and the powerful tools it might place at our disposal – tools that seem both fascinating and terrifying to a species just emerging from the technological self-affirmations of the sliced-bread age. That apprehension lies at the bottom of the increasingly fundamentalist rhetoric surrounding all aspects of mind-matter research, including mind-body therapies – yet it is precisely there that we ought to look if we are going to dedicate millions of dollars and entire careers to the study of meditation, as the West is finally compelled to do. Driven by patient demand and physicians looking for adjunctive therapies, and spurred on by the economic realities of a healthcare system crashing under the burden of lifestyle-

generated comorbidities, the developed world is finally starting to pay close attention to the medical and spiritual knowledge systematized by Eastern cultures while the West was busy grinding physical reality into smaller and smaller pebbles. We are now in a position where both systems of knowledge seem to have reached their individual limits in terms of applicability to the challenges of modern science – so both are forced to look across the aisle, in what we hope is the beginning of a viable synthesis.

Thousands of papers have been written on mind-body therapies, with both basic and clinical research now being carried out at many major hospitals and medical schools in the US. However, in contrast to research conducted in China and other Asian countries, it seems that the West is facing a self-imposed barrier when it comes to mind-body experimental models: the vast majority of studies in US and European academic centers deal with the effects of meditation on the brain, or with the clinical end results of the relaxation response – essentially a parasympathetic cascade that counteracts the detrimental effects of stress on the human physiology and immune system. “Distant mental interactions with living systems” (DMILS) are considered a form of psi, hence most studies are relegated to the backwaters of parapsychology literature, where only the very curious, very foolish or very old dare to venture. Yet over a hundred controlled DMILS studies have been published by now, with a cumulative probability exceeding one trillion to one (Radin, 1997 pp. 151-152). So slowly, often apologetically, the phenomenon of distant influence between living systems is making its way into the Western scientific mainstream – from over a dozen papers on EEG synchronization between isolated senders and receivers (see Radin 2006, pp.136-144 for a thorough review; also Persinger et al 2003, 2008) to cellular studies in which experienced meditators focusing their intent on remote *in vitro* or *in vivo* targets manage to alter their mitotic rates, cell differentiation and mutagenesis, gene-specific transcription and translation rates, apoptosis programs, as well as conformational changes in cell membrane, chromatin and proteins (see Sidorov and Chen, 2006 for a detailed review, or the Bibliography DMILS section for more recent studies). As an example, a 2012 paper published in *Molecular and Cellular Biochemistry* (Yan et al, 2012) identified 39 genes whose expression was changed by external qigong in small-cell lung cancer line NCI-82, inducing apoptosis of cancer cells while repressing their proliferation, metastasis and glucose metabolism.

But are these two effects the result of the same process? In other words, is the medical effect of meditation in part mediated by nonlocal mechanisms?

The current working premise of most neuroscientists when it comes to the “anomalous” or nonlocal effects of advanced meditation (siddhis), even in the cutting-edge dialogues taking place under the auspices of Dalai Lama’s Mind and Life Institute, is that, to paraphrase Eddington, “something unknown is doing we don’t know what, but whatever it is, it will have a strictly materialistic, classical explanation” (often a euphemism for fraudulent research). That attitude, and the borderline unscientific reasoning used to support it, have been most recently discussed in Dean Radin and Larry Dossey’s latest books (see Dossey 2013, Radin 2013). It is beyond the scope of this colloquium to review the massive evidence that Radin, Dossey, Jahn and Dunne, Carter and others have analyzed in their books and peer-reviewed journal articles (see “Nonlocal Interactions – General Reviews and Meta-Analyses” section in Bibliography), all of which point to the contrary conclusion – namely, that something about consciousness is not reducible to the electrical impulses flowing through our neurons. It is, in fact, unnecessary to begin with that conclusion; but what *is* necessary, if we are to make real progress in

understanding the connection between mind and body, is to start with what we know and then ask the right questions, even when those questions push us into rather controversial territory.

As we begin to lift off the veneer of classicism over the macroscopic world and uncover the role that quantum mechanics and photonics play in living systems, the primary issue to focus on is “what features of quantum biology are relevant to mind-body healing and placebo effects, if any?” It serves us poorly to say “nonlocality, of course!” if that term does not provide a clear mechanism of action – and to date we have no such mechanism. But half-way between the narrow lens of a neuroscientist’s microscope and the apotheosis of a New Age devotee lie some very concrete observations, and it is with these that we must begin if we wish to make sense of these perplexing phenomena.

The following discussion brings together scientists who have, in their own way, stretched the envelope of conventional research into mind-body or quantum biological effects, to highlight an architecture of subtle information and energy transactions which nevertheless appear to play a profound role in global regulatory functions – possibly overriding some of the more obvious, biochemical and neural pathways we are familiar with. The effort to understand these biological processes, their functional parameters and the mind’s effect on the locus or direction of action is only beginning, but over the past few years a number of experimental and theoretical breakthroughs have converged to suggest that photons may play a central role in biological signaling and control programs. In fact, the evidence presented here indicates that photobiology may be part of a much larger picture of cellular and inter-organism entanglement/quantum communication, perhaps representing an evolutionary pathway from the simplest biological structures to ever increasing levels of cooperation and complexity, which may ultimately span the entire biosphere. To ask what physical principle drives that organization is probably the most important issue we could confront, but before we earn the right to tackle such abstract problems, we need to address the experimental evidence, the mechanics and the theoretical models underpinning them.

All living cells (in plants, animals and humans) emit weak electromagnetic waves on a continuous basis, at a typical rate of under 1000 photons per sec per cm^2 (Tafur et al., 2010). These biophoton emissions, which are in the near infra-red (NIR) and UV range of the spectrum, have been shown to correlate with the organism’s physiological state, including redox status and cell cycle (Tafur et al., 2010, Rahnama et al., 2010, 2011 Popp 1986, 1999, 2002, Ho and Popp 1993, Popp and Chang 1998, Gariaev et al 1992). Although some debate persists, the general consensus is that these endogenous photon fields are coherent (Rahnama et al., 2010, 2011) and associated with the oxidative metabolism of mitochondria (NIR) or DNA conformational changes (UV range) (Tafur et al., 2010, Rahnama et al., 2010, 2011). While the exact function of biophotons in living systems has not been extensively investigated, a number of researchers have suggested, on the basis of both experimental data and theoretical arguments, that they must play a role in regulating body-wide, nonlocal cell signaling and coordination, including morphogenesis, brain synchronization and the maintenance of normal tissue architecture, or its disruption in oncogenesis (Popp 2002, Rahnama et al 2011, Fels 2009). More recently, biophoton emissions have been shown to correlate with EEG alpha power, cerebral blood flow and energy metabolism, and microtubule conformational states (Rahnama et al., 2011, van Wijk et al 2008, van Wijk et al 2006, Nakamura 2000, Lin 2003, Kawano 2001, Dotta et al 2011, 2012). Dotta and his colleagues showed that increased BPE intensities could be measured in the proximity of a subject visualizing white light

while in a dark chamber (Dotta et al, 2012) and Sun's team demonstrated that biophotons could be transmitted along nerve fibers (Sun et al 2010). Finally, numerous experimental studies show that distant mental interactions between remote human subjects or in vitro cell cultures are often associated with changes in biophoton emissions (see Kawano 2001; Dotta et al, 2011; Persinger and Lavallee, 2010; Kokubo et al, 2008).

The hypothesized regulatory role of biophotons in living systems receives some support from the field of photomedicine. For over 40 years, researchers and clinicians at major hospitals all over the world have been using low level light therapy (LLLT) in the visible or near infra-red (NIR) range to heal wounds, deep tissues and nerves, minimize pain, inflammation and edema and reduce tissue damage after heart attacks, strokes, nerve injury and retinal toxicity (Hamblin 2008). The primary mechanism of action for these therapeutic effects has been shown to be the absorption of photons in the NIR range by cellular chromophores, in particular cytochrome c oxidase in the mitochondria, leading to increased reactive oxygen species and ATP production, (Smith 2013, Karu 2008, Hamblin 2008) which in turn modulate the induction of transcription factors, the level of cytokines, inflammatory mediators and growth factors. While both coherent (laser) and incoherent light have been shown to have identical cellular effects for the same wavelength and duration of treatment, the biologically effective intensity level of incoherent light is restricted to surface layers (tens to hundreds of microns); coherent laser light can achieve effects on tissues that are mm to tens of cm deep, some of them presumably due to the generation of a "laser speckle" interference phenomenon (Karu, 2011).

In spite of its clinical successes, LLLT remains a relatively marginalized subfield of medical practice and research; this is attributed to a combination of fluctuations in cellular response with cell cycle and redox state, insufficient understanding of optimal irradiation doses and inconsistencies in research protocols, as well as a still incomplete grasp of its physical mechanisms of action (Hamblin 2008, Karu 2008). What is however clear is that LLLT is characterized by a biphasic response, in which the optimal biological effect is restricted to a narrow intensity and irradiation time (dose), in addition to specific photon wavelengths, with decreased or even detrimental effects manifesting outside that window (Huang et al 2009). The interplay of these complex parameters has led to significant methodological challenges and replicability issues that are strangely reminiscent of those faced by biofield (mind-body) researchers.

In a recent paper, Yount and his colleagues discuss the difficulties encountered by biofield investigators as they attempt replication of their positive outcomes (Yount et al, 2013). Yount notes that when treating cancer cells with suppressive intent from an experienced practitioner, "a trend of decreasing cell viability with increasing biofield dose was evident in the first set of experiments assessing dose-response", where increased dose meant repeating the treatment with 10 min rest periods. Although this correlation could not be replicated, the results are intriguing and again suggest a possible overlap with LLLT dosimetry considerations: what are the optimal LLLT irradiation/ healing intent parameters and would we be able to demonstrate improved reproducibility if the input were fully standardized?

One promising methodological approach has been explored by Kokubo and his colleagues (Kokubo 2012, Kokubo, et al., 2006; Kokubo & Yamamoto, 2007a; 2007b; Kokubo et al., 2007; Kokubo & Yamamoto, 2009), who attempted to standardize the magnitude of healing effect by looking at changes in BPEs from target and control samples, measured for several hours post-treatment. Preliminary results show a wave-like distribution of "bio-PK field" intensities around the healer's body, as measured by effects on these biosensors (Kokubo, 2012). An interesting aside is that their data shows an abrupt change in BPE at

about 5 hours post treatment, which suggests to us that epigenetic changes, rather than a direct energy transfer, might account for the bulk of remote effects. However the primary question to consider, with this and any other attempt at measuring bio-PK, is whether the effects are due to classical energy propagation or a nonlocal, hence discontinuous information/energy transfer – in which case the distribution of proximal effects around the healer’s body is less significant than the ability to make mental contact with the target. Indeed it may be that two separate mechanisms are in play, both classical (near-touch radiation or own-body wave propagation) and a remote one based on quantum entanglement.

The replicability issue is of course at the heart of a century-old controversy surrounding all research in mind-matter interactions: regardless of how spectacular the significance levels of any given study, or how compelling the cumulative probability of a meta-analysis, the unpredictability of any *individual* attempt at demonstrating such effects continues to cast understandable doubts over the validity of the phenomenon and its medical or technological usefulness.

The advantages of *in vitro* models (standardized targets and the use of more invasive and transparent measurement techniques) are, in Yount et al.’s opinion, counterbalanced by the disruption/absence of the natural environment and its hypothesized biofield – one of the reasons, they feel, which accounts for such erratic effects. On the other hand, some researchers are beginning to recognize the importance of standardizing not only the target, but also the quality of the healing intent. For example, Monzillo and Gronowicz (2011) describe testing therapeutic touch practitioners and looking at the consistency of their results over several months. But quantifying the “healing input” is a complex undertaking, as each practitioner follows his or her individual protocols: for example, Hammerschlag (Hammerschlag et al, 2012) discusses a review of 20 non-touch therapy randomized controlled trials, 65% of which reported at last one statistically significant biomarker effect, observing that the total treatment time per trial ranged from 5 minutes to 480 - which greatly complicates any theoretical modeling attempt. And even if the “healing dose” were standardized in terms of treatment time, the quality of the mental exercise remains a central methodological challenge: do all forms of meditation/ healing intent produce identical biological effects? In (Sidorov et al, 2013) we have discussed several recent papers which show that different forms of meditation/visualization produce different gene expression profiles (Ravnik-Glavac et al., 2012; Qu et al., 2013; Li et al., 2005; Chien et al. 1991; Rein and McCraty 1994; Achterberg and Rider; NIH report 1992). This is corroborated by multiple studies (see Sidorov and Chen, 2006 for review, plus DMILS section in Bibliography) showing that external qi can produce opposite effects on the same remote targets, depending on the operator’s intent – a biological mirror of classical PK effects on random effect generators, which have by now been demonstrated with a statistical probability of over a trillion to one (see Jahn and Dunne 2005, 2011, 2012; Carter 2007; Radin, 1997, p 140 for *Foundations of Physics* meta-analysis of 832 PK studies).

But perhaps the most striking illustration of directional, localized effects on biological targets is a series of experiments on *in vitro* DNA samples conducted by Glen Rein and Rollin McCraty at the HeartMath Institute. In these controlled studies, (see McCraty, Atkinson and Tomasino) human operators were asked to increase or decrease the rate of DNA denaturation in solution samples either held by them or kept in a laboratory 0.5 miles away. The experimental subjects were trained in generating high ECG coherence rates according to the HeartMath protocol and measured by fast Fourier transform techniques, with the coherence ratio determined by the percent of coherent to non-coherent epics during the two minutes of recording. The denaturation rate was measured using UV spectroscopy. While individuals who showed

low coherence ratios, although in a calm state of mind, were unable to change the conformation of DNA, all subjects trained in the HeartMath technique were able to produce high coherence rates and significant DNA changes ($p < 0.01$), with one individual demonstrating an effect size that was three times larger than the maximal thermal and mechanical perturbation known to be possible. The winding and unwinding of DNA reflected the pre-stated directionality of intent, and in one protocol involving three identical aliquots of DNA, two samples were denatured to different degrees while the third one was left unchanged, as intended. Of additional interest here is a second experiment conducted by Rein and Laskow (Benor pp. 159), in which they showed that four different visualizations (healing intentions) by the same healer produced distinct magnetic signatures and corresponding biological effects on tumor cell cultures.

But if different types of visualization produce different electromagnetic signatures and different chromatin configurations, as well as different genetic expression profiles, then how much conceptual stretching is needed to put it all together and ask: to what extent does our state of mind control our epigenetic expression - and what exactly is it that mediates this control? While there is no doubt that the relaxation response is one pathway to brain-body regulation, the demonstration of analogous effects in samples miles away from the owner of that brain creates a slight complication. Either we accept that hundreds of REG-PK and DMILS studies are independently fraudulent, or we need to look for a new mechanism of action.

A tentative pathway for epigenetic regulation at the level of EEG-modulated biophoton fields was sketched out by Sidorov and Chen (2006), based on the tissue and light coherence arguments developed by Popp and Ho, Becker's electromagnetic model of the body and Gariaev's "wave-genetics" theory (Popp 1986, 1999, 2002, Ho and Popp 1993, Popp and Chang 1998, Gariaev et al 1992, Gariaev et al. 1991, 2000, 2002a,b,c; Reshetnyak et al, 1996; Becker R. and Selden G, 1985; Ho, M.-W., 1993) as well as a comprehensive review of external qi effects on genetic regulatory processes and biomolecular conformation. Since then, basic research in photobiology has made considerable progress: we now know that visualization can produce distinctive biophoton emissions measurable in immediate proximity to the brain (Dotta et al, 2012); that fluctuations in the strength of the cerebral alpha wave (which is generally enhanced by meditation - Van Wijk et al, 2008, 2006; Kawano et al 2001) are significantly correlated with biophoton emissions (van Wijk et al, 2008; Rahmana et al 2010, 2011]; that biophotons can travel along neural fibers (Sun et al, 2010) as well as microtubular networks, appearing to play a central role in the synchronization of brain activity (Rahmana et al 2010, 2011) ; and that coherent light such as external low level laser radiation or presumably our endogenous biophoton fields (Popp 1986, 1999; Karu 2011) can generate a so-called laser-speckle phenomenon, in which the constructive interference of multiple waves results in areas of increased intensity and temperature gradients deep in the tissues. Finally, Bokkon and others (Rahnama 2010, 2011) have argued that for any measured intensity of biophoton emissions (which is typically captured several centimeters outside the body) the actual intensity of the light field within the organism can be up to two orders of magnitude higher, with the most significant fraction being absorbed during cellular processes.

But if meditation practice and specific visualizations can modulate BPEs in the proximity of the subject's body, can we detect these effects anywhere else? 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?

Section I: Long- term meditation remodeling and its effects on biophoton emissions

Question 1: We know what happens in the brain as a result of long term meditation: an increase in cortical thickness, changes in gray and white matter density in the brain stem, hippocampal, frontal areas and a number of other functional modules (Luders et al, 2009, 2011, 2012a.b; Vestergaard-Poulsen et al, 2009; Lazar et al 2005; Kang 2013); thicker callosal regions and increased and persistent structural connectivity along major projection pathways, as well as commissural and association pathways, suggesting greater hemispheric integration and synchronization (Luders et al, 2011, 2012; Hasenkamp and Barsalou, 2012; Lutz et al, 2004); and typically increased alpha wave power (Mason et al, 2007; Tsai et al 2013; Kerr et al, 2011; Chiesa and Serretti, 2010). Is there any reason to believe that such plasticity is restricted to the brain – and if not, then are you aware of any data suggesting that a similar anatomical and functional remodeling might be taking place throughout the body? Dotta and his colleagues (2012) have demonstrated that simple visualization of white light can generate an increase in BPE proximal to the subject's head. Could meditation/visualization exercises trigger BPE/redox-regulated changes in the coherence state of body-wide microtubule arrays and could those changes become part of the brain/body remodeling process, leading to increased coherence and synchronization?

LUCAS TESSARO: Meditation, regardless of origins of practice, tends to have very similar physiological effects specifically within the brain, which is a decrease in power of the higher frequency bands and an increase within the alpha band. However some yogic practices are also capable of controlling visceral functions such as digestion, heart rate, and other bodily functions not traditionally associated with meditation. This would suggest an inherent ability to at the very least functional

remodeling throughout the body, but anatomical changes are possible within the realm of healing – the shrinking of a tumor, for example.

I would not couple BPEs with redox changes in the body. This is only one hypothesis for the emission of BPEs. Redox reactions involve high energy particles such as free radicals interacting with stable molecules to give off light as a form of excess energy, but redox reactions if not controlled are violent and destructive to the cell. If all BPEs were emitted solely due to redox reactions, then it would suggest that the generation of these BPEs is detrimental to the individual causing them. Aging itself is due to uncontrolled redox reactions. In addition, most meditations are associated with a decrease in all forms of metabolic activity – redox reactions require an excess of energy, therefore I do not think that mediators can affect BPEs through this particular mechanism.

Finally, there is an inherent mind-body dualism that is posited within this question – “can the mind affect the body” is the blunt interpretation. Many studies now suggest that the mind and body are more coherent and synchronized than is commonly known; the placebo effect is a fantastic representation of this, as well as many studies suggesting positive thinking can lead to a healthier, happier life. The sooner we accept that the mind-body dualism is a farce, the sooner we can realize how strongly we can affect our physiologies just with thought.

RAJENDRA BAJPAI

Preliminary Comments: What is the significance of biophoton emission (BPE) and why is it essential in unravelling the mystery of ‘life’?

The belief in the quantum nature of ‘life’ is on the increase. 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. The description of human subject in the framework is very informative. Every living system spontaneously and incessantly emits mainly visible range photons of ultra-weak intensity; the emitted photons are called biophotons and the signal is called biophoton signal. The source of energy, emission mechanism and properties of biophoton signal cannot be understood in a classical or semi-classical framework but can be understood in the quantum framework. The need of the quantum framework is brought out forcefully by photon count distributions of a biophoton signal obtained using different measuring intervals. The photon count distributions correspond to the signal in a squeezed state specified by four parameters. Three squeezed state parameters have same values in overwhelming large majority of biophoton signals detected in healthy human subjects. We prefer to call these values as normal values. The fourth squeezed state parameter differs in different bio photon signals

and is related to their intensity. It is pointed out that the intensity is different in biophoton signals emitted at different body locations of the same person and at the same body location in different persons. The skin of human subjects responds to mild concentration of H_2O_2 by enhancing the intensity of visible range photon signal emitted by it. The intensity slowly decays with non-exponential character. The decay after a few minutes of applying of H_2O_2 is ignorable in an interval of 3min. The decaying signal in an interval with ignorable decay is no different from spontaneous biophoton signal and the photon count distributions in the interval correspond to a squeezed state with normal values of three squeezed state parameters.

Squeezed state parameters are obtained by fitting photon count distributions for different measuring intervals. The sum of the squares of residuals also carries some information of the signal. The behavior of Fano Factor of signal at different measuring intervals also suggests that a squeezed state does not provide the complete description of spontaneous biophoton signal. The squeezed state describes core component of a biophoton signal and misses out its peripheral component. Some other attributes of a biophoton signal describe the effect of its peripheral component. We have identified eight attributes for measuring and describing the effect of two components of a spontaneous biophoton signal. Eight attributes make the intensity based description of biophoton signal perfunctory. In addition, the values of attributes are different in biophoton signals emitted at different anatomical locations of a person. The values of an attribute of signals at different locations determine the profile of the attribute. The set of profiles of all attributes of a human subject determines its biophotonic profile. The biophotonic profile is an important property that provides quantum description of the subject at the level of whole organism.

We have determined the biophotonic profile of many human subjects and believe its existence in other living systems. Its existence has far reaching implications. It solves the basic conundrum about the physical nature of 'life'. Since two physical systems (live and dead states of same object) cannot differ in only one property of 'life', there has to be another property law like related with the first property in all aspects. The two properties are isomorphic. I believe that biophoton emission and 'life' are two isomorphic properties in any living system. The isomorphism implies that the complete information of all aspects of 'life' in a human subject (as well as in any living system) is to be found in its biophotonic profile. It is emphasized that biophoton signal is a physical system devoid of 'life' and the information contained in a biophoton signal is extractable decipherable by physical methods. We need to unravel and explore this information. In particular, we need to find out whether biophotonic profile contains patterns capable of characterizing pathological, psychological or stressed states of human subjects.

Human subject is an extended object and biophoton signal associated with all but a few portions on the body of the subject can reach at the center, site or organelle of its 'consciousness'. It confers nearly complete awareness of self. It also acts as a feedback loop for course correction at any instant. The mechanism of self-awareness is considered to be a hard problem of consciousness. Biophotonic profile paves the way for its solution.

Some human subject may have the capability to detect biophoton profile of signals emitted by another human subject. The capability confer power of remote sensing or clairvoyance to the detecting subject. The propagation causes attenuation in a biophotonic signal. The attenuation is different in core and peripheral components of the signal. It corrupts biophoton profile of the signal and makes its information erroneous. The detecting capability may extend to biophoton signals of some non-human living subjects and some non-human subjects may also have similar capability.

Biophotonic profile points out that the photon field associated or rather entangled with live subject has a complex structure but only small amount of energy. Same or similar photon field may trigger processes leading to alteration in the state of the subject. The possibility opens of curative applications and remote intervention. We need to understand the answers of many questions. Some relevant questions are: What is the meaning of similar photon fields and how to identify them? Is similarity expressed by an attribute, a combination of attributes or specific pattern in the profile? Can similar fields be generated by oneself, by other subjects or artificially?

Our Recent papers relevant to the program

1. R.P. Bajpai, E. P.A. van Wijk, R. Van Wijk and J. van der Greef(2013): Journal of Photochemistry and Photobiology B: Biology 129, 6–16

“Attributes characterizing spontaneous ultra-weak photon signals of human subjects”
2. K.Lenger,R.P. Bajpai and M spielmann(2013): Cell Biochem BiophysDOI, 10.1007/s12013-013-9712-7
“Identification of Unknown Homeopathic Remedies by Delayed Luminescence”
3. D Racine, A Rastogi and R.P. Bajpai (2013): Chinese medicine, 4, 2019-2024.
“Hints at Quantum Characteristics of Light Signals Measured from a Human Subject”
4. R.P. Bajpai, L. Brizhik, E. Del Giudice, F. Finelli, F.-A. Popp , K.-P. Schlebusch (2010): J Acupuncture Meridian Studies,
“Light as a Trigger and a Probe of the Internal Dynamics of Living organisms”
5. Eduard P.A. Van Wijk, Roeland Van Wijk , Rajendra P. Bajpai and Jan van der Greef(2010): Journal of Photochemistry and Photobiology B: Biology 99, 133–143.
“Statistical analysis of the spontaneously emitted photon signals from palm and dorsal sides of both hands in human subjects”
6. Bajpai R.P. (2009): In Bioluminescence in Focus- A collection of Illuminating Essays(Ed. Meyer-Rochow V. B., Research Signpost, Trivandrum, India) 357-385.
“Biophoton Emissions: A clue to unravel the mystery of “Life”?”
7. Bajpai R.P. and Drexel M.(2008): J Acupuncture Meridian Studies, 1, 114-120.
“Effect of Colorpuncture on Spontaneous Photon Emission in a Subject Suffering from Multiple Sclerosis”.
8. Lenger K., Bajpai R.P. and Drexel M.(2008): Homeopathy,**97**,134-140.
“Delayed luminescence of high homeopathic potencies on sugar globuli”.

Re: Question 1. Long term meditation affect BPE (spontaneous biophoton emission) from the whole body. The effect is not detectable by the intensity of BPE at one location even though intensity is also affected. Van Wijk et al measured BPE signal at 12 sites in sixty subjects. The signal at each side was measured for 2min using bin size of 50ms. The subjects were in three groups practicing transcendental meditation(TM), some form of meditation other than transcendental (OM) and no meditation (NO) for more than 10 years. We have analyzed their data and determined eight attributes of each signal. We also performed unsupervised cluster analysis for determining the number of clusters and their members using the profile of every attribute and some combinations. All profiles correctly or nearly identified the clusters and their members. They placed all subjects of TM in one clusters though differed in placing of few subjects of other groups. The analysis reveals that not only meditation changes the profile of attribute throughout the body but different types of meditation change the profile differently. We also investigated the effect of reducing the number of sites in the profile on the discriminating capability. The profile made up of four sites was also reasonably discriminatory. The profile lost its discriminatory capability on further reduction in the number of sites.

The effect of visualization of red green, blue or white light will alter the profile of BPE but may not be detectable by intensity alone.

The intensity of BPE is not the measure of coherence and synchronization. The better measures will be the intercept and slope of Fano Factor curve, Squeezed state index and Sum of the squares of residuals in photon count distribution in the optimization procedure for estimating squeezed state parameters.

MATTI PITKANEN

Preliminary Comments

The following answers to the 3rd JNL Panel on meditation, mind-body medicine and placebo are accompanied by an [Appendix](#) containing a summary of TGD perspectives on consciousness and quantum biology. Several new insights inspired by the notions of magnetic body and dark matter have emerged lately, including further developments on quantum metabolism and prebiotic life; the basic input comes from the claimed free energy phenomena interpreted in TGD framework. Water structures representing simplified analogs of basic biomolecules suggested by water splitting (producing so called Brown's gas) might also be highly relevant for the ordinary metabolism. The main new input concerning remote mental interactions comes from a possible answer to the question whether TGD- based ontology of physics could allow the "shamanistic" view that the experiences induced by various psychedelics used in the spiritual practices of indigenous people could be genuine remote sensory perceptions rather than hallucinations. Affirmative answer would mean a direct and testable connection between neuropharmacology and remote sensory perception with serotonin defining the crucial neurotransmitter and pineal gland ("third eye", also quite concretely for some lower animals) serving as a candidate for the brain area of special importance in this respect.

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. Meditation can be seen as "bodily exercise" of the magnetic body and a method to improve the communications between magnetic body and biological body. In healing magnetic body would be the active participant and healing would be also the healing of magnetic body. The placebo effect could be seen as an outcome of intentions of magnetic body affecting the biological body.

The change in gene expression under the influence of meditation could also be understood as mediated by the magnetic body: genetic expression would be naturally determined by the permanent flux tube connections from the magnetic body to the promoter portions of DNA. Differentiation would select the promoters to which the magnetic body has permanent connections. The change in gene expression could be due to a change in these connections. Meditation, placebo effect, and healing could induce changes in gene expression in this manner. 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.

Re: Question 1 I see no deep reason why plasticity would be restricted to brain alone. The brain might have however achieved the highest level of plasticity because it represents a kind of "postmodern" layer in the evolution of cell cultures allowing cellular individualism. An interesting question in TGD framework is also the plasticity of magnetic body. Is meditation reshaping the magnetic body, making it more plastic so that it can build reconnections and in this manner direct attention more sharply and more stably?

Question 2: What other physiological parameters do you feel would be critical in achieving biologically effective BPE intensities at the level of targeted cells?

JOSEPH CASWELL: There is evidence that engaging in cognitive 'intention' is capable of noticeable increases in biophoton emission (BPE). Current research suggests that simply engaging in an imaginative task or creative thinking is adequate for producing significant BPE increases. Regarding targeted effects of consciousness on an external system: a number of recent experiments in our laboratory have demonstrated that the process of cognitive 'intention' is sufficient to affect changes in the BPE of external cancerous cell cultures.

RAJENDRA BAJPAI The belief that intensity alone determines the interaction of the photons of BPE and cells is too restrictive and probably, incorrect. The experiments with onion roots (fish and frog eggs) indicates that only BPE of onion roots and not incoherent light is able to influence the growth in other onion roots. It suggests that some other attribute besides intensity is crucial for interaction. I also agree with Mandel's view (Colorpuncture Therapy) that incoherent photons of intensity higher than that of BPE

may not interact with targeted cells. The optimal intensity is that of BPE. Quantum nature implies that the decrease of BPE intensity with distance travelled does not follow inverse square law.

Question 3: What technologies could we use to detect increased tissue molecular coherence, conductivity, and cellular-level synchronization over large distances?

RAJENDRA BAJPAI I shall look for correlation in photon emission at spatially separated locations.

Question 4: Would the increased alpha power, brain connectivity and synchronization translate into greater amplitudes and biophoton field coherence throughout the organism? And is there any mechanism through which BPE's could be reflected within the body's various conduction matrices (neural system, the mitochondria-microtubule reticulum – see Rahnama et al, 2011) acting like a resonant cavity for laser-like amplification of EEG-pumped BPEs, in order to reach the requisite thresholds for biological action?

If there is a common mechanism of action between LLLT and mind-body healing, as suggested by the parallels reviewed in the discussion above, then of particular interest is the fact that proficient qigong meditators appear capable of directing biophoton emissions to specific areas of the body [see “Intent-directed localization” section in bibliography]. Given that LLLT is limited in the depth of effective tissue irradiation, the prospect of targeted delivery of specific frequencies is quite intriguing. On the other hand, the actual intensity of biophoton fields inside the cells and the robustness of quantum coherence at physiological temperatures remain controversial issues (Tafur et al, 2010; Rahnama et al, 2011).

KEVIN SAROKA: The law of conservation of energy posits that the amount of energy within a system does not change. We have observed on many occasions that increases in delta-power produced by the brain's electric field through EEG recordings are ultimately coupled with a decrease in activation within higher frequencies. Therefore, one might posit that an increase in the specified parameters could change the spectral characteristics of biophoton field coherence. That is to say that the body will still emit the same amount of energy, but in a different way.

JOSEPH CASWELL: Again, research from our laboratory has previously demonstrated significant correlations between EEG activity and BPE. Other research in our lab has suggested that the cellular membrane may be a good candidate for BPE.

RAJENDRA BAJPAI I shall expect both intercept and slope of Fano Factor curve to decrease, Squeezed state index to increase and the sum of the squares of residuals to decrease in BPE signals at various locations. I shall also expect the profiles of different attributes to change and the point representing the state of the subject in profile space of every attribute to shift.

I also performed two types of mind body healing experiments. In the first type the healer was requested to change the state of a lichen sample or plucked leaf. The change was detected by the decay shape of light induced BPE. The state did change but the change was transitory and lasted for few hours.

In the second type a healer healed a subject and BPE was measured from both healer and subject. The intensity did not reveal any pattern but the squeezed state index (SSI) did. Before the healing, SSI of healer was 1 and of the subject around 0.6. During the healing the SSI of the subject increased towards 1 while that of the healer decreased. After the healing the SSI of the healer recovered to 1 in about 15min but SSI of the subject decreased to its value in about an hour.

MATTI PITKANEN If biophotons are what results from dark photons in phase transition then increase in alpha power and more generally in EEG power should increase biophoton yield : BPE pumped by EEG corresponds to BPE as leakage from EEG. That there is decrease for meditators might be related to the absence of sensory and motor mental images: if there are no mental images, there is nothing to be communicated by dark EEG photons to the personal magnetic body.

Question 5: In light of Sun's demonstration that biophotons can be conducted along neural fibers (Sun et al, 2010), do you think it's possible that the localization of BPE during such visualization exercises is due to the photons' transmission from the brain to that affected area along efferent neurons, in the same way motor commands would be locally transmitted? Is it technically possible to measure such neural photon conduction in meditating human subjects? And should localization of action, such as targeted BPE, be part of patient training in mind-body interventions?

BLAKE DOTTA: In any biological system there will be an abundant amount of varying wavelength photons in and around the system (human body). Some of these photons may be part of a conduction pathway as described by Sun and colleagues, and others can be external to the system and not related with any "obvious" cellular process. The idea of targeting BPE to a specific local site is very exciting. The route by which the meditation, which leads to increased BPE, proceeds to the targeted site remains a mystery. But unlike a motor command being transduced down the nervous system, electromagnetic radiation in the form of BPE may not require a step by step progression. All that would be required is coherence between the meditation state and the target area. This could be potentially measured by taken simultaneous Photomultiplier tube measurements from the subject and the site for the target BPE.

JOSEPH CASWELL: It is most likely that cerebral BPE occurs as a result of neuronal processes underlying behaviour and thought. Therefore, when visualizing white light it is probable that the increased BPE observed is occurring from the relevant structures associated with this particular visualization process.

Yes, targeted BPE should be part of patient training in mind-body interventions. There is a series of experiments which suggest the potential for light (photons) to induce/increase/enhance natural healing processes.

RAJENDRA BAJPAI Localization of BPE photon has been suggested by Soliton community particularly in reference to IR imaging during acupuncture. I am skeptic about it. I suggested a healer to focus the BPE at the photo multiplier and change its background noise but he did not succeed. I also suggested the healer to change the BPE of lichens or leaf in both directions but he did not succeed.

MATTI PITKANEN That LLLT is limited by tissue depth, ceases to be a problem if dark photons propagate along magnetic flux tubes. Darkness would provide also shield against decoherence. One can imagine two manners to achieve targeting.

1. Password mechanism for which parts of body correspond to characteristic resonances so that dark photons with particular frequency determined by energy and value of h_{eff} are received only by that body part.
2. Second mechanism is propagation along magnetic flux tubes directed to that body part. If dark photons have cyclotron frequencies in the magnetic field of a flux tube, these mechanisms are more or less equivalent. Frequency corresponds to magnetic field strength and this in turn to thickness of magnetic flux tube. Microtubular matrix could be accompanied by magnetic flux tubes perhaps serving as a template for it. Biological effects at specific frequencies at the other end of the pathway would be the basic signature.

Question 6: What do you think of target specificity in mind-matter interactions – based on your understanding of the literature, how narrowly are we able to target a particular area of the body or a particular effect? Could the differential sensitivity to LLLT on the basis of redox status or proliferation rate account for the fact that qigong-based therapies show apoptosis of tumor cells but not normal cells? What do you think is the physical basis of such differential effects, or their localization to particular areas of the body?

LYNDON JUDEN-KELLY: Clarity of intention in mind-matter interaction is of crucial importance. The limitations associated with any given goal oriented action are defined by the thoughts, emotions, and beliefs of the individual engaged in the task. Therapeutic practice would target or localize only tumor cells because that was the intentions of the healer, leaving healthy cells unaffected.

JOSEPH CASWELL: Given the huge number of experiments conducted over decades of research on this topic, it is evident that human consciousness is capable of non-local interaction with the external environment in some capacity. This has been shown for a myriad of systems including chemistry, cellular biology, botany, and particle physics including the electron and the photon. The mere fact that participants appear capable of affecting statistically significant deviations in external random number generator devices by simply ‘intending’ for a particular outcome (up or down deviation), which is essentially an abstract and arbitrary representation of the source phenomenon, strongly suggests a differential sensitivity which is clearly reflected in cognitive constructs employed in mind-matter interactions.

RAJENDRA BAJPAI In the conventional picture, target specificity has to have a mechanism for recognizing a target, sending a signal to the target, capability in the signal to affect the target and feedback mechanism to alter the signal to make desired effects in the target. Such a mechanism is hard to invent. I, therefore, hypothesize a different picture.

Hypothesis:

1. BPE (or rather Light Induced BPE) signal is specific to a living system (that includes human subject). The BPE signal is altered in the presence of a pathogen (living and non- living) and the alteration is pathogen specific. The BPE signal can travel long distances because of its quantum nature.

2. Living system interacts with BPE signal. The interaction provides a window to the living system to sense BPE signals. The interaction is system and signal specific. As a result, sensing capability differs in different living systems and also for different BPE signals. The living system has to learn to use the window for identifying the properties of the emitter of a specific BPE signal. Some fortuitous happenings or procedures e.g. meditation appear to initiate the learning processes. Learning confers clairvoyance and any healer ought to have it.
3. A healer has the capability to alter BPE signal, perhaps, by coupling with the signal. The altering of BPE signal triggers changes in the living system emitting the signal.

The hypothesis gives a cogent description of mind body interaction and its ingredients are falsifiable. The procedure for testing the hypothesis has to be different. It requires measuring the attributes of BPE signals of healer and subject before, during and after healing. Another ingredient can be added to the hypothesis for explaining some hard aspects of consciousness.

4. A human subject can detect its own BPE signal that is the set of profiles of attributes from reasonably large number of locations. The number of locations should be sufficiently large and not exhaustive. It confers the awareness of what one is doing and the capability to manipulate the action similar to a healer.

HIDEYUKI KOKUBO I think that a veteran therapist can feel reactions from the target and adjust his operations finely based on those reactions. This process is done unconsciously, like we adjust movements of our arms when we write a letter on a paper.

MATTI PITKANEN The different sensitivity of tumor cells and normal cells would be explained by different cyclotron frequencies for their magnetic bodies. The unhealthy state would be also unhealthy state of magnetic body: maybe some parts of collective magnetic body of tumor cell complex with rather large value of h_{eff} are just missing and this translates to selfish behavior of tumor cells. The claim of inventor Royal Rife (http://en.wikipedia.org/wiki/Royal_Rife) regarded as pseudoscience by the mainstream is that tumor cells can be destroyed using irradiation with specific resonance frequencies. This method must be distinguished from radiation therapy based on ionization of DNA. Rife's claim would be roughly consistent with TGD inspired proposal. Basically the challenge would be to find the frequency serving as the password to the cancer cell's magnetic body.

Question 7: In your opinion what is the most likely mechanism underlying the connection between long term meditation practice and the development of healing/ psi abilities?

LUCAS TESSARO: Whether or not meditation practice can lead to the development of healing/psi abilities is highly contentious, however I would argue that the ability to perform healing/psi abilities falls under two categories. The first are naturally gifted healers/psi users. Individuals like Sean Harribance and Ingo Swann were simple born with a genetic predisposition towards these abilities. This would suggest that there are structural differences at the level of the brain. This was confirmed by EEG and microstate analyses for SH, who demonstrated significant differences his neural processing. Furthermore, subsequent studies applying his brain patterns as electromagnetic fields have been used to affect the rate of cancer cell growth *in vitro*, further suggesting that healing abilities are genetically determined.

The second category involves studies within our group that have looked at whether or not psi abilities can be trained; and in general the answer is yes. In reality, however, it is much more complicated. In one study investigating this topic, it was found that individuals who underwent “psi training” actually performed worse at remote viewing compared to controls in the first week of testing. However, the entire test group – regardless of training – improved over the course of the testing; that is, by the end of the experiment all groups showed an improvement in psi abilities.

So in short – some individuals are clearly predisposed towards healing/psi abilities. These abilities can be trained, but only through the practical application of those abilities. Analogous thinking can be that you can learn to kick a soccer ball and how to dribble it, but unless you actually play soccer, you cannot truly improve.

LYNDON JUDEN-KELLY: Long term meditation may have an intrinsic connection with healing and psi abilities through a quieting of external noise, and a greater self-awareness.

JOSEPH CASWELL: A number of studies have suggested that EEG activity, particularly within the alpha frequency range, is associated with successful ‘psi’ interactions, including mind-matter interaction effects associated with random event generator devices. It is also well established that experienced meditators demonstrate enhanced alpha activity. Furthermore, various researchers have demonstrated that the output of random event generator devices show incredibly significant deviations from chance expectations when proximal to large groups of meditators. These three well-demonstrated factors easily converge on an apparent hypothetical solution to this question; by enhancing the capacity for thought associated with practiced meditation, individuals likely become more conducive to engaging in anomalous processes associated with consciousness, particularly cognitive ‘intention’. Finally, recent research we have published suggests that the application of weak intensity specific physiologically-patterned electromagnetic fields increases or enhances the capacity for individuals to engage in mind-matter interactions, or consciousness-correlated collapse of random external physical systems. This further suggests a relevant role for specific neural processes, particularly within the frequency domain.

MANDY A. SCOTT: As a meditator and psi researcher I have often considered the incongruence between spiritual and psychic development as one certainly does not equal the other, nor are they mutually exclusive. Drawing first from my own experiences, I think it is possible that a meditator may not develop psi abilities per se since psi, for example, remote viewing, requires a specific intention and state of receptivity that can be learned but takes practice (Scott & Persinger, 2013a). The reciprocal of this, the idea that someone interested in developing psi only for personal gain might one day accidentally become enlightened tickles me to no end! Is this possible? What do we know about meditation and psi that can inform us about the underlying mechanisms that meditate these processes?

Meditation experience establishes a reference point, a new category for non-local experiences. The experience needn’t be long for all it takes for the brain to encode the new experience is 20min, the time it takes for a single dendritic spine to grow and represent the experience in long term memory. Repeated trials of meditation experience reinforce the new non-locality label and it expands, branching out into subtler labels for the different varieties of non-local experiences. This process is technically learned, as far as our understanding of the structure and function of the brain is concerned, however I hope that future research may demonstrate this process is actually one of *remembering*. Nevertheless, as part of a learning paradigm, this process is mediated by the development of higher order dendritic representation of experiences in non-locality which are then reconciled (or not) with all other experiences

in locality (consensus reality), in dreams, in memories, etc. As more meditation experience is logged, there is a reliable increase in baseline alpha and theta power in the brain; frequencies associated with relaxation and creativity, but also frequencies correlated with psi abilities.

For the meditator, synchronicities may be the first area where they begin to observe the significance of the relationship between thoughts and reality, between intention and experience. Although there is no mainstream accepted consensus on the significance of synchronicities, long-term meditators may be wired to discern them. With increased theta power in the meditator brain comes increased resonance with the Earth's geomagnetic field, the Schumann Resonance (7Hz). My colleagues and I in the Neuroscience Research Group (Persinger, Roll, Tiller, Koren, & Cook, 2002; Persinger & Saroka, 2012; Scott & Persinger, 2013a,b) have demonstrated the role of the right temporal lobe and specifically the right parahippocampal gyrus in non-local intentionality. The significance of this part of the temporal lobe is clear as it has been shown to be sensitive to changes in the local static magnetic field, the field in which all 7 billion brains are immersed, and is profuse with reciprocal connections to cortical sites for sensation, perception and memory, the building blocks for conscious awareness. Another critical feature of the mediator brain is the ability to maintain sustained awareness on the present moment, or *now*, an interval of experience that is protracted in experienced meditators. If synchronicities are the correlation between two events in a single moment, and if meditators experience a moment that is longer than the normal 40msec, this suggests meditators have the potential to extract more information from their environment (within or without) than non-meditators, giving them more information from which meaningful connections can be discerned or created (right frontal lobe).

Although human brains are all equal in terms of the required structures to transduce non-local stimuli, and there are many reports of spontaneous psi experiences, the development of reliable healing and psi abilities requires practice or reinforcement, just as any other ability. While synchronicities are often brushed off as insignificant coincidences by some, there may be special kinds of synchronicities, the relationship between reduced stress and increased health and wellbeing for example, that to the meditator will signal an opportunity to participate more intentionally with the generation of new experiences. Healing is one such special synchronicity that is often cited anecdotally by meditators as being their first foray into psychic development, that critical moment when a thought (e.g. "I wish this headache would go away") becomes the experience (i.e. the headache disappears).

Human consciousness, as part of the whole, can access apparently distal energy and information that too is part of a whole representation of experiences that is our universe; that is us. The exceptionality of human potential to explore, to learn, to create, is something our world is beginning to re-learn, and I would argue, given the role of the temporal lobes in these processes and the congruence between activity in this area and the local cosmic environment as well as universal constants for neuroquantal energy and information processing (Scott & Persinger, 2013b), this may actually be a process of remembering. Are there ways we can design experiments under the model of remembering as opposed to learning that can further elucidate the underlying mechanisms that mediate non-local experiences? Given the level of individual variability it has already been stated by my colleagues and others that the solution will necessarily be holographic, a matrix of variables whose individual components can vary significantly from one person to another but whose output yields valid and reliable information transfer. In light of this and recent findings involving biophoton emission during white light visualization (Persinger, Dotta, Saroka & Scott, 2013), a popular technique common to a variety of meditation practices, the way forward

must necessarily involve an interdisciplinary approach designed to capture how these different aspects of mind, body, heart and subtle quantal energies converge, diverge, and interact with the environments within and without.

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RAJENDRA BAJPAI I envisage that meditation trains a person for detecting a BPE signal, determining its attributes and using them to obtain information of its source. The training is not easy. In the first stage, the person develops the ability to pick a weak classical signal from a soup containing some strong classical signals and many BPE signals, and to retain information about the signal in the face of flit and forget strategy adopted by the brain during information processing. Retaining of information of the signal for a little longer allows the checking of its identity with signals stored in memory. Success in the first stage of training alters the usual pattern of information processing and is bound to make some physiological changes. The next stage of identifying an ultra-weak BPE signal is harder but achievable and will further affect physiological properties.

MATTI PITKANEN I see meditation and visualization as practices for making magnetic body more flexible. This process modifies also biological body since genetic expression is changed as magnetic body controlling the expression of genes alters it. Also build-up of connections to the larger layers of magnetic body with large value of h_{eff} would be in question as well as developing the ability to reconnect to other magnetic bodies. The travels of meditators/shamans/etc. to other realities could involve real sensory perceptions in TGD based ontology based on same mechanisms as remote sensory experiences. This sounds crazy but follows from logical extrapolation of the key ideas.

HIDEYUKI KOKUBO I think that control abilities of healing/ psi will be developed by meditation practice.

Section II: Healing input parameters, dosimetry, research technology

Question 8: What other approaches and technologies could be used to quantify healing intent? Is there a place for operator EEG, heart rate variability, skin conductance and operator biophoton measurements on the input side of mind-body research protocols? Should we find a correlation between healing effects and BPE intensity/frequencies, would this provide a more useful, quantitative assessment of “healer input” in mind-body methodologies than the years of meditation practice?

LYNDON JUDEN-KELLY: All aforementioned capacities are sufficient modern day tools for exploring mind-body interaction. Random Event Generating (REG) technologies could also assist in quantifying healing intention. Discrepancies between human operated output and baseline of REG frequencies have been found in the discourse of consciousness related time frames associated with the refresh rate of consciousness and the percept.

LUCAS TESSARO: There is definitely a place for operator EEG and other physiological measurements. As I mentioned above, SH’s EEG was unique in many aspects, but more interestingly when his EEG pattern was reapplied as a EMF signal it was shown to affect cancer cell growth. This suggests that EEG can be utilized to quantify healing intent.

SH’s healing properties were also shown to be associated with altered BPEs. Considering this, a current study is investigating traditional healing techniques (laying on hands; Reiki) and BPEs. Although within a preliminary state, the current results suggest that these healing techniques can affect the cellular viability of cancer cells. One working hypothesis is that the healing techniques involve BPE – therefore, quantifying the level of BPE would be necessary to determine any correlational effects.

One caveat of all psi research is once you think you have it, you’ve likely lost it, however feedback in any practice is necessary. A correlational relationship between healing effects and BPEs would be able to provide that measure of feedback to the healer in question. If healing BPE is directly related to the mind-body relationship, then it goes without saying that their thought processes at the time can affect their performance in healing. Succinctly – feedback on their thought processes and BPE output will assist healers in refining their techniques.

JOSEPH CASWELL: One of the current methods for evaluating a similar process which is being tested in our laboratory is to measure BPE of cancerous cell cultures which have been ‘intended upon’ by a human participant. These trials have shown significant changes in subsequent BPE. Testing for healer EEG, HRV, and BPE are the obvious next steps which will be undertaken in the near future. There is no reason to consider testing these factors on the input side of mind-matter interaction irrelevant; if the healer is indeed affecting these phenomena, it would increase our capacity to exploit and/or enhance these mechanisms for future applications. Biophoton correlates of non-local healing effects are as useful as other physiological measures including EEG; it provides an additional tool to allow further insight into relevant biophysical processes associated with the phenomenon of non-local healing. We have recently conducted experiments which suggest cerebral BPE as a potential factor in mind-matter interaction with a random event generator device, which provided a great deal of insight into neuronal and physical

processes which might be involved in this phenomenon. However, there is no reason that additional methodologies should negate the use of meditation practice...

RAJENDRA BAJPAI Squeezed state index of BPE signal appears to be a good candidate for measuring the possibility of healing. Some other physiological parameters of the healer should also be indicative of healing.

The gradation of healing capability will require measuring BPE signal from at least 4 sites (palm and dorsal sides of both hands).The distance of the representative point of the profile to the centroid of meditators (or known healer for validation) will be a reasonable measure of the effectiveness of healing.

HIDEYUKI KOKUBO I think we should measure responses of bio-sensors (receivers) by various methods.

MATTI PITKANEN If information molecule-receptor complexes serve as bridges to magnetic body parts, the technology quantifying healing intent would involve also correlates at neuro-pharmacological level. Neuroscience and study of remote mental interactions would fuse together. Elaborate maps about the information molecule connections to magnetic body would be constructed.

Question 9: Since we know the action spectra required for specific LLLT effects, would it be useful to compare these LLLT spectra to the BPE wavelengths measured outside the heads of qigong healers attempting to produce the same effects through visualization? Could we feedback-train patients to reproduce such circumcerebral frequencies through meditation?

RAJENDRA BAJPAI I have not studied these papers critically. Still I hazard a guess. Action spectra may not play a significant role but photo count distribution will. It will be quite interesting to explore if action spectra of different healers in response to visualization of same ailment have common features or whether one healer in response to visualization of different ailments produce different action spectra. Similar studies should also be made with all attributes (Specially, squeezed state index and slope of Fano Factor) of BPE signals.

One healer with whom I interacted has amazing capability. He mentions frequencies too but I take it a metaphor for different attributes. (<http://www.trivediscience.com/>)

MATTI PITKANEN The comparison of peaks of LLLT and biophoton spectra would be very interesting. This idea can be expanded if one accepts interpretation of EEG as dark photons The naive prediction would be that the ratios of peak frequencies for EEG for given value of h_{eff} and for biophotons are the same. In principle (I do not know about practice) this could be tested by looking at action spectra for LLLT and biophotons!

Question 10: Persinger's group found that pre-trial bonding between unrelated senders and receivers produced statistically significant EEG trial correlations (Persinger et al 2007) as opposed to non-bonded couples. These results are corroborating several other studies (see Jahn and Dunne, 2005; Radin 2006; Benor 2001) which showed previous connections/bonding to play a crucial role in establishing an effective mechanism for DMILS.

What do you think is the mechanism through which sender-receiver bonding facilitates DMILS effects? Specifically, could we test whether healing-specific EEG frequencies and the intensity of BPE at the sender are greater when the sender has a shared history with the receiver (due to cognitive/emotional memory activation and increased neural recruitment)? Could then “pre-bonding” with a targeted tissue, such as detailed visualization of a tumor, be used to enhance the effect of a patient’s healing meditation on his own body?

DR. LINDA S. ST-PIERRE and DR. MICHAEL A. PERSINGER: One of the general operations that might promote DMILS (Distant mental interactions with living systems) could involve the consequences of traditional approaches to behavior: shared reinforcement history. If two people share the same space-time and are exposed to very similar sensory stimulations that generate patterns of representations of these experiences within their brains they would be more similar than those who do not share these experiences. Within their brains one would expect that the representations of these experiences as patterns of spines emerging within dendrites throughout the cerebrum would be similar. In general the greater the shared reinforcement history, the greater the congruence and complexity of these shared patterns, that is, the microspatial patterns approach an identity.

Certain conditions would increase this congruence. For example, similar genetic history which is known to affect the macro- and micro-structure of brains would contribute an additional source of shared variance. Genetically related siblings in the same family, parent-children, and particularly monozygotic twins would include the primary range of this enhanced congruence. Analyses of spontaneous reports of DMILS (Persinger, 1974) revealed a ‘stimulus generalization gradient’ for the proportion of cases of stimulus (“agent”)-response (“percipient”) pairs. The most proportionate were mother-offspring followed by members of the immediate family, distal family, and friends, respectively.

What appears to be a more exotic component, passive proximity even without obvious interaction between two people, is less impressive when two measurements are considered. First, human beings generate in the order of 100 to 150 Watts of energy because of their general metabolism. There are also about 1 million photons emitted per s per m². These two factors allow for the possibility of interaction and simultaneous representation of information from the other person. That this can occur with some people was shown with our analyses of several volunteers who were proximal (about 1 to 2 m) to Sean Harribance while he “read” their memories (Hunter et al, 2010).

We found very clearly as Mr. Harribance and the subject shared space over time, the electroencephalographic activity of the subject’s left hemisphere became more and more similar to Mr. Harribance’s unusual right hemispheric activity. The effect was particularly apparent after 15 min. This same activity, when digitized as successive 3 ms increments and applied for 30 min as magnetic field patterns to cancer cell cultures reduced the growth of cells (Karbowski et al, 2012). Consequently there was the possibility that simply proximity to some people for 15 to 30 min could modify the pattern of spine growth on dendrites. Such growth requires about 15 to 20 min. The patterns of spines through the brain in response to the appropriate electromagnetic and chemical stimuli effectively are the memories.

If we assume the intrinsic space-time operations associated with our excess correlation experiments (Dotta and Persinger, 2012; Dotta et al, 2011a,b) are applicable, then human brains not exposed to the paradigm must simulate this condition. Our most effective means of demonstrating transient (about 8 minutes) excess correlation between two different spaces involves the simultaneous

application of magnetic fields with changing angular velocities generated within circular arrays of solenoids. If the group and “phase” velocities are dissociated the excess correlation occurs. By excess correlation we mean that if the injection of 0.1 cc of reagent produces a discrete emission of photons at either one of the two sites when injected singly, simultaneous injection of 0.1 cc at each site doubles that amount and duration of photons. In other words, the system behaves as if both loci separated by non-traditional distances are convergent or “the same space”. To date we have demonstrated this effect in spaces separated by at least 3 km.

Recently we (Dotta et al, 2103) have shown a similar effect with changes in pH. If a discrete amount of proton donor (acetic acid) is injected into one flask containing 25 cc of spring water and results in a decrease in pH, the pH in another flask containing the same amount of spring water some distance away shows a discrete increase in pH (about 0.02 to 0.03 of a pH unit) . This “conjunctive effect”, i.e., coupling of increase and decrease pH) only occurs if the two beakers share the same sequence of rotating magnetic fields with changing angular velocities. We have shown that the change in pH is directly related to the energies from the applied magnetic field within the population of hydronium atoms.

The pattern that generates these transient “excess correlations” or “entanglements” involves an accelerating angular group velocity containing a decreasing phase velocity pattern for about 4 min followed for 10 min or so by a decreasing accelerating group velocity fields containing an increasing phase velocity pattern. The rotation is counterclockwise as viewed from the top of the system. Any other combination does not produce the effect and the angular velocity must be a derivative, i.e., changing. To date the most effect parameters have been 20+2 ms during the first phase followed by 20-2 ms during the second phase within which the excess correlation between the two spaces occurs for about 8 min.

The 20+2 ms indicates that the duration of the decreasing phase velocity pattern occurs for 20 ms within the first solenoid, 18 ms within the second solenoid...and 6 ms within the 8th solenoid. The 20-2 ms indicates that the increase phase modulation pattern is presented for 20 ms within the first solenoid, 22 ms within the second solenoid...and 34 ms within the 8th solenoid. The total durations for one cycle for the two conditions are 104 ms (9.62 Hz) and 216 ms (4.63 Hz), respectively with a beat of 5 Hz.

For this model to apply to two human brains separated by substantial distances, such as during DMILS, some operational similarity of the experimental procedure should occur. One candidate is the electromagnetic fields associated with the creation or at least the “correlate” of consciousness. We, like many others, have shown that consciousness in the most complex sense is associated with discrete recursive, electroencephalographic fields coherent over large surface areas of the brain. Their durations are approximately 20 ms with a range between 15 and 25 ms. There are also phase modulations within this range.

This is equivalent to about 40 to 45 Hz or the well known “40 Hz” or gamma band. Assuming a typical functional rostral-caudal length of the cerebrum to average around 11 cm, the bulk velocity of these recurrent waves would be in the range of 4 to 5 m·s⁻¹. This range of velocities are important because when the cerebrum is considered a variant of a sphere with an average functional circumference of about 60 cm, the intrinsic resonance overlaps significantly with the Schumann resonance of the earth-ionosphere cavity.

These cerebral cortical waves move in a rostral-caudal direction. To complete the “circular array” there must be a return path. Our recent data suggest that the Default Mode Network, which involves the anterior and posterior cingulate regions as well as some caudal cortical areas, may satisfy this condition. If this were valid, then the “circularly” rotating magnetic fields required to simulate our experimental procedures could be met within cerebral space. However unlike our experimental studies where the rotations are occurring within the horizontal field, these “rotations” would be primarily orthogonal, moving through the vertical plane with respect to the earth’s surface for standing or sitting person. Movement in the horizontal plane would occur when the person lies on either side.

What would be required is some condition, either shared by reinforcement history or produced in both pairs of people by a shared external third factor, such as the geomagnetic field within which we are all immersed, that would produce a brief period (of about 4 min) of a rotating intracerebral magnetic field moving through the “cerebral circuit” within both participants whose 20 ms base duration is accelerated by increments of 2 ms. This would then be followed by a more protracted period when the rotating intracerebral field slows by increments of 2 ms. The duration of the excess correlation would be about 8 min. Most episodes of spontaneous DMILS occur within this time frame.

There are several physicochemical mechanisms that could mediate the transient excess correlation within the cerebral spaces. If the process involves moving protons (the hydronium atom) within water then the velocity for this magnetohydrodynamic “wave” can be estimated by $v=B\cdot\sqrt{\mu\sigma}$, where the latter two are magnetic permeability and density respectively. Because the excess H^+ associated with the hydronium atom at pH=7.4 is about $1.66\cdot 10^{-6}\text{ kg m}^{-3}$. The square root of the product of magnetic permeability ($1.26\cdot 10^{-6}\text{ N A}^{-2}$) and the density is $1.66\cdot 10^{-6}\text{ kg}\cdot\text{s}^{-1}\cdot\text{A}^{-1}\cdot\text{m}^{-1}$. When divided into a typical value for the horizontal component of the geomagnetic field, in the range of 8000 nT, the resulting velocity would be about 4 to 5 $\text{m}\cdot\text{s}^{-1}$. This is the same range as the velocity of the recurrent cortical fields associated with consciousness and the “40 Hz” band.

The relevance of this 40 Hz band for integrating and for proliferating information over the surface of the planet becomes obvious when one considers the role of water. If we assume the (median value) volume of water on the surface of the planet is $\sim 1.3\cdot 10^{18}\text{ m}^3$, then the energy (E) contained within it from the geomagnetic steady state field strength would be:

$$E = T^2 \cdot (2\cdot 4\pi 10^{-7}\text{ N A}^{-2})^{-1}\text{ m}^3$$

or $(25\cdot 10^{-10}\text{ T}^2)$ divided by $25\cdot 10^{-6}\text{ N}\cdot\text{A}^{-2}$ multiplied by the volume. The intrinsic energy is $\sim 1.3\cdot 10^{15}\text{ J}$ contained within the oceans. The product of the volume of the oceans ($1.3\cdot 10^{18}\text{ m}^3$), 10^3 L M^{-1} , $5.56\cdot 10^1\text{ M L}^{-1}$, and $6.023\cdot 10^{23}$ molecules per M, indicates there would be $43.5\cdot 10^{45}$ molecules. The quotient of $1.3\cdot 10^{15}\text{ J}$ and $43.5\cdot 10^{45}$ molecules indicates about $3\cdot 10^{-32}\text{ J}$ per water molecule. When this value is divided by the quantum indicator (Planck’s constant, $6.626\cdot 10^{-34}\text{ J}\cdot\text{s}$) the intrinsic frequency is $\sim 45\text{ Hz}$. The convergence does not necessarily imply interaction with cerebral consciousness; however the shared frequency over the entire earth’s surface suggests an entry for investigation.

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RAJENDRA BAJPAI Again I have no access to this literature. I am hazarding a guess. Bonding sensitizes a subject to the BPE field of the healer. The sensitization increases the chance of detecting and recognizing the BPE field of the healer. Recognition of BPE field is the healing as it triggers changes in subject. The healer, probably, does not have capability to direct BPE fill at will in specific direction. The healer, perhaps, has the ability to match some attribute that may not be frequency. The reason for ruling frequency lies on various accounts pointing out that resonance does not build up with time but is a momentary phenomenon. Finally, many subject may tune to and recognize the same BPE signal broadcasted by a healer. We still do not know how a healing BPE signal is generated by the healer.

MATTI PITKANEN Pre-trial bonding would translate to permanent flux tube connections between magnetic bodies due to the reconnections. This would facilitate DMILs effects: the two magnetic bodies would receive some input from each other's biological bodies by dark photons, say EEG. The correlations between EEG spectra and also spectra at other frequencies could serve as a signature for this.

Question 11: Although the controlled data is very limited, we have historical and experimental evidence suggesting that in some cases, specific meditative states (“Bigu”) can induce physiological changes which allow living organisms, from in vitro cell cultures to active human beings, to subsist and function normally on very restricted or even zero caloric intakes, with no evidence of starvation in their metabolic profiles (see Sidorov et al, 2013). A related phenomenon has been

observed in Iditarod sled dogs, where the animals spend extremely high amounts of energy during the race without burning through their body's glycogen and fat reserves, as other species, including humans, are known to do (Robson, 2008). This "metabolic switch", if identified, would have significant applications, from defense (Robson, 2008) to humanitarian crises – but of course the research is so rudimentary at this stage as to allow considerable doubt about the validity of the phenomenon.

Given the fact that LLLT photons feed directly into the respiratory chain of eukaryotic cells, supplying non-nutrient sources of energy for the generation of ATP, could endogenous, EEG-generated biophotons be trapped and utilized as such a source of energy? And could specific forms of meditation trigger new, low-dissipation physiological configurations and metabolic pathways which would allow the capture and high-efficiency utilization of surrounding environmental photons, such as light absorbed through the eyes? How could we test for such epigenetic and molecular configuration changes?

RAJENDRA BAJPAI The wave site (<http://www.trivediscience.com/>) lists the effect of healing on many living and non-living systems. I experimented with the healer but was unaware of what to look and analyze. I was concentrating only on the shape of Light induced BPE signal and did not critically measure or explore spontaneous BPE signal. I shall dig up my old computer to see if some data was there or not.

MATTI PITKANEN The trapping of dark photons to flux tubes would look more natural than trapping of biophotons in TGD framework. The utilization of environmental photons in Bigu does not look to me an attractive option: dark photons from magnetic body would look more natural if TGD ontology is accepted. I have considered a model for Bigu assuming that magnetic bodies serve as fundamental storage of metabolic energy. What this really means is far from obvious and several options can be imagined. The metabolic energy assigned with the covalent bonds of biopolymers could be actually cyclotron energy assignable with large h_{eff} magnetic flux tubes. Metabolism could be basically transfer or generation of negentropic entanglement assignable most plausibly to electron Cooper pairs. Bigu might reduce to sending of negative energy dark photons to some magnetic body with same cyclotron frequency (but does this generate negentropic entanglement in sender, say that between electrons of Cooper pair?). This would involve formation of reconnection to this magnetic body (same field strength, same cyclotron frequency). Negative energy photons make sense only if the arrow of geometric time (thermodynamical time) can vary, and this quite generally would make possible also instantaneous communications as reflections of signals in time direction making possible remote mental interactions with arbitrarily distant targets. Zero energy ontology guarantees this.

Section III: Is placebo a form of healing intent? Placebo genotype vs. phenotype

There is reason to believe that a similar combination of mental imagery/motivation/belief/expectation is at work in placebo and various forms of PK, including DMILS or external qi effects. From a parapsychology perspective we know that these psychological factors tend to play a critical role in PK

effect size; that remote viewing and PK can to some extent be trained; but also that there are subjects with a powerful innate ability and that this ability can seldom be surpassed by mere training (see McMoneagle 1997, 2000, 2002; Radin 2013).

Question 12: How do you physiologically interpret the recent finding that patients with a met/met COMT variant are more prone to placebo effects (Hall et al, 2012)?

LUCAS TESSARO: First, I would have to state that the concept of the placebo is highly contentious as is. Virtually all pharmaceutical treatments are associated with affecting a naturally occurring physiological process, and arguably the placebo effect is a naturally occurring physiological process. Therefore, it is not surprising that some individuals are genetically predisposed to a higher placebo effect than others. Conditioning studies suggest that the brain is capable of learning things that we are not consciously aware of, so it could be said that the placebo effect is simply the brain learning how to enhance the immune system triggered by a foreign substance positively effecting physiological processes.

Given the connections made in the paper between COMT and dopamine catabolism, which is intimately involved with the reward pathway, it is not surprising that this is associated with the placebo response. Basu and Dasgupta (2000) showed that DA can act as a regulator and mediator of the immune system; therefore it suggests that the activation of the reward/pleasure pathways, leading to DA release, which then enhances immune response can be triggered by the placebo effect.

Furthermore, another form of CNS interneuronal communication suggests that neurotransmitters and other biologically active compounds can reach distant receptors outside of the CNS. "Volume transmission" suggests that a particular molecule could spread throughout the body at multiple receptor sites and act as a unified whole. Otellin (1989) demonstrated that there is a non-synaptic nature of interactions between different neurotransmitters within and outside of the CNS. These postulates therefore indicate that mediation can influence the body through this volume transmission theory, and that the placebo effect is likely another form of this volume transmission, where neurologically initiated processes induce physiological changes as a unified response to the stimulus.

MATTI PITKANEN That persons with met/met COMT would be more prone to placebo effects than normal variant, looks at first rather strange. From Wikipedia (<http://en.wikipedia.org/wiki/Catechol-O-methyl-transferase>) one learns about the claim that people with this variant tend to feel happier than those with normal variant.

If one believes that neural transmitter-receptor complex establishes a plug-in from neuron to relevant part of the magnetic body, then this does not look so strange anymore. Methylation of DNA and proteins is a universal mechanism for modifying the functioning of reaction pathways and appears also in epigenetics. Met/Met COMT instead of Met/Val COMT could favor the generation of this kind of bridges to some parts of magnetic body with higher value of h_{eff} : if larger negentropy is responsible for feeling happiness, then the finding could be understood. The parts of the magnetic body are in one-to-one correspondence with those of brain areas and might have similar specialization to feel happy or unhappy as limbic brain is claimed to have (right limbic brain seems to be specialized in suffering!). These bridges or "plug-ins" would most naturally correspond to post-synaptic receptors for some neural transmitters - perhaps one could localize them to limbic brain.

Placebo would be self-healing based on building this kind of contacts. Healing could be seen as healing of the communications between biological and magnetic body (or bodies, say magnetic bodies

of collectives).

RAJENDRA BAJPAI Answer to Questions 12-15

Determination of the profile of BPE signal in of COMET met/met variant population and associated cluster analysis will throw light on these questions.

Question 13: Given the evidence that meditation produces different effects on plasma catecholamines according to BDNF or COMT polymorphisms (Jung et al 2012), do you think there is there a common genetic/CNS/therapeutic pathway between placebo and healing qi ability? Could subjects' placebo and healing effectiveness be correlated with an ability to entrain massive CNS domains through both activation of broad cognitive basins (multisensory visualization) and emotional modules? Would certain genetic variants be more conducive to this type of CNS activation?

RYAN BURKE: I think it is important to remember that our biochemistry is a dynamic system that is constantly adapting to its environment. When we think of active manipulation of our biochemistry, the simplest example would be pharmaceuticals. We know that we can take a pill and change our biochemistry, but the system is simply responding to a new stimulus. Meditation is another method of actively manipulating our biochemistry, yet it's more difficult to understand because it is not possible at this time to standardize a "dose" that will produce a predictable response. That does not change the fact that changing the information in a system will alter its response.

Jung and colleagues reported differences in stress response between controls and meditators in the BDNF Val/Met and BDNF Met/Met polymorphisms. This difference was not observed between controls and meditators in the BDNF Val/Val polymorphism. Several studies have demonstrated an interaction with the BDNF Val/Met variant and stress in predicting depression from adolescent to geriatric populations (Kanellopoulus et al., 2011; Chan et al., 2012; Herbert et al., 2012). Moreover, the Val/Val polymorphism was implicated as a neuroprotective variant against structural changes associated with major depression by Kanellopoulus and colleagues.

Taken together with the data from Jung and colleagues, this could be demonstrating a similar effect between meditation and pharmaceutical intervention of our biochemistry. Using a simple analogy, if you take an aspirin and you have a headache, you expect your headache to improve. Yet if you have no headache, taking the aspirin provides no relief. Similarly, mediation may provide benefits to those who require those benefits, such as those more prone to depression and other emotional challenges, but will have no effect on those who don't.

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MATTI PITKANEN I tend to think that many pathways are involved. The pathway in question need not be the same for placebo and healing qi ability. For psychedelics and perhaps also for remote perception the pathways affecting serotonin accumulation to postsynaptic receptors seem to be important and pineal gland might be the seat of action. The general mechanism could be similar to that conjectured for the action of psychedelics/hallucinogens. The interpretation would be that connections to some parts of magnetic body or even other magnetic bodies become more stable. If information molecules and receptor proteins are crucial for building connections to the magnetic body, gene dependence is implied: biochemist could probably easily tell whether methylation is a universal mechanism for modifying these molecules.

Question 14: Could certain types of meditation training replicate this effect even in subjects who do not carry the COMT met/met variant – i.e. could we train patients to “compensate” for placebo effects by long term physiological remodeling?

LUCAS TESSARO: If we continue with the hypothesis that the placebo effect is partly a ‘learning’ process, and that this learning process can affect both reward pathways and those pathways which stimulate immune responses, then it is highly plausible that individuals can be ‘trained’ to elicit the placebo effect, or rather a self-induced heightened state of immune response. The initial stages of the placebo effect can be used as the ‘positive feedback’, or the conditioned response to the conditioned stimulus. Following the example of Pavlov, an individual could then have the conditioned response (immune responses) to unconditioned stimuli (immune threats) through proper training.

The most ideal processes to try to enhance to elicit these responses would be the serotonergic modulatory neurons, which have been demonstrated in the snail to be required for the elaboration of the conditioned response (Zakharov et al., 1995). It is important to note that the ‘learning’ is not necessary a hippocampal activity, or rather it is not an incorporation of ‘memory’ *per se*. If we incorporate the theory of volume transmission, these reinforcement responses utilizing serotonergic transmission could trigger receptor responses throughout the body associated with the placebo effect (i.e. immune activation) and healing as a unified whole.

MATTI PITKANEN It is hard to believe that meditation would not work at all for those without met/met variant. It would only make things easier.

Question 15: Would it be useful to compare the remote bio-pk ability of the two populations studied for placebo in the Hall et al. COMT experiment, to see if that same genetic variant may translate in a different *in vitro* effect size?

MATTI PITKANEN Both PK ability and placebo would involve "motor actions" of magnetic body. I however believe that the structure of hierarchy of magnetic bodies is as rich as the spectrum of neurotransmitters and other information molecules. Therefore I prefer to not answer the question!

Section IV: Biophotons in long-range effects: DMILS from life precursors to biosphere; morphic fields, the Global Consciousness Project, TGD fractality of physical and cognitive dynamics

In a 2011 paper published in Brain Research (Dotta et al, 2011), Persinger's team reported that exposure of a cell culture to light flashes produced an increase in photon emissions at another, remote cell culture maintained in the dark, when both shared the same magnetic field. A similar phenomenon was observed around the heads of isolated human subjects sharing identical magnetic fields, when one of the volunteers was shown light flashes, with receiver biophoton emission (BPE) intensities of about 10^{-11} W/m² or 10^{-20} J per cell, which is associated with an action potential. In 2012, Dotta and his colleagues demonstrated that an increase in biophoton emissions could be measured from the right hemisphere of subjects visualizing white light (Dotta et al. 2012). On the other hand Kido (2001) reports that subjects in a distant healing study (300 km) experienced body actions and reported visions of light images during the sending windows (Kido 2001). This observation is supported by other distant healing studies which report inadvertent (but validated) perceptions of remote target characteristics by the healer (see Benor 2001). Although anecdotal, such perceptions and imagery appear to concatenate with a vast literature of remote viewing and other forms of extrasensory perception, which are beyond the scope of the present discussion but which may nevertheless share common mechanisms with the phenomena we are addressing here.

Question 16: Could the images reported by Kido in the distant healing study above have been generated by biophoton emissions induced through external qi? Bokkon has suggested, that "the images associated with visual perception and dreaming are the experiences of fields of photons structurally organized within the cerebral cortices due to its intrinsic neuroanatomy" (Persinger and Lavalley, 2010) This model seems particularly relevant to remote viewing and DMILS – if biophoton transactions are a signature of entanglement between remote operator/target, as described by Topological Geometro-dynamics (Pitkanen, 2013d) and detected in the External Qigong studies cited above, then it is conceivable, according to this model, that the RV imagery is produced by such evoked photon bursts in the viewer's or the receiver's brain. It is also possible

that remote healing may be mediated by the healer's ability to produce such photon discharges at the target organism, which then propagate along the target's body, with or without EEG imagery/amplification.

MATTI PITKANEN 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. If pineal gland functions like a "third eye" able to remote view by using dark photons instead of ordinary ones as for lower animals, its role in all remote mental actions could be important. Could this be tested by looking at what happens in pineal gland or some other brain region during remote mental interactions? Could the ability of birds and fishes to migrate to the birth places be one spectacular example of remote mental interaction? This is discussed in more detail in Appendix, which also contains references.

Question 17: Are there any studies looking at biophoton emissions during remote viewing?

TREVOR CARNIELLO: Inferential methodology is a useful tool when associated with such a question. Dotta et al, (2012) have demonstrated an increase in UPE over the right hemisphere (right parahippocampal region) in individuals who were asked to imagine white light. Similarly, although be it somewhat unrelated, Scott and colleagues (2013) demonstrated a conspicuous increase in right parahippocampal theta activity associated with increased accuracy on Remote Viewing tasks. The high concordance between parahippocampal activity across these tasks suggest that there is a high likelihood of correlated deviations associated with EEG power within Remote viewing tasks. Although this notion is only speculative and correlational at best, it may be an essential *a priori* hypothesis for future testing. The only way to truly identify a causal relationship would be to undoubtedly test this hypothesis.

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Question 18: Can you conceive of a technology that might allow us to differentiate between memory/imagination and remote perception on the basis of associated biophoton emission profiles?

JOSEPH CASWELL: Given the reliable increases in cerebral BPE observed in association with visualization, if the assessment of BPE signatures related to various cognitive states could be determined

then nonlinear computer modeling (e.g., artificial neural networks) could be trained to classify participant mental states based on an input of BPE using autoregressive modeling.

BLAKE DOTTA: Much like a QEEG, a highly sensitive multi channel PMT may allow for very sensitive measurements of BPE from subjects' heads (or whole body) during different states. From this we could potentially learn specific patterns of emission as well as emission intensities and which wavelengths are being emitted at different times from several populations. Much like how increased alpha activity within the occipital lobe is associated with an individual closing their eyes, specific states (i.e. developmental, meditation, intention, etc.) may be paired with highly specific BPE.

MATTI PITKANEN In TGD framework it is surprisingly difficult to distinguish between these two since also memories and vision about future can be also seen as examples of remote viewing. If fishes and birds are able to find their birth places in the manner discussed in [Appendix](#), one would have a rather dramatic example about remote sensory perception. Hypnosis could be seen as second dramatic example of remote mental interaction.

Question 19: Do you think the increased photon emissions at living recipients is due to a change in the physiology of the organism, or a direct transfer of energy/ signature of entanglement? Would it be worth looking for unusual photon emissions at the site of random even generators (REGs) in successful PK experiments, or during windows of statistically significant GCP (Global Consciousness Project) deviations? And if such photon signatures are found to be correlated with remote effects of consciousness on nonliving targets, then what would this test tell us about the mechanisms of mind-body healing and placebo: should we keep investing most of our resources in stress-related clinical research, or is it time to rewrite the meditation research agenda with a focus on quantum nonlocality in biological systems?

LYNDON JUDEEN-KELLY: Increased photon emissions under these circumstances may be both a product of change in physiology as well as a signature of entanglement; photon absorption and release may be a natural exchange with the external environment and an adaptation strategy of the individual. It may also be- at the same time- an intrinsic property of being and becoming entangled with proximal space-time conditions.

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.

Photon signatures associated with consciousness related effects on non-living targets have profound implications with mind-body healing insofar as the non-living targets operate in the same matter as quantum and cellular processes involved in intracellular communications and interactions. At no point in science should old approaches be abandoned unless deemed obsolete, with this said, a significant effort should go into investigating and understanding quantum nonlocality in biological systems.

Belief systems as well as brain structure and function could act as a filter which determines what universal representation is experienced from the individual's viewpoint. Biophoton field interference patterns could very well act as an overarching blueprint. Likely influenced from the sun; genetic, tissue, and communicative processes could be affected and perhaps be dictated by such interference patterns. If

there are significant correlations between this proposed Biophoton field and the earth's naturally occurring electromagnetic field, then it would lead one to believe that the proposed effects are inevitably a reality.

JOSEPH CASWELL: This is an excellent question, and a vital one. This is very difficult to determine given the current data, although my opinion is that the transfer of energies (e.g., via 'excess correlation' or 'entanglement') is associated with the subsequently observed change in state. Therefore, it is likely that both of these possibilities occur in tandem. We have examined participant BPE in the context of REG experiments with some very intriguing findings. It would certainly be worth investigating photon emissions around the device itself. However, the current commercially available REG devices (Psyleron) have a large blue light on the device itself which makes this type of assessment relatively impractical for the average 'PK' researcher. As with most problems, the issue of investment should not be so rigidly divided in an all-or-none, either-or fashion; meditation research and quantum biophysics present with precise convergences and should be employed together.

RAJENDRA BAJPAI Answer to Questions 19-25

The only model that explains the shape and photon count distribution of a bio photon signal as well its dependence on many factors envisages a quantum photon field associated with a living system having manifest or dormant life. The signal is a record of the detection times of photons and is expressed as the number of photons detected in consecutive bins of definite size. The model considers the results of measurements in consecutive bins as outcomes of repeated measurements in the quantum field. Photon count distribution is a property of the field and its measurement proves that photon field is quantum in nature, extends to large distances and is observable over macroscopic time. Quantum photon field has to be coupled (considered as emitted) to some quantum field of matter in the living system. The field of matter, like the quantum field of photon, exists for macroscopic time. Live object remains a quantum object dressed with photon field throughout its lifetime. Matter field is short range but its dressing is long range. It is a new ingredient and has the potentiality to explain many phenomena mentioned in this section. It permits distant interaction between living systems through the exchange of photon field with same or similar attributes. The photon field can be a serious candidate for morphogenetic field and can fulfill the role envisaged by Sheldrake because of its living system specific attributes. Some attributes are likely to be species specific, which could allow species specific channel of information transfer (and communication). The coupling between matter and photon fields has to be **A** (and not **B**) dependent, which leads to Bohm Aharonov effect like scenario. The measurements with high potency homeopathic remedies point out the possibility of resonance like effect with some frequencies of **A**.

I am refraining from speculating the answers of the questions of this section due to lack of data on the attributes of BPE signals of different species.

HIDEYUKI KOKUBO I think it is useful to study relationships among responses of RNGs and bio-sensors during PK tasks. However, we should start our tests with a local RNG and bio-sensor.

MATTI PITKANEN TGD expectation would be that the emission would be basically due to leakage during communications to some parts of magnetic bodies involved. If one is ready to believe in dark photons and magnetic body, neuropharmacology of conscious experience and quantum nonlocality inspired approach could be combined together. Questions to be asked would such as "What biophoton energy and what ELF frequency (that is h_{eff}) does a particular information molecule/neurotransmitter

correspond to?" The hierarchy of Planck constants and the hierarchical anatomy of magnetic body would correlate with analogous hierarchy of information molecules and their receptors with neurotransmitters at top: this would mean also hierarchy at the level of cells with neurons at the top. This promises a testable connection between quantum consciousness, quantum biology and even remote mental interactions on one hand and basic molecular biology and bio-pharmacology on the other hand. Focus on quantum non-locality would be consistent with the approach stressing bio-pharmacology and provide the term "information molecule" with a deeper meaning.

Question 20: Sheldrake has talked about morphic fields as providing the architectural blueprint of self-organizing matter, from crystals and living cells to organisms and social groups; and of mind/memory as a property of an extended, extra-corporeal field, reminiscent of p-adic space-time sheets in Topological Geometrostatics (Pitkanen 1985, 2000, 2001, 2012, 2013a,b,c]. Again, as with remote healing, we believe that the theory should be recast in more concrete terms: that is, if physical forms and morphic resonance are a matter of "attractors" in the dynamic of these morphic fields, as Sheldrake has suggested, then what is the physical substrate or *variable* described by this dynamic, whose function generates the shapes of physical objects, guides morphogenesis and the expression of DNA throughout life? Could biophoton field interference patterns represent the overarching blueprint regulating the shape and function of living organisms through coordinated genetic expression and tissue architecture, as well as nonlocal communication with other living things?

NICOLAS ROULEAU: If electromagnetic and gravitational fields are composed of units or points, it would be sensible to attempt to identify the point representation of the morphogenetic field. However, it is first necessary to examine whether or not these fundamental forces and their associated fields can accommodate the consequences of the morphogenetic field. After all, it might be that "morphogenetic field" is an over- or under-inclusive concept. Suppose a combination of gravitational and electromagnetic forces can account for the phenomenon of formative causation.

In our research, we have identified subtle shifts in the decay of processes in chemical systems associated with antecedent exposures of the space itself to rotating electromagnetic fields. In other words, we observe that injecting small amounts of acid into a beaker of spring water after the space in which the beaker is placed was exposed to rotating electromagnetic fields alters the magnitude of pH shifts within the system itself. We are compelled now to contemplate the possibility that space itself can be imbued with properties by temporally non-local exposures to a field of force. These properties appear to self-maintain in the absence of the original stimulator (i.e. the rotating fields). We have observed that even pulses of light can affect aqueous systems and cell cultures. Photons, being the carriers of the electromagnetic force, seem to be fundamental to the phenomenon whether they are of biological or abiological origin.

Perhaps some natural variant of this electromagnetic phenomenon guides the shape of cells, tissues, organs, and even organisms. If this were the case, we should be able to interfere with morphogenetic fields of cells, tissues, organs, and even organisms. Our laboratory is demonstrating that the structure-function of these units can and have been altered by exposures to weak, complex-patterned electromagnetic fields. Two possibilities are immediately apparent: 1) It could be that electromagnetic

fields are able to interact with or even override the physically distinct morphogenetic fields, and 2) it is quite possible that electromagnetic fields, both local and non-local, account for formative causation and are therefore subject to electromagnetic interference.

JOSEPH CASWELL: Given the large volume of research associating consciousness with electromagnetic effects both theoretical and experimental, and the obvious factor that photons themselves are the quanta of electromagnetic radiation, it is likely that the electromagnetic force itself governs many of these phenomena. This includes providing an electromagnetic 'blueprint' for various genetic codes as previously discussed by Dr. Michael Persinger. Furthermore, our laboratory has also shown that application of specific electromagnetic fields can induce non-local effects including 'excess correlation' or 'entanglement'.

TREVOR CARNIELLO: The proposition of inherent static but dynamic fields that govern and modify the organism was originally proposed by Burr and Northrop (1935) in their electrodynamic field theory. Conversely, work done by the former authors and that of Leonard J. Ravitz (1953, 1959) suggest a structural change (as denoted by changes in polarity and the magnitude of potential differences) for wound healing, altered states, psychosis and schizophrenia. The working hypothesis of these two individuals suggest that the electrodynamic field of an individual organism exists as a homogenous subset of binding agents in order to retain the structure and function of said organism.

With respect to Sheldrake's idea of a morphogenic field may be a change in the nomenclature of past (1940 to 1960) research and labels. However, as we evolve throughout the course, we have a collective organization of humans, increase the sensitivity of our measuring equipment allowing us to probe another facet of a given problem. In order to test the idea that a collective arrangement of geometric aggregates can be reflected within a biophoton field one would have to relate the physical properties (charge separation, geometric curvature etc) to changes within the spectral density of UPE. Currently, the application of the resonance recognition model (RRM) as presented by Cosic (1994) uses fundamental electric potential interactions of a protein's amino acid arrangement, in order to determine the relative electromagnetic wavelength and frequency for that protein. This suggests that any protein has the possibility to absorb a given wavelength of light based on the geometric organization of charge distributions and their energetic interactions. Recent research by Dotta et al (2013) challenge this idea of passive photon absorption by investigating the potential of increasing or decreasing the production of light based on a specific class of proteins. The results of these experiments suggest that the structure of a given protein class has a specific emission of light.

If this light is coupled to electrodynamic properties (Burr and Ravitz hypothesis) and electrodynamic separation is reflective of a geometric organization within a given space-time then Sheldrake's notion of a morphogenic field representing the structure of a given organism would be a collection of the biophoto-electrodynamic properties of the system. Similarly, this field would act as a physiological binding factor that retains the structural integrity of the organism. A further contemplation, on this topic, would suggest that exogenous moderators of the biophoton-electrodynamic (morphogenic) field can inherently change the organization of underlying processes. This notion may be of extreme interest in the future.

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- Ravitz, L. J. (1953). Electrodynamical Field Theory in Psychiatry*. *Southern Medical Journal*, 46(7), 650-659.
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- Cosic, I. (1994). Macromolecular bioactivity: is it resonant interaction between macromolecules?-theory and applications. *Biomedical Engineering, IEEE Transactions on*, 41(12), 1101-1114.
- Dotta, B. T., Lafrenie, R. M., Karbowski, L. M., & Persinger, M. A. (2013). Photon emission from melanoma cells during brief stimulation by patterned magnetic fields: Is the source coupled to rotational diffusion within the membrane? *General physiology and biophysics*.

Additional questions from Dr. Matti Pitkanen:

Question 21. Learning in the scale of species and collective consciousness

Are language and ability to co-operate possible without collective levels of consciousness? What could sleep and dreams mean from the point of view of collective consciousness?

JOSEPH CASWELL: Yes, language and co-operation are possible without collective consciousness, although this does not nullify the potential for a collective consciousness. I am of the classical opinion that dreaming serves the function of ‘practice’ for potential future events. However, this includes conscious access of non-local information which may surface in cases of ‘anomalous cognition’ associated with dreaming.

DAVID VARES: The ability to co-operate implies the understanding and recognition that there is another individual that is separate from one’s self. This level of consciousness necessarily includes the collective awareness of others within the definition. Language can be considered the basic auditory communication between two identified individuals.

Assuming that consciousness is a fundamental element throughout the universe, then the individual can be simply defined as a conduit for which consciousness is interpreted, and expressed. This gives rise to the collective consciousness foundation, from which identity and individuality prescribes. Communication and co-operation are therefore derivatives of the collective consciousness that is expressed via the individual. The function of dreams are two-fold, one is to consolidate the previous day’s events by pruning the unnecessary neural connections and solidifying the neural connections that are identified as important (emotionally) to the individual’s future survival, and two is to prepare the individual for future events that have yet to ‘take place’.

Because the expression of the individual is mediated by the temporal ‘now’, the future and past are relatively defined and expressed within the individual. This does not mean that they are not available for access, nor does this violate the 2nd law of thermodynamics. Rather, within the universality of consciousness there is access to past and future events. The boundary conditions of the individual

prescribe the awareness of such past and future events to only be expressed within the relative temporality of the 'now'.

HIDEYUKI KOKUBO I remember an episode in my student's report in 2009; she tested her friend using Zener cards with down-through (DT) method. Her friend showed a very high score - 163 hits / 250 trials (the expected value is 50 hits). She was a Korean student who had started to learn Japanese. And also she was not aware about her own ability of clairvoyance at that time. I think we can learn language efficiently because our ESP is activated unconsciously. Maybe, our ESP will decrease after learning language. I think it is not important to dive down to collective levels of our consciousness when we learn language.

Question 22. EEG as related to large scale effects.

EEG is certainly a correlate for consciousness: for the physicist this is highly non-trivial, taking into account how small photon energies are involved. EEG wavelengths are of the order of Earth's size and corresponding time scales are of the order of those associated with the effects found by Libet. There are also the effects reported by Blackman and others, suggesting endogenous magnetic fields of order 2/5 times Earth's magnetic field play an important role in the brain of vertebrates.

Could EEG also relate to collective consciousness? Could low EEG frequencies which do not correspond to our conscious experience be in question? What are the implications of Persinger's group results (and other similar studies), showing EEG correlations of distant brains? What is the role of magnetic fields in Persinger's experiments?

KEVIN SAROKA: The average rostral-caudal potential difference occurring at 10Hz is within 10^1 microvolt range. If one takes this voltage and divides it by the speed of light multiplied by the rostral-caudal length one gets a magnetic field equivalent in the order of femtoTesla. Other solutions have produced solutions that approach a picoTesla. This magnetic field intensity approaches that measured with modern magnetoencephalography, but it also approaches the intensity of the fundamental and eigenfrequencies of the Schumann resonance generated between the earth's surface and the ionosphere. If we assume that resonance occurs when energies and frequencies between two bodies match, then the correlation between the brain and Schumann frequencies may support the idea of a collective consciousness. And because the dominant frequency in the brain is about 10Hz, which is a frequency below the '40-Hz' threshold for awareness, one may even predict that the experience would be largely unobserved subjectively.

JOSEPH CASWELL: In our laboratory we use physiologically-patterned electromagnetic fields with very specific applications, the properties of which are derived through careful dimensional analyses and examination of empirical data. By using fields with specific pattern parameters, we are able to target relevant cerebral structures and enhance or interfere with these natural processes. This is not entirely surprising given our other many experiments which have shown that even small perturbations in the geomagnetic field are associated with significant changes in brain activity.

NICOLAS ROULEAU: The constructive and destructive interference patterns generated by the brain as EEG are of importance to the consciousness researcher. In unpublished works, this author has found that

artificial interference patterns can be generated using very low frequency sine waves with wavelengths associated with typical neuronal signaling. The interference patterns that are generated show harmonics in the range of gamma or 40Hz. Perhaps like the synchronized activity of neural networks, sinusoidal pulses can be transmitted from the brain to interfere with the emissions of other brains; a holographic connection based upon very simple processes.

Question 23. Remote interactions technology

Persinger claims that Ingo Swann did much better on RV accuracy after being exposed to the circumcerebral magnets (Persinger and Lavalée, 2010). Is there any other data corroborating this assertion? Any practical suggestions for how to enhance distant mental interactions using magnetic field technology? Could remote mental interactions (synchrony in particular) involve collective levels of consciousness? Could low frequency EEG activity serve as a physical correlate allowing to test this hypothesis?

TREVOR CARNIELLO: Unpublished results from experiments conducted by this author suggests that physiologically or mathematically patterned weak electromagnetic fields can enhance the ability of individuals on Remote Viewing tasks. The working hypothesis suggests that appropriate application geometry of these fields resonate at frequencies comparable to increasing activity within the right parahippocampal regions allowing for increased receptivity of exogenous, non-local information.

If one accepts the possibility that, regardless of the mechanism employed, a universal interconnected exists and can be accessed through interactions with the local geophysical environment (the geomagnetic field) and received by specific portions of the brain (primarily involved in the right hemisphere) then access to exogenous information can be shared. Theoretical, if states of consciousness are entangled, the effect of receiving exogenous information can be increased. If we consider the brain as being a single antenna that receives an arbitrary signal, the more antennae operating as a cohesive unit could boost the clarity of the received information.

LYNDON JUDEN-KELLY: RV accuracy has been found to be significantly deviated from chance expectations during application of weak complex electromagnetic fields administered via SAM-360 technologies, namely; after 5 minutes of a primer field (Lindagen) condition, and after 15 minutes of Burst-X exposure.

While intensity is accounted, the pattern with regard to magnetic field technology, order of field presentation and duration of condition seem to play a crucial role in the effectiveness of the field. The application of a priming field (Lindagen) before decelerating (Thomas) and accelerating (Burst-X) fields elicit significant results in Human-Random Event Generated (REG) interactions; these results are different than Field-REG interaction, and REG interaction on its own.

Remote mental interactions may involve collective levels of consciousness. These collective levels may be necessary to elicit such effects, as human-REG interaction have been found to be correlated with the components (X, Y, Z) of the Earth's electromagnetic field, before, during, and after intention. Low level frequency could act as a physical correlate for testing the hypothesis.

JOSEPH CASWELL: We recently published an experiment which demonstrated that transcerebral application of a specific physiologically-patterned electromagnetic field enhanced or increased the capacity for participants to engage in mind-matter interaction with a REG device. If this phenomenon occurs through processes similar to remote viewing, then this would certainly provide further support to this statement.

- Caswell, J. M., Collins, M. W. G., Vares, D. A. E., Juden-Kelly, L. M., & Persinger, M. A. (2013). Gravitational and experimental electromagnetic contributions to cerebral effects upon deviations from random number variations generated by electron tunneling. *International Letters of Chemistry, Physics and Astronomy*, 11, 72-85.

DR. MICHAEL A. PERSINGER:

The Technology

The application of a specific sequence (“batch file”) of circularly generated magnetic fields with changing angular velocities within the horizontal plane around Ingo Swann’s head during his first visit to our laboratory significantly enhanced and “reactivated” his capacity for remote viewing (RV) according to his own reports. We completed this process by applying the next stage in the Complex software and related technology developed by Professor Stan Koren whose genius and insights initiated a new era of devices for experimentally linking cognition and subtle electromagnetic fields. The device became known as the “Octopus” because it was an array of 8 pairs of solenoids; each pair was contained within a small plastic (film) container. The 8 containers were equally spaced (45 degrees) around the (head) plane just above the ears.

The containers were adhered in position by a Velcro band. The pairs of solenoids (actually they are reed relays) were activated in sequence. This means the device produced repeated circumcerebral magnetic fields. Software programming allowed the duration of the complex fields that were applied to pairs of solenoids to be varied. In addition, we added a second derivative, the rate of rate of change, by adding an additional operation that allowed discrete intervals to be either added or subtracted to the durations of the field as it moved from one pair of solenoids to the next. For example the programming 20+2 indicated that the first solenoid (which was over the left prefrontal region) was 20 ms but by the time this field with an accelerating angular velocity reached the 8th solenoid pair (right prefrontal region) the duration of the field was 6 ms. Then the cycle was repeated so that the next duration (the first solenoid pair) was 20 ms. The coherent movements of these succinct temporal packets of magnetic energy were considered analogous to “group” velocities.

We had found that counterclockwise rotation (as viewed from the top of the person’s head) was most effective. We had tested the clockwise vs counterclockwise hypothesis because we had modeled consciousness as electromagnetic-gravity fields of interference patterns. A counterclockwise circularly rotating magnetic field would be moving against the repeatedly (cursively) produced natural, rostral-caudal direction fields over the right hemisphere only. These recursive, global neuroelectromagnetic fields occur in waves every approximately 20 to 25 ms with phase modulations in the order of 10 ms.

The vectorial characteristics of magnetic fields generated by the Octopus are different than those produced by the more well known Koren Helmet or “God Helmet” as it is often called within the popular literature. The Koren Helmet involves different circuits where each of the four pairs of solenoids embedded in the helmet on the left and right side (level of the temporal lobes) are functionally connected like a “horseshoe” magnet. Hence when one pair is activated the flux lines penetrate the intermediate space (containing the brain). There are four pairs of these solenoids. A commutator rotates each activated left-right pair at any given time; usual rotation times are 2 s to 20 s. The penetrability of these fields through the brain have been shown experimentally (Persinger and Saroka, 2013).

On the other hand the Octopus (circumcerebral fields) is designed such that each pair of solenoids (in a container) is interconnected. Their activation produces a local magnetic field. This local magnetic field then moves around the head (counterclockwise) at rates of change programmed by the software. The field strengths for the Octopus near the skull are in the order of 1 to 5 microTesla. Whereas the Koren Helmet is frequently associated with the experiences of a sensed presence and out of body experience, experiences within the Octopus are more typical of RV. In addition to subjective time distortion the most typical experiences of people sitting blind folded in the dark within the chamber were either unimpressive or involved bits of apparently “unrelated” information. Later we realized this “unrelated” information often reflected events at substantial distances or suggested a marked expansion of the specious present.

For both the Octopus and Koren Helmet designs the information contained within the “group velocities” were the physiologically-patterned fields. The two most frequent patterns we have employed were the decelerating frequency modulated pattern (the Thomas pulse) and an accelerating frequency modulated pattern (the Burst pattern). They were generated by converting a series of 256 numbers (below 127= negative polarity; above 127=positive polarity) to between -5 and +5 V. These values are then applied through the solenoids to generate the magnetic field patterns.

Each pattern was generated by the serial presentation of an integer value between 0 and 257. The duration each number was present and hence each voltage (and magnetic field intensity) was generated, called the point duration, was programmable as well. We primarily employed 1 ms or 3 ms because they were most effective compared to 2 ms, or greater than 3 ms. For our most effective studies the IBM 286 was the source computer. For more advanced computers software was required to ensure that 1 ms was indeed 1 ms. In addition DOS-based software alone rather than WINDOWS-based systems were always more effective.

Swann Studies

Some of the remarkable examples of RV exhibited by the equally remarkable Mr. Swann were published earlier (Persinger et al, 2002). The most compelling neuroquantitative results were the moderate strength correlations between the duration per trial of an unusual ~7-Hz spiking over Mr. Swann’s right temporooccipital region and the quantitative degree of accuracy for his drawing and statements about that target stimulus. The two distant structures (that had been randomly selected from a pool of targets) were drawn so accurately by Mr. Swan that when the series of pictures and comments were shown to naïve first year psychology classes students who lived in the locality they quickly identified the structures (one was the Science North Building; the other was a grade school). In fact one student, a few years after Swann’s visit, saw the drawings of the grade school (she had attended the

school) and explained that the “circle-eight” in Figure 2 of the Persinger et al (2002, p. 937) publication was the actual pattern of how people walked through the structure of the hallways.

The paradigm preferred by Mr. Swann was for him to visit a space containing a table within about 10 m (in another room) from where he would be sitting in an acoustic chamber, look at the space (without touching the table) and then return to the chamber. Another experimenter would then place an 8 x 11 envelope containing a randomly selected picture onto the table surface (nothing else on the table). After a brief period he would then begin to draw his “perceptions” or write brief phrases about the stimulus. From the suggestion of Dr. Bill Roll the pictures that were selected by a third person emphasized emotions, color, implied spatial movement, and novelty. Effectively, the emphasis was on right cerebral hemispheric processing.

In some instances Mr. Swann would request three or four pictures in a trial to be placed in tandem order, once he had “finished” the previous one, on the same table in the same space. There was always only the single envelope containing the picture on the table at any given time. Once he had completed the series (session) he would always walk to the table area where someone removed each picture from its envelope. Mr. Swann would then compare his drawings and comments for the target with the actual target. This was a classic reinforcement paradigm. Mr. Swann also mentioned that when he was learning this procedure he and Dr. Puthoff and Dr. Targ learned that RV was acquired more effectively if he stopped at the peak of accuracy rather than repeating trials until he failed.

Post-Swann Experiments

Over the subsequent decade after Swann’s visit we exposed four people to the Swann procedure while these or similar patterns and point durations of circumcerebral magnetic fields were applied. Based upon Swann’s performance and some theoretical considerations, the “conspsi” (consciousness-psi) batch file contained the following 6 separate presentations (377 repetitions each) of the Thomas pattern (frequency modulated pattern) with point durations of 1 ms and inter-stimulus durations of 1 ms. This is equivalent to about 5 min per pattern. Between each presentation there were 100 repetitions of the blankx.dac file, that is, no programmed pattern (no field). The six field duration and derivative values from the beginning to the end of the session were: 200-20, 200+20, 100-10, 100+10, 20-2, and 20+2 ms, respectively. The negative value for the second number indicates that this interval (in ms) was added to the base durations for successive activations of the solenoids. The positive value indicates this duration was decreased from the base duration.

Approximately 100 different photographs were employed as stimuli. Different pictures (usually from magazines) with the appropriate themes were placed in the same manner on the same table that was employed for the Swann studies. We investigated several approaches. For example, while the person was sitting the chamber and the six different, approximately 5 min sequences were presented, six different pictures would be placed singly for 5 min each on the table. We found that the contents of one picture would often occur in subsequent drawings of experiences for later pictures. What was difficult to rationalize, at the time, was that the components of content from pictures that would occur in the last part of a sequence or session could also appear in the drawings for the pictures in the first part of the sequences.

Because of this “blending” effect and because we were attempting to isolate the appropriate “circumcerebral pattern” that produced the greatest accuracy (“tuning”) for the space containing the picture, we also investigated paradigms where only one picture hidden in the envelope remained on the table while the six different patterns were generated while the person was recording images or words. The goal was to discern which pattern was associated with the greatest accuracy.

The rating procedure for the four or five different pictures and the corresponding page/s of drawings and words for each picture was similar to other RV studies. We employed one of two raters who were familiar with the process of what constituted the content of RV which is effectively the “emotional theme” or “general gestalt” of the target picture.

General Results

One should remember that our goal was to isolate the optimal magnetic field parameters and procedures that would generate the most accurate congruence between the target pictures and the drawings/comments. Although people like Ingo Swann display these effects (with or without the applied circumcerebral magnetic fields) we thought that the capacity to induce these effects in “the average” person and to experimentally manipulate the intensity of the accuracy or the patterns of the congruent experiences would be demonstrable of the physical substrate of the process. This is a classic scientific methodology. If one were trying to understand the bases to the brain activities associated with great art, rather than studying the brain of the artist, one would optimally test average people to whom one would apply treatments, preferably reversible, to produce a very similar effect. Our general findings were the following:

- 1) For all four individuals that were involved with this study, the accuracy of the drawings of the hidden pictures increased over weeks. Because the exposures were only once per week (a value purposely selected based upon the efficacy of treatment in our clinical studies), this often involved 15 to 20 weeks. From this large-time perspective improvement was obvious. For example, Figures 1 through 3 show the targets (a) and the drawn (usually in pencil or pen) responses (b) during the RV process for early trials. Figures 4 through 6 show the improvement of percept and the additional inclusion of associative and affective dimensions during the RV process after several weeks of procedures.
- 2) Within the “conspsi” pattern the most frequently congruent stimulus-response pairs occurred for the 20+2 ms and 20-2 ms sequences. There were interesting RV phenomena during some of the other sequences but their effectiveness was more variable. Interesting it was not just the 20+2 ms per se that were critical. When we ran the conspsi in reverse, i.e., the 20+2 ms was first in the sequence, the general effect sizes were less large but still very significant statistically. This suggests that the temporal cascade was important.
- 3) Similar to what was reported by others, the drawing and words that were most congruent with the target stimuli were often associative, emotional, contained motion, and were distorted as if magnified or de-magnified components were sampled by the RV process. Colorful pictures were particularly effective.
- 4) Almost all drawings and words contained “intrusive” components that were not necessarily random but, at least upon retrospect, were associated with the person’s idiosyncratic association with the stimulus. Ingo Swann called this “analytical overlay”.

- 5) Despite our best attempts to isolate environmental variables, even the geomagnetic component, there were some days when RV detail even with optimal conditions, were less clear.
- 6) The accuracy of the RV could be blocked if the target stimulus on the table was exposed to the same frequency-modulated field that was contained within the circumcerebral field pattern if it was generated from WINDOWS or Microsoft, that is non DOS, technology. When we completed spectral analyses for the patterns generated by DOS or through WINDOWS, there was a significant difference. DOS generated the pure and exact pattern of the magnetic field. When this field was generated through WINDOWS, presumably because of the background operations, there were magnetic field signatures smeared across the entire range of frequency domains. The specific pattern was “lost in the noise”.



Figure 1a. Example of a target stimulus during early phases of the experiments.

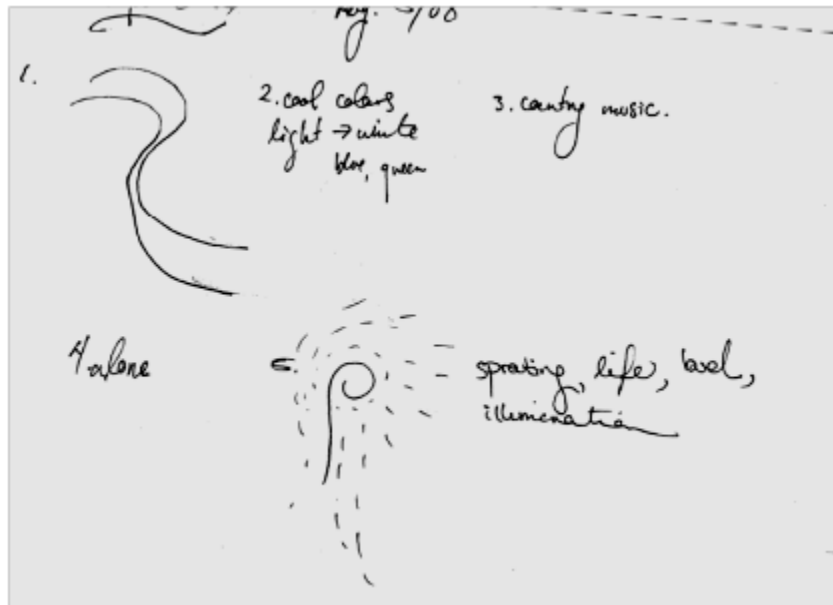


Figure 1b. The RV response to Figure 1a. The comments include “alone, cool colors, light-white, blue, green; country music, and for the spiraling component “sprouting, life, illumination”.



Figure 3a. Target stimulus, emotional face.

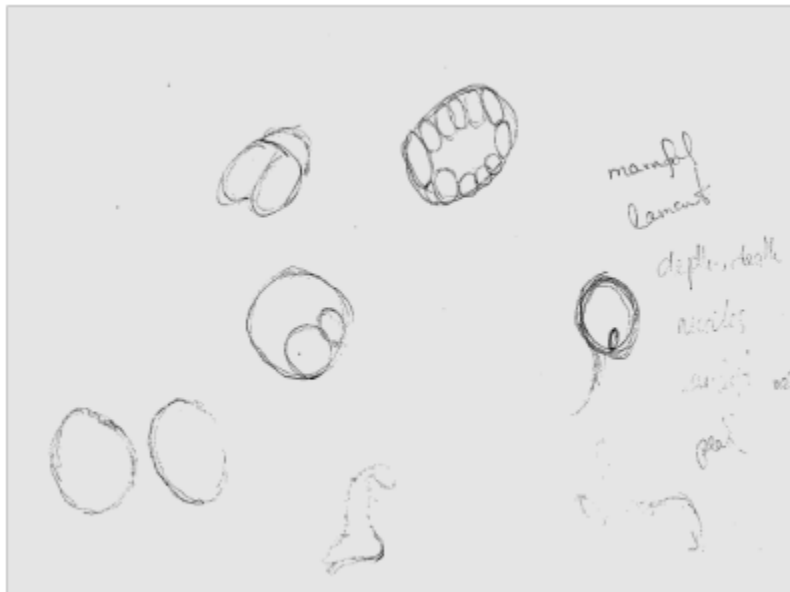


Figure 3b. A series of circles and oval shapes within the circles. The words are “meaningful, lament, depth, death, needles, peak”.



Figure 4a. Target picture: an unusual and particularly emotional representation.

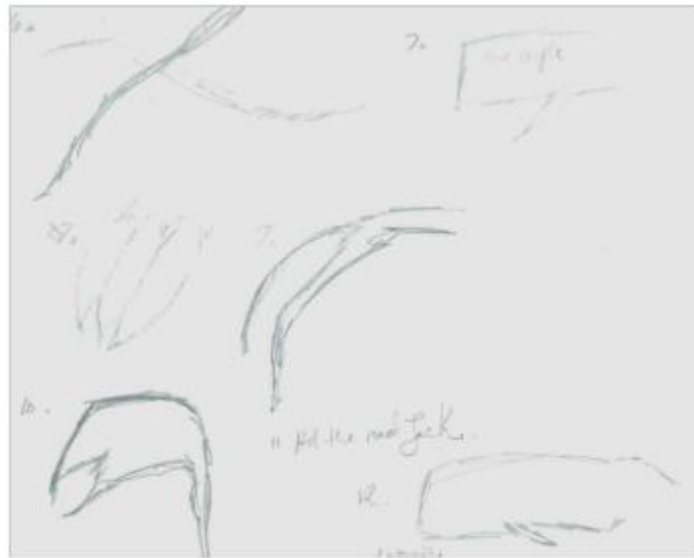


Figure 4b. Light RV drawing (light pencil). Upper left hand corner: sperm; several general shapes: bent; lower right was identified as a sperm whale.



Figure 5a. Target stimulus: burning ship.

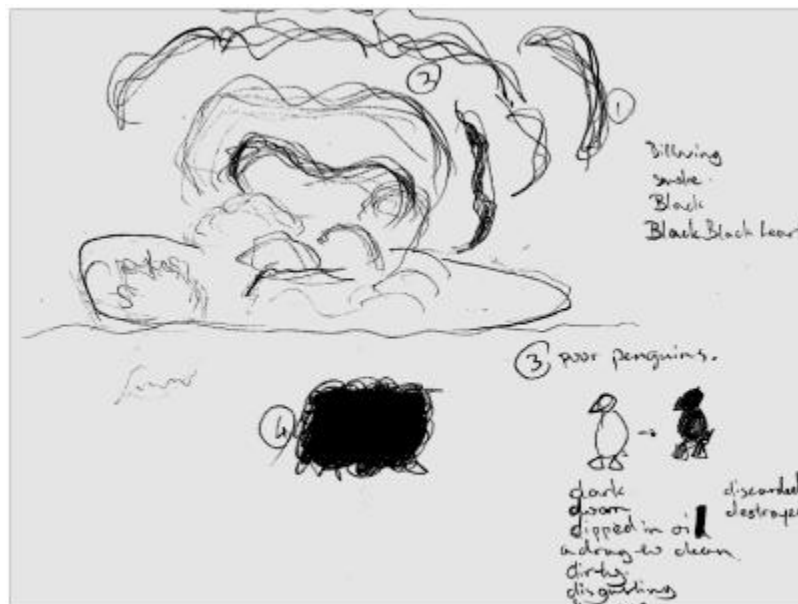


Figure 5b. Organization very proximal to the perceptual outline (burning ship). The bird-shapes in the lower right say “poor penguins”. Words are billowing, black, black black heart, dark, doom, dipped in oil, disgusting, discarded.



Figure 6a Stimulus picture



Figure 6b. Percept is apparent with various degrees of formulation. Words include circular, squishing, goose pumps, stick, snails.

Why Did We Stop This Variant of RV?

Considering the apparent success of repeated exposures to the circumcerebral magnetic fields for enhancing at least this version of RV, why did we stop? First, the process is very labor intense and requires commitment from experimenters and participants. Second, it became obvious that there was content within the RV experiences about pictures that in all likelihood captured other aspects of the actual events. In the few cases where we had the opportunity to discern more about the event captured by the

photograph we learned that some of the details in the RV pictures and words had occurred during the event but were not revealed in the photograph. This indicated there would always be some degree of uncertainty for accuracy ratings and scoring because most of the pictures were from magazines obtained by other individuals who selected them and for which the historical or story-context was not known to us.

The third feature was the easy access to quantitative electroencephalographic (QEEG) measurements. By the end of 2008 we began employing QEEG. This allowed spectral analyses and other analytical techniques to be employed to measure changes in the person's brain activity while they were engaging in drawing or writing the words in response to the stimulus. We appreciated, as we suspected Puthoff and Targ realized, that despite the conspicuous nature of our results and their implications, the resistance by most members of the contemporary scientific community to this phenomenon (because of the growing conceptual conservatism) would be significant. After all despite Robert Jahn's definitive publication of powerful kinetic effects in the prestigious *Encyclopedia of Neuroscience* (and their demonstrations over decades the phenomena) edited by George Adelman (1987) the effect was largely ignored.

Although from many perspectives a relatively illogical motive, we opted to use the simplest of stimulus response procedures that were elementary, could be manipulated for "intensity" or "frequency" dependence and could be quantified employing a piece of equipment (rather than human rating). Our first experiment where this approach was implemented involved flashing different light frequencies to one person who was wearing the circumcerebral field devices and watching the change in topological frequency patterns in the second person some distance away who was also wearing a circumcerebral device. As usual, the field parameters were set by computer software operating the Complex software where the point durations were 3 ms or 1 ms. Measuring cerebral photons, s-LORETA (low resolution electromagnetic tomography) as it became available, and complex QEEG processes for this paradigm were logical extensions.

We also appreciated that the emphasis upon photon patterns and intensities generated from the brain during "RV" studies had the potential to simulate the conditions but avoid the limitations of the cognitive imagery that was dependent upon the person's ability to draw or describe. Because many people, and appropriately so, question the full extent of the veridicality of verbal behavior, photon emission profiles appear to be minimally affected. I indicate appear, because the degree to which photon emission profiles could be subject to the same complexity as cognitive behavior and subjective imaging must still be investigated.

What does occur when photon profiles are measured instead of reported images is the potential for exploring different quantum mechanisms. When photons become involved with any process then, theoretically at least, the extent of the universe and expansiveness of time become less of an impedance. This becomes evident when perhaps one of the least explored congruencies is realized. The time required for a photon with a velocity of c to move through a plasma cell membrane with a width of 10^{-8} m is about 10^{-16} s. This value is within error measurement of the time for an electron to complete one Bohr orbit. Hence the interaction between matter within the plasma cell membrane and the information from exogenous photons or the coding of photons moving through the membrane by the information within the neuronal membrane as they expand into space-time become high probability events.

Recent Developments

The RV effect, as shown by the Stanford Research Institute Group many years ago, is so robust (as Mandy Scott's recent research has shown; Scott and Persinger, 2013a, b) in its natural form that augmentation by the appropriately applied magnetic fields is relatively easy. In fact we know encourage the interested undergraduate student to design experiments to test the phenomena. Most recently, one of the bright stars of the laboratory, Trevor Carniello, who had published a major paper concerning Minkowskian space as an undergraduate, demonstrated that specific patterns of fields could enhance the accuracy of the remote viewing. He employed a repeated measures experimental design. In the latter the each person receives each of the three different fields at different times but in random orders during the RV process.

Field exposures consisted of a sham condition, a Harribance field and a Fibonacci field. All fields were generated from a modified Arduino-DAC (digital-to-analogue converter) configuration coupled to a toroid built to fit over the cerebrum of most humans. The toroid (effectively a circular ring of iron wrapped with a single layer of wire) sat on the head like a crown at approximately the level of the temporal lobes. We had selected this geometry because late 19th, early 20th century scientists had found that under certain conditions people who wore "iron crowns" or rings that had been worn previously by others displayed evidence of "acquiring information" from those previous people. This "information" could be eliminated by heating the iron ring. All fields were applied for a minimum of 15 minutes. Measures of the intensity of each field ranged from 1 to 3 microTesla. Testing occurred over a three week period.

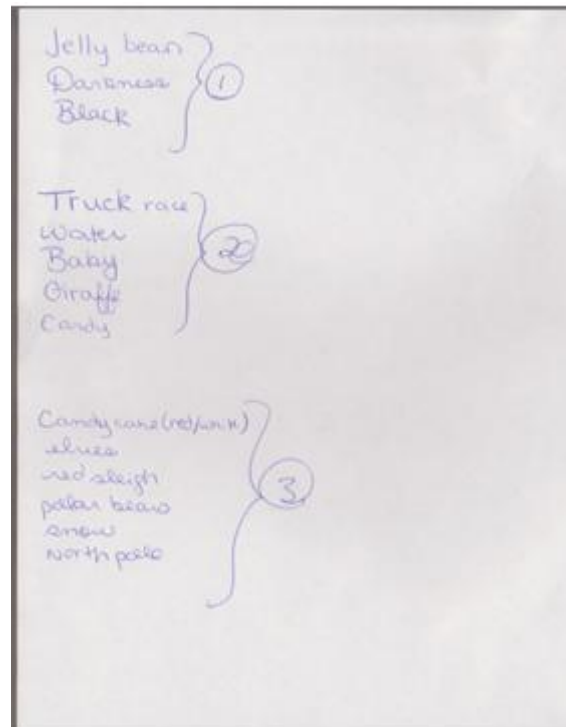
The Harribance field was derived from the activity measured over Sean Harribance's right parahippocampal gyrus, the area most associated with his unique abilities. The Fibonacci field was created based on the Fibonacci sequence (1,1,2,3,5,8,13 and 21) which was employed to produce a series of three millisecond points of 0s and 1s where 0 was equal to 0 Volts running through the Arduino-DAC system, and a 1 which represented a 5 Volt output of the Arduino-DAC system. Similarly, point durations for the Harribance field were set to 3 milliseconds.

Accuracy on remote viewing tasks was assessed by 5 judges, which ranked the content of the written or drawn document on a scale of 1 to 4. Judging was conducted in a manner that compared three non-target photos and the actual target to the written account of the participant generated in the remote viewing exercise. A score of 4 was indicative of a transcription that was not at all like the target picture and a score of 1 represented the most accurate description of the target picture. The mean across the five judges were taken as measures of remote viewing accuracy. An example of the most accurate score is demonstrated below.

A multivariate analysis of variance was conducted for remote viewing scores for each field condition by sex. There was no main effect of field condition on remote viewing scores, however there was a significant field by sex effect [$F(2,10) = 6.85, p < .05, \eta^2 = 0.58$]. The effect was primarily due to the more accurate scores for females that were exposed to the Harribance field compared to both sham and Fibonacci fields. Males did not show significant differences across field conditions. The effects were very conspicuous and suggest that different patterns of fields and geometries may be optimal for different genders as well as personality profiles. This will be explored over the next decade by those who are interested.

Example of a hit:

Transcript of description: Jelly bean; Darkness; Truck race; Water; Baby; Giraffe; Candy cane; (red/white); Elves; Red sleigh; Polar bears; Snow; North pole



Mean Accuracy Score=1.0



Figure 7b: Target image

Figure 7. Top: the words during RV that were experienced as “impressions” for the target picture (the bear) that was placed about 50 m away.

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Question 24. Remote/collective metabolism

In Bigu state (Sidorov et al, 2013), what could be the source of the metabolic energy? Is there a trivial explanation? Could one imagine coherent metabolism in the scale of population or even biosphere?

Question 25 . Is there a nonlocal, non-metabolic source for biophotons?

Persinger and others report a correlation between fluctuations of EEG and of biophotons. EEG wavelengths are in the order of Earth's size. What could these correlations mean? Further tests? Are biophotons the outcome of standard chemistry or something new? Are biophotons the essence of nonlocal signaling or a byproduct of something more fundamental?

JOSEPH CASWELL: Again, there is no need for an either-or division or explanation when both aspects are perfectly compatible. Correlations between EEG and BPE are likely a result of increased activity associated with specific neurocognitive processes. However, this does not imply that BPE does not *also* occur with more fundamental cellular processes such as reactive-oxygen species. Photons have been associated with a wide range of phenomena linked with consciousness including non-local effects and correlations with cognition and EEG, but they still may occur in association with general cellular metabolism, which *itself* is *also* likely linked with specific cognitions and non-local effects.

CONCLUSION

Is the demonstration of remote EEG correlations evidence that our brains are a critical interface in the reception of nonlocal information? Much of the parapsychology literature appears to suggest just that – along the argument that the brain acts as an antenna for what is ultimately the unbound, immaterial Mind. However, the presence of similar nonlocal correlations in living structures far below this level of

complexity hints that this primary interface may be something other than the brain – which at best could act as a translator between our subconscious and the conscious mind. That conclusion would in effect shift the research momentum from its current focus on brain states to a focus on a more universal feature of macroentanglement and mind-matter interactions. Based on the data reviewed so far, there seems to be one obvious candidate for such universal entanglement signatures - and that is a change in photon emissions at the target. Most mind-matter experiments exploring photon signatures have involved human operators and living targets. But should such correlations prove applicable to all psi interactions, including inanimate targets, then we will need to rethink our understanding of biophotons and their role in human physiology: far from being a mere waste product of metabolism, endogenous biophoton fields may provide the deepest (to date) organizational blueprint of an organism and the link between consciousness and matter. If remote energy and information transactions can be mediated by topological operations (as in TGD), leaving a photon fingerprint at the target, then what is probably needed is a spectroscopy of mind-matter effects and a deeper understanding of how the body *as a whole* can be remodeled into a more efficient transducer. To enter that stage, the emerging field of quantum biology may need to pay closer attention to mind-body interactions, including the effects of long-term meditation.

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