

The Mind in Time:
a Round Table Discussion on Causality, Physics and Parapsychology

As the ideas of quantum mechanics, relativity and parapsychology slowly make their way into our collective consciousness, our common-sense views on time and causality find themselves more strained than they've ever been in the course of human history. Will this challenge remain the domain of theoretical science, or can we foresee a day in which the general understanding, and even the experience of the average individual, will be shaped by this new perspective on reality?

To answer this question, we have invited several physicists to share their opinions on the evolving definition of causality in the context of conscious observation and its implications for quantum mechanics and parapsychology. **Matti Pitkanen** is a member of our editorial board and a previous participant in this interview series (see www.emergentmind.org/interviewMP_AK.htm). **Fred Alan Wolf** received his Ph.D. in theoretical physics from UCLA in 1963. A well-known scientist, writer and lecturer, he is author of 10 books including the National Book Award-winning "Taking the Quantum Leap". He has taught at the University of London, the University of Paris, the Hahn-Meitner Institute for Nuclear Physics in Berlin, The Hebrew University of Jerusalem, and San Diego State University in the United States and has appeared on The Discovery Channel's The Know Zone and on many radio talk shows and television shows across the United States and abroad. **Douglas Matzke** received his PhD in quantum computing from the University of Texas at Dallas in 2002 and was chairman of the PhysComp92 and PhysComp94 Conferences. He has a long-standing interest in the limits of computation and transpersonal consciousness, has taught classes on quantum information and psychology and is the author of nine patents and over thirty scientific papers (see www.matzkefamily.net/doug/). As of June 2003, we are very pleased to welcome him on the JNLRMI editorial board.

Lian Sidorov

Q1. It would seem that the most difficult conceptual challenges in both physics and parapsychology today ultimately point to the notion of causality - hence time. Do you think we have improperly defined either of these two terms - is common

experience artificially creating a natural logic that is at odds with physical reality? How so?

Doug Matzke: According to Einstein, space and time are linked, so any theory of time must also entail some theory of space. Quantum objects (qubits, ebits, etc) are defined by the mathematical nature of the spaces created using independent high-dimensional axes (very many orthonormal bases). It is the very nature of these high-dimensional spaces that gives quantum objects the properties (superposition and entanglement) that 3D classical objects do not possess. These properties allow quantum systems to enjoy computational/informational advantages over classical systems (Shor's algorithm, Grover's algorithm, quantum cryptography, quantum teleportation). The universe is a large quantum simulation producing the classical 4D worldview we interact with macroscopically. It is impossible for the reverse to be true. These quantum information underpinnings must have existed in a protophysical manner before the "big bang" cooled to produce classical matter/energy interacting in 4D spacetime, thereby suggesting the more provocative term of "bit bang". Bits are so fundamental to physics that black holes are nothing but bit buckets. Throwing a bit into a black hole increases its surface area by the minimum amount (about Planck's area) otherwise the 2nd law of thermodynamics would be violated. Therefore it is now understandable that "information is physical" and not just a mathematical metric. A bit has a very, very small effective mass just like energy does.

Based on the above most modern and accepted understanding of the relationship of quantum information and the universe's organization, it is clear that some protophysical informational mechanism underlies the known universe. My primary perspective is that consciousness evolved because biology naturally taps into these ubiquitous information mechanisms at all levels. This is consistent with the thinking that everything contains quantum information, everything is conscious and everything has chi. This approach would have survival advantage because quantum search is faster than classical search. Also, since information is physical, organized states could have an effective energy due to their information content and could affect the physical world.

So everything in the universe is due to a protophysical information substrate, including quantum objects and most likely consciousness (appeal to Ockham's razor requiring only one such ubiquitous informational mechanism). This information substrate is protophysical, since it is the essence of the "bit bang", "bit buckets" and zero-point energy. My goal since early 1990s has been to understand why quantum information systems are fundamentally different than classical computation or communications systems. The key to this understanding is that quantum space and quantum time are "outside the box" defined by classical 4D spacetime and essentially creates that 4D box. This naturally leads out of causality and even relativistic time. The very high-dimensional quantum spaces form a quantum foam that fills even the emptiness of outer space (zero point energy).

This protophysical mechanism can bootstrap itself using the informational mechanism of distinction, where each distinction is a new unique dimension that converts from non-existence (the value of 0) to containing the state value of either +1 or -1. Qubits are formed using nothing more than two distinctions/dimensions (see my PhD dissertation from May 2002 that uses geometric algebra). Qubit rules can be derived directly out of the non-commutative combination of two state vectors. At this level, classical time does not yet exist so all states are ideally concurrent. This concurrency can be expressed mathematically as the sum of the orthonormal state vectors, so the + operator means concurrent, (which is the same exact convention used in Hilbert space bracket notation).

The precursor of time is change and these non-classical states can change using quantum-like operators. Thus, the seeds of classical spacetime can occur from purely non-classical informational roots.

Quantum state vectors are the precursor to qubits, and not the other way around. Large collections of tiny distinction dimensions can create topological structures (knot theory) and form high level information structures. This can occur using mathematical rules for quantum entanglement. This kind of information structure forming process would create topological structures that are somewhat akin to “rotes” as described by OBErs and remote viewers. Rotes also resemble IP packets of the Internet, since they carry structured information, but do not rely on physical encoding of information using energy or matter. The more distinctions included in the rote packets, the larger they become and the more information they contain. In general, the more dimensions a computation process uses the “smarter” it is (per step) since the locality metric is larger. For example, Shor’s algorithm can factor very larger numbers by computing everything in one step. Classical versions of Shor’s algorithm are restricted by the locality metric, thus requiring so many execution steps that the computation extends past the age of the universe. In contrast, a large collection of purely random distinctions forms a black hole.

Another approach to organizing groups of distinctions also produces topological structures. It is possible to form a larger space by concatenating the distinctions as addresses (as in a qubit). An important step towards determinacy is to understand how implicit quantum randomness can lead to stability of any kind. This is possible due to a little known mathematical field called “probabilistic geometry” plus the information metric used by correlithm theory (see www.LT.com). The idea is simple. First, randomly pick two points in a N-dimensional binary state space. Next, compute how far apart they are using the Cartesian distance formula (same one used by relativity and for unitarity constraint in quantum mechanics). Most likely, you would expect the answer to be something random! It turns out, the distance result is approximately $\sqrt{N/2}$ (or $=10*\sqrt{2}$ for $N=100$). This is true for any two pairs of random points and the standard deviation is a constant of .35. All randomly chosen points are at this standard distance, thereby naturally defining a high dimensional tetrahedron or N-equihedron (not a hypercube nor hypersphere). This N-equihedron may be the mathematical structure beneath the merkaba energy form.

These random points can be used as “soft tokens” for computing since they are intrinsically unique even if some noise is injected. Using this distance metric, it is highly unlikely that two random points will be closer than standard distance, so when two points are forced close together this represents a way to encode information using probabilistic geometry. A set of points that are less than standard distance form a topological structure that again has the characteristics of a rote. Each of these soft tokens can also be treated as normalized vectors, and they can be shown to have a standard angle of 90 degrees (plus a standard deviation) and can be normalized by a standard radius, as a kind of unitarity constraint. This means soft tokens can be used as a generalization of orthonormal basis vectors exactly like quantum state basis vectors in quantum computing, which includes superposition, entanglement, etc.

As N become very large, the *normalized* standard distance approaches the constant of $\sqrt{2}$ and the normalized standard deviation of all these metrics approach 0. These properties robustly occur in any kind of space but only when $N > 20$. In our work, we have shown that these metrics are applicable to randomly generated neural statistics and also when encoding information in a quantum Hilbert space. The brain could provide random but repeatable patterns that uniquely interact with the quantum state spaces. When the same quantum soft token is measured in multiple trials, the answers define points in a binary space that are closer than standard distance, thereby showing that quantum soft tokens survive the quantum measurement process. Additionally, using soft tokens, quantum measurement can be thought of as a noise injection process. The quantum mind could manipulate the statistical processes into the brain thereby allowing amplification of quantum probabilities to form a noise injection based mindbrain link. Early experiments should try to detect quantum noise injection by mental intent.

I believe these soft tokens can be structured to form non-physical, abstract topology rotes, which could be used to represent meaning. Perhaps, this non-local topology would form an interdimensional encyclopedia of meaning (i.e. Akashic Records) that any one could tap for personal growth, remote viewing, NDEs, astral projection and etc. Rotes could also form the universal encoding underpinnings for direct knowing and telepathy. Essentially, the mind is a non-physical information system (perhaps quantum-like) and a mathematical theory of non-physical rotes may be useful to correctly predict experimental RV and PK results.

Therefore, it is essential to start with no-time or quantum time using a pure informational perspective. "Become like the light" is literally a command to switch to a timeless perspective (infinite time dilation means ideal concurrency). Quantum polynomial-time algorithms give us the big clue on the physics side. The zone of sports, gives us the same perspective of exiting classical time from the subjective experience. The higher self is in the "timeless" now. Our culture has a hard time comprehending these temporal abstractions since our thinking and society is spatially dominated.

M. Pitkanen: My answer to this question is probably highly predictable from what I have been saying for few years! There are two times and two causalities and the failure to realize this has led the standard view in which one tries to believe that there is only single time and single causality; is forced to throw away free will and intentionality; accept that time is simultaneously irreversible and reversible and that future exists and does not exist simultaneously. The view inspired by canonically quantized general relativity is that there is no time at all since basic object of dynamics is 3-geometry. Unless one is ready to deny the subjective experience of time flow this statement must be phrased to read "there is no geometric time but there is subjective time". The lack of geometric time however leads to grave difficulties since special relativity, the notions of energy, etc.. rely on the existence of geometric time. If one replaces 3-geometry as fundamental physical entity with 3-surface in the 8-dimensional imbedding space of TGD, one has both geometric and subjective time. Thus the one gets from Barbour to TGD by replacing 3-geometry with 3-surface.

The basic objection against quantum models of free will is that they cannot explain precisely targeted intention. They predict only probability distribution for the outcomes of quantum jumps and this means randomness. In TGD intentions are represented at spacetime level as p-adic spacetime sheets and the transformation of intention to action as a quantum jump in which p-adic space-time sheet transforms to a real one is TGD based approach to intentionality. This does not yet explain the precise targeting of intention. If system generates p-adic ME transformed to positive energy ME it ends up to a state of lower energy and having momentum opposite to that of ME. There are however a large number of spontaneously occurring transitions which would mask the effect of the intentional transition.

Second key element needed is the possibility of negative energy spacetime sheets (spacetime is 4-D surface in imbedding space), in particular negative energy MEs. The generation of p-adic ME which transforms to negative energy ME in intention-to-action quantum jump gives for a system involved positive energy and also a definite momentum as a recoil effect. Transitions to higher energy states do not occur spontaneously so that there is no background masking the intended transition. Thus precisely targeted intention is doing something which does NOT occur at all spontaneously (and is impossible in standard quantum physics)!

A further objection against quantum theories of consciousness is that quantum jumps are random phenomena so that intentionality cannot be really understood. Intuitively intentionality corresponds to local randomness superposed with long term determinism due to the conscious planning. p-Adic fractal statistics realizes this intuition mathematically. The point is that rational spacetime points which are very near to each other p-adically are very far from each other in real sense and vice versa. What is small p-adically is large in real sense and vice versa. Therefore p-adic continuity for a p-adic spacetime sheet implies local chaos and long range correlations for the real spacetime sheet resulting from it in intention-to-action quantum jump.

Statistically intentionality differs from randomness in the following manner. If one measures the state of the system N times during time interval T at evenly spaced time intervals, randomness would predict that the frequencies for different outcomes converge to probabilities as N grows. For p-adic fractal statistics this does not occur and real probability concept fails, much like the attempt to measure the length of fractal coast of Britain fails. In p-adic case however the frequencies for N and $N + kp^n$, n large enough number are near to each other. One can perform this intentionality test for any system, be it molecule or magnetosphere, and determine the value of p and resolution dependence of the statistics is the signature of intentionality.

Fred Alan Wolf: The problem arises when we attempt to conceptualize time. We can only do this through metaphor and the metaphors aren't really capable of encompassing time itself. Hence we do improperly define time. Here is the crux: what we experience and how we order our experiences are not interchangeable-one doesn't map onto the other except approximately. We see this approximation in terms of causality and synchronicity-two broad categories that each attempt to provide logical but inconsistent description to experience. In the causality camp we have the usual logical western point of view of one thing-event-2-happening after another-event-1-because of the first thing-

event-1-that happens. In the synchronicity camp the order of the events becomes immaterial and often we see event-2 determining event-1 even if the events occur simultaneously or for that matter in any time order. Logic is a subject-predicate construction of mind, hence we will order or attempt to order the events as consistent either way.

Q2. What do you think is the relation between our consensus notion of time and the reality in which RV information exists? Does information "flow" back from a future event as in retro-pk and precognition, or is it already "out there", as Joe McMoneagle suggests, in "no time"? What is the meaning of action, of separation between events, if all information about all events is already available? Do we construct spacetime as a function of intersecting perspectives?

M. Pitkanen: If quantum jump is the the "elementary particle of consciousness", it is not possible to locate consciousness in spacetime but is in the nowhere between two different quantum realities which in turn are quantum superpositions of classical realities (spacetime surfaces). Conscious information can however be said to be **about** a particular region of spacetime, spacetime sheet. This spacetime sheet changes its shape and size in every quantum jump (10^{39} quantum jumps per second), and if mindlike (having finite duration with respect to geometric time), it drifts towards geometric future. The belief that there is single objective reality so that information is already there would leave the conscious mind outside the classical universe or force to identify the conscious mind with it. That the conscious information is always in the change replacing reality with a new one conforms with the fact that we perceive only changes.

For instance, we perceive only spatial changes in illuminations at particular wavelength as color transformed to changes with respect to subjective time by saccadic motion of the eye. How to define information measures is however a highly nontrivial problem.

a) One could define information as gain of negentropy/ loss of entropy: this looks very natural definition as far as one considers conscious information.

b) We are also used to assign simple information measures to static objects such as computer files representing bit sequences. This suggests that Shannon entropy somehow fails to detect all that is relevant to information. Conscious information is certainly associated with cognition and in TGD framework cognition corresponds to p-adic physics. p-Adic entanglement entropy must be defined using number theoretical counterpart of Shannon entropy and the real surprise was that this entropy can be also negative so that cognitive entanglement can carry positive information. The interpretation is that the experience of understanding corresponds to p-adic entanglement with negative number theoretic entropy. One could generalize this notion also to real bound state entanglement with rational or algebraic entanglement coefficients.

Quantum classical correspondence suggests that spacetime surfaces to some degree represent various aspects of quantum and consciousness and that one can assign information measures to spacetime sheets. The non-determinism of TGD based classical

spacetime physics indeed allows even a (non-faithful) representation of quantum jump sequences as sequences of fully deterministic spacetime regions. If spacetime sheet contains N fully deterministic regions one can assign to it statistical ensembles by dividing this set of regions to equivalence classes by some criterion and assign to the i :th equivalence class containing N_i regions a rational valued probability as the ratio $p_i = N_i/N$.

If one accepts the new number theoretic information measures allowed by p-adic variant of the Shannon entropy, one can assign to any spacetime sheet a positive definite and unique information measure as that number theoretic entropy (Shannon entropy defines always non-positive information measure) which is maximum. Same applies to p-adic spacetime sheets. I believe that spacetime surfaces, imbedding space, and configuration space of 3-surfaces are real. I can never prove my belief since neither space-time surface, imbedding space, configuration space, nor configuration space spinor fields are conscious. The fact is however that if I want to construct a theory explaining what I experience I must assume all this ontology: without the notion of spacetime I would lose all basic concepts of physics.

Doug Matzke: From the perspective of quantum spacetime, there is an infinite locality metric and no time. Using this *panoramic* view above/outside time, any information can be addressed directly without memory (movement of information thru time) or communications (movement of information thru space) resources. This involves directly tapping into the probabilistic based topologies of specific non-physical states, which most likely has universal meaning. I personally know several telepathic pairs of people and have experienced direct knowing in connection with nature. This agrees with descriptions of expansion of self in mystical traditions.

Fred Alan Wolf : I think Joe McMoneagle has it right. The need now arises to deal with the "no-time" realm with full insight and power gained from the research being carried out in psychology including quantum physics and RV. Defining *meaning* itself has different meanings. For me, *meaning* has an almost Socratic flavor; it means a kind of funny feeling that arises within my bodily boundaries when events both appearing within those bodily boundaries and outside of them appear to be intimately connected-as if I had rediscovered them again after having learned about them in some ancient time.

Q3. Joe McMoneagle has described a phenomenon he refers to as "a snap in reality", where essentially a remote viewer engaged with a target about to undergo a violent transformation at a quantum level (such as nuclear fission) is unexpectedly forced into a different spacetime perspective which makes it impossible to witness the critical event itself (see McMoneagle interview in this issue). Since a number of these experiments have been done blindly, with the subject having no prior information about the target, and such identical, atypical experiences were reported, one is forced to wonder about a possible connection between spacetime, matter and consciousness at a quantum level. Do you believe that consciousness gives rise to spacetime as a result of observation, that consciousness is embedded at

the smallest level of material quanta, or is there another way in which you see these three representational aspects come together to form our reality?

Fred Alan Wolf : In “no-time” these events are not separate for “no-time” also means “no-space” and “no-matter”. Perhaps a bubbly cauldron of frothy spacetime matter at the Planck level is where we need to look.

M. Pitkanen: If remote viewing involves entanglement with the target remotely viewed and if everything is conscious, it would not be surprising if the catastrophic event in target could induce sudden change of perspective. Sharing of mental images is what remote quantum entanglement makes possible. In TGD universe every piece of spacetime contributes to the contents of conscious experience of some self so that also the target would somehow contribute to the contents of consciousness of some self. The changing perspective would correspond to a change of mental image about target. Consciousness does not give rise to spacetime as a fictive notion. By quantum-classical correspondence spacetime surfaces can be seen as symbolic and cognitive representations for quantum and consciousness. We experience universe as 3-dimensional because the points of the configuration space are 3-D surfaces and we are quantum superpositions of 3-D surfaces. The notion of primary cognition introduced by Steve Bacster on basis of his experimental findings is the counterpart of sharing of mental images: plants, cells, bacteria and even molecules react to our emotions and violence suffered by animals or plants. At the level of our consciousness this ability is almost lost since the evolution of more and more privatized consciousness accompanying evolution of cognitive abilities tends to reduce entanglement with environment. Remote viewers possess this ability.

Doug Matzke: I would fully expect this based on a quantum mind perspective. This perspective is compatible with PK using radioactive REG devices, early mortality of semiconductor devices around some people, perception of mechanically generated chi (using quantum processes), copper wall, occult chemistry phenomena and etc etc. Let's stop trying to prove it and embrace predicative theories to design useful next generation devices based on quantum noise injection principles.

Q4. In somewhat of a corollary to this question - is there any way, from a purely physics-theoretical point of view, that we can continue to hold onto the standard materialistic model - i.e. matter existing on an absolute background of space-time and giving rise to consciousness as an emergent property of increasingly complex living systems? If not - what are the major theoretical and experimental counter-arguments as far as you can list them?

Fred Alan Wolf : I find it hard to believe that even so-called “standard materialists” still exist. I feel more or less sure that even materialism has undergone a big change these days what with relativity bending minds as well as space and time, and quantum physics

implying a deeper “mindlike” reality or essential probabilistic reality underlying materialism.

M. Pitkanen: I see no way to hold onto the materialistic view, even the proper definition for the notion of emergence is impossible in materialistic framework. I list only the most important philosophical paradoxes implied by the materialistic view. Determinism-non-determinism paradox related to quantum measurement problem; observer as an outsider only able to affect the physical reality by quantum measurement; the dissipative and irreversible observed reality versus the non-dissipative and reversible realities of fundamental physics; the problem of how the initial values in Big Bang were selected; the lacking justification of anthropic principle; the assumption that only single solution of field equations represents the "real" reality meaning that there is in principle no way to test the theories since one cannot study the entire solution spectrum. What puzzles me is that the deep crisis of modern physics obvious from this list is not topic number one in the discussion when two physicists meet.

D. Matzke: This topic is so last millennium's physics. Everything is quantized even classical space and time at Planck's level. Everything is bits even black holes and qubits. Quantum research proves this. Everything is quantum and everything is intelligent. The problem is this cannot be directly measured, since is quantum based.

Q5 It has been argued repeatedly over the past century that the formalism of QM, as well as macro-scale evidence such as retro-pk, seem to require that observation become an integral component of reality - that is, all events exist in a superposition of probable states up until the moment of observation. Braud's and Radin's RPK reviews have recently pointed out (2000) just how ubiquitous the effect of conscious intent is - retroactively biasing the behavior of random number generators, human skin conductance and heart rate, the movement of steel marbles, small mammals and humans. At the same time, the evidence seems to suggest (Braud) that once a state has been consciously observed, it is no longer susceptible to modification by intent (that is, if an intermediary observer views the pre-recorded RNG data in the typical Schmidt retro-pk experiment, the data is no longer amenable to skewing by the subsequent observer). Clearly, the question that begs to be asked is - what exactly constitutes "observation"? Peoch's chick/robot pk studies (PA Conference 1998) suggest that animal intent is capable of interacting with RNG events as well as human intent. What about subliminal awareness - would that interfere with retro-pk susceptibility as well? How can we begin to quantify the effect of consciousness on material systems, and what might that tell us about the possible qualitative differences between conscious, local mind and subconscious, nonlocal Mind?

M. Pitkanen: The notion of self hierarchy forces to take seriously that both higher and lower conscious entities are present: our mental images are the nearest conscious creatures below us in the hierarchy and we can experience their presence directly. One is forced to reconsider what one means by subsystem in many-sheeted spacetime since the

spacetime sheets a resp. b glued to larger spacetime A resp. B can be joined by what I call join along boundaries bond. This means that the selves A and B which are unentangled can have sub-selves a and b which are entangled to represent a mental image shared by A and B. This is impossible in standard physics. It could mean that the levels of self hierarchy below us can involve shared mental images which we are not directly conscious of.

TGD based model for sensory organs leads to the view that primary sensory organs are the seats of sensory qualia. Even more, skin and olfactory organs could routinely entangle with external world and provide remote sensory information which is not directly conscious to us. There is a good reason for this: there is not much sense to get drowned to information not directly relevant to us. For instance, the galvanic skin response associated with remote mental interactions could reflect the fact that it is skin which consciously shares mental images and that these mental images are sometimes communicated to our level. Some dog's are known to have ability to precognize that their master is coming home or is going to have an epileptic attack. The explanation that dog's olfaction is somehow involved might be correct in the sense that it olfactory remote sensing is involved. Callahan has shown that at least in case of insects olfaction is basically infrared vision and one can ask whether negative energy IR vision could be basically involved and give rise to olfactory qualia. Support comes from several findings. For instance, Callahan has found that insects find more easily plants suffering from denutrition: the explanation is that the starving plants generates negative energy IR MEs getting in this manner metabolic energy and these MEs entangle it with the insect which thus pays the metabolic energy bill and gets the honey as a reward. Same mechanism could apply to epileptic attacks and dogs.

Fred Alan Wolf : Certainly a first person's observation-whatever that means-alters the ability of a second observer to perceive; that fact quantum physics indicates very well. My question would be what would it mean to quantify consciousness? How could it be numerically comparable with another "thing"?

D. Matzke: If a quantum god existed outside classical spacetime, he/she could influence any quantum state any where at any time, even if this is overriding some local physical effect and even if causing a temporal paradox. The quantum world allows complete paradox (called superposition). It is only the physical world and the narrow mind of classical physicists that do not believe such a thing is possible.

Q6. How does a given system's state probability distribution affect its susceptibility to mental influence? That is - are more likely outcomes easier to obtain psychokinetically than the less probable ones? How does this correlate with the consequences flowing out of particular outcomes -are states "causally entangled" with other systems less labile to retro-pk than those of no further consequence, and could we eventually devise a quantitative measure of such "causal inertia"?

Fred Alan Wolf : Good question! This could lead to quite a debate. Probability distributions arise in two related but distinct manners.

(1) In the first manner known as the classical realm of estimating events, probabilities refer strictly to the subjective world of mind and its ability to estimate on a numerical scale the relative possibilities of events occurring. In this classical case the only reason a probability distribution arises at all, simply because the mind has incomplete knowledge as for example in the case of a flipped fairly weighted coin hidden from view where the probability of “heads” must be 0.50. The coin, although hidden, must have a “tails” side as well, and it could be “up”.

(2) In the second realm probability arises differently coming about through what is called a quantum wave function. A quantum wave function describes in a very specific manner based on complex variable theory, an abstract space of vectors called Hilbert space, and other abstract mathematical constructs together with their rules of operation, our knowledge of any physical system-that is any system that can be considered to be “physical”, external to mind, “out there”, “real” existing, and so on. Most physicists would agree with this. However quantum wave functions surprisingly and perhaps mysteriously include something else as well-they not only describe probabilities of physical things and events, but they also can change physical events and things when the quantum wave functions describing those events undergo change. It’s kind of like putting the cart before the horse.

In (1) we have the usual horse in front pulling the cart along wherein the horse is the physical world and the cart is the abstract world of mathematical functions. Change the physical world and the numbers-the probabilities-must accordingly follow. But in (2) the cart pulls the horse-change the numbers and the horse changes to suit.

Hence it is definitely true that the more likely outcomes are easier to obtain psychokinetically, if we posit that the mind is the realm of quantum wave functions and hence when the mind undergoes some form of change it must alter the odds, ergo the events. Going back to the hidden flipped coin. In realm (2) the coin is thought to not possess either a “heads” up or a “tails” up until an observer equipped with “head-tail” observational equipment arrives on the scene and has a look. He could arrive on the scene with a different apparatus that does not measure face details of the coin, but perhaps its color code and color code and side might be complementary variables. Hence if the knowledge of the coin were to become available to the mind, it would follow that the coin would change accordingly.

D. Matzke: Actually, our belief system keeps us from effecting probabilistic things except by accident. I am convinced that our brain is such a system and we influence it all the time. Did you ever wonder why the motor neurons are shaped like little pyramids (they are called pyramidal cells)?? Many people constantly cause infant mortality in electronic devices (watches, cameras, etc) and have boxes full of such dead electronics. They give up wearing watches of any kind and only buy disposable cameras. The copper wall experiments showed that people could generate 200 volts on isolated copper plates, which is more than enough to fry modern semiconductor devices. Nothing is truly causal, only highly probable.

M. Pitkanen: I am not sure whether I understood this question. I would use instead of "probability distribution" the word "the state of system". With this replacement the question transforms to the next question.

Q7. What type of targets are most prominent in remote viewing and why? Empirical evidence suggests that those events which have a survival value to the subject are more likely to induce pre-cognitive or pre-sentiments episodes. What does that say about the characteristics/ "storage"/ access of such information by an observer?

M. Pitkanen: In TGD based model of remote viewing viewer receives negative energy from target if target is in geometric future and sends negative energy to the target if the target is in the geometric past. For the remote viewing of the future the target which is in need of energy is optimal. For instance, dogs could precognize the epileptic attacks of their masters for this reason. This suggests obvious tests: could dogs precognize the arrival of a tired and hungry master better than master who is happy and well-fed? For instance, Backster's findings support this view in case of plants, bacteria and cells. In the viewing of the past the target which can provide energy by receiving negative energy is optimal. Sleeping brain satisfies the criterion since it does not utilize metabolic energy to motor actions and sensory perception. Remote viewing of thoughts of sleeping person might be a good idea. Also precognition should be optimal during (lucid) dreaming. Dunne's classic "Experiment with Time" and Joe McMoneagle provide support for this prediction. Critical systems are certainly optimal for remote viewing and PK.

D. Matzke: Something that a person has an affinity to or can correctly address. Mental noise due to mental chatter also can swamp the deciphering of an incoming rote. The key to connection is we attract similar information (birds of a feather is an information law, where as opposites attract is an energy law -N/S poles and +/- charges). Much more could be said on this topic, especially regarding the topic area: the don't ask for the negation of some state, since according to quantum principles, that is it's own unique state and you are attracting what you do not want.

Fred Alan Wolf : I would only guess here that the simpler the target is to visualize the easier it would be to "see." Survival values I would only guess here would not help since I believe we have used biological adaptation to desensitize ourselves to not remote view. Indeed survival of the species seems quite pronounced into survival of the individual with a little help from our friends rather than survival of us all.

Q8 Beyond this subject-dependent target significance, what target-intrinsic aspects make some pieces of information more readily accessible than others? May and his team have demonstrated that targets with a higher entropy gradient yield a greater amount of data in RV (see the 1998 Convention of the Parapsychology Association and McMoneagle interview in this issue), while empirical evidence suggests (McMoneagle) that highly energetic targets, especially nuclear material, are particularly easy to identify. Any ideas about why these features would make a

target more prominent to the subconscious - or whether it is merely the translation into conscious thought that is facilitated in such cases?

M. Pitkanen: I think that the finding of May and his team reduces to a general fact about sensory perception be it remote or ordinary (even ordinary sensory perceptions can be seen as memories in time scale of fraction of second, Libet's experiments). Entropy gradients correspond to spatial or temporal gradients are transformed to subjectotemporal gradients and qualia correspond to average increments of quantum numbers. Subjectotemporal entropy gradient measures the intensity of experience. There are also many findings supporting the view that collective multibrained/bodied selves are essential for remote viewing. These higher level selves could serve as kind of relay stations contacting remote viewer with target by quantum entanglement. This higher level multibrained self would entangle only with the targets which we find most interesting. I do not believe that the microscopic properties of targets are too important here, it is the relevance of target for the brains composing the multibrain. On the other hand, my previous argument suggests that targets which are highly energetic in the sense that they can receive negative energy are optimal for the remote viewing of the past.

D. Matzke: These are both unusual informational structures. We have worked with mechanically generated chi encoded on audiotapes. We continually had people coming up to us attracted by the unusual signature of these chi tapes (both consciously and unconsciously aware). The tapes were a kind of private "blue light special".

Fred Alan Wolf: No thoughts here.

Q9. If consciousness is indeed a fundamental (rather than emergent) ingredient of reality, what do you believe would be the most relevant experimental approaches we could conduct in order to understand more about the way it interfaces with matter and space-time? And what is further being done within the physics community to further probe the implications of Quantum Mechanics' "observer effect"? Has this branch of physics effectively transmuted into parapsychology - and if so, why is there virtually no support for parapsychology research from the physics community in the mainstream scientific publications?

Fred Alan Wolf : A considerable effort must be made to form theoretical models of what to look for. Again this may be the cart before the horse idea, but I am led to think that the main discoveries to be made will come to mind first before they are witnessed as physical events. I think of how Dirac "discovered" the positron in his own equations, well before anyone even thought to look for antimatter.

I am currently working on a number of possibilities having to do with self-reference arising through a means to directly record a quantum wave function in the brain and some ways to use the mind to accomplish time travel. Of these more shall be released in good time.

D. Matzke: In the same manner that quantum mechanics has a particle/wave duality (which leads to a paradoxical understanding) it also contains a energy/information duality, with its subsequent paradoxes. This duality effects our understanding and even affects our language. For example, I believe that the term “subtle energy” is a complete misnomer, because most of the effects are completely informational. The above question also betrays the same kind of classical bias (matter/energy/space/time) rather than a quantum perspective (informational, self consistency, a-temporal, non-local). Experiments should also be proposed from the quantum mind perspective (informational, probabilistic, noise, etc).

M. Pitkanen: I would regard quantum measurement theory with an intentional observer included essentially as a quantum theory of consciousness. If one accepts fractality and many-sheeted spacetime, the problem of how cell can behave as a coherent whole differs in no essential manner from the problem what the mechanisms of remote mental interactions are.

Q10. Is there any compelling reason for which we should believe that the brain is the primary physical detector for nonlocal (psi) information and focus our comparative physiology studies on it? While the brain may be the primary transducer to conscious, analytical thought, the weight of evidence from DMILS experiments (from Backster and Sheldrake to Braud, Schlitz and Pech, to Radin, May, Yamamoto and the Chinese histo-molecular studies with external qi) strongly suggests that all living systems, regardless of the existence or complexity of a brain, react in a consistent, intelligent manner to directed nonlocal information. The fact that this reaction is reproducible all the way down to the level of DNA, RNA and protein behavior (as directional changes in configuration, synthesis and transcription rates, mutagenesis and programmed death) seems to indicate that genetic material might be, both from an evolutionary and ontological point of view, the oldest, possibly most sensitive detector of psi information in our bodies. Given the relative simplicity of studying electromagnetic, physiological and metabolic DMILS signatures in a living tissue sample (see Backster), compared to the human brain, why is there no such work being done in the West? More specifically, why study the frequency spectra of an enormously complex environment like the brain and not those of a simple tissue sample during altered states of consciousness/psi function?

Fred Alan Wolf : Good question, I see no reason to focus in strictly on the brain. You might gather this from my remarks above.

M. Pitkanen: As far as human conscious experience is concerned, I see brain as a builder of symbolic and cognitive (p-adic) representations and a realizer of desires of the magnetic body, which is the intentional agent transforming its p-adic topological light rays representing intentions to negative energy topological light rays representing desires quantumly communicated to brain of geometric past and inducing a response of the brain

and material body as action. Ordinary sensory perception, motor action and memory are all based on same basic mechanism involving remote mental interactions in astrophysical length scales. Libet's strange findings about unreasonably long time delays of consciousness provide direct support for the view that sensory input is communicated to the magnetic body having size measured Earth's circumference as a natural unit.

For instance, long term memories involve quantum entanglement of the magnetic body with the brain of the geometric past to communicate the desire to remember by sharing of mental images. The time scale of geometrottemporal nonlocality is lifetime at least. In case of sensory and episodal memories also the remembered mental images results from sharing of mental images but since sensory and episodal memories are rare, the dominating communication mechanisms would seem to be based on classical communications. But also this communication involves the magnetic flux tubes structures of Earth's magnetic field and/or Z^0 magnetic fields analogous to wave guides so that astrophysical length scales are involved.

In TGD framework qualia are at the level of sensory organs. Sensory receptors hear the music and brain puts it into notes and communicates the symbolic representations to magnetic body. It might be that skin senses and olfaction involve also the highly nonlocal aspect and that we are in continual communication with other organisms without knowing it. One common language might be provided by memes. Memetic codons would be represented as sequences of 21 DNA triplets in intronic portion of the genome and expressed in terms of em or Z^0 field patterns associated with MEs. The duration of meme is .1 seconds and it consists of 126 bits. The common memes would define the vocabulary understood by the communication life forms.

The recent work with the model of EEG has however made it clear that memetic code what is only a special case although it might be common to all prokaryotes due to the universality of alpha band in ZEG. Any p -adic prime nearly equal to 2^k , k power of prime, defines a hierarchy of k -bit codes and durations of codon defined by n -ary p -adic time scales. The p -adic frequencies are constants of nature, and it turns out that the narrow resonance frequencies of EEG correspond to these frequencies and their differences and sums. This follows solely from simple number theory, not a single world about horrible complexities of brain dynamics! This model predicts also correctly that sleep involves 4 stages and relates the hierarchy p -adic codes in EEG range with the structure and function of brain. Universe seems indeed to be an infinite conscious computer communicating at all levels: both quantumly by sharing of mental images and classical using these cognitive codes. Our level is only single node in this enormous Indra's net.

D. Matzke: Quantum/chi effects biological systems at every level, chemical binding, neurotransmitter gap, microtubules, DNA, brain statistics. I am convinced we can design an electronic device to amplify the probability distributions of mind, sort of a high-gain, advanced PK device. People can train to use these using biofeedback techniques and include them with children from day one. It is not electromagnetic, but rather *shaking* the quantum ether, as occurs with succussion in homeopathic preparations. Electromagnetics, gravity and sound can all shake the ether using acceleration/deacceleration. Think information not energy.

Q11. In his post-quantum mechanics, Sarfatti talks about self-referential Godel loops - two way "causal" relations between brain and mind, the quantum matter embedded in space-time and the quantum wave, existing in the field of information of Bohm's "implicate order", beyond space-time. Such action-reaction loops suggest that mind and matter continuously modulate each other, rather than exist as absolute causative agents. Considering what we now know about the experimenter effect, retro-PK and telepathic overlay, is physics heading into a new logical landscape - and what type of science is likely to come out of it? Do you believe our research goals are likely to change as a result - and how?

D. Matzke: Repeatable brain random correlithm object patterns can stabilize quantum correlithm object patterns. Stability of non-physical rote encoding is something that needs to be discussed more by this group. Perhaps this is like a dynamic balance, similar to a beach ball above a fan. I call this new field of study "spirited science" and is a union of physics and spirit. For example, I expect a "love pattern" machine could be built, using next generation chi generator technology. This entire field is ripe for technological discovery. For example, I hear a story about someone who had the most patents in a high tech company. He claimed to have brought them into existence by peering into his own future and writing them down. Also there are stories about people "walking" around in the "hall of inventions" in the virtual library of the akashic records. Many inventions are inspired in non-ordinary ways. Good ethics and social responsibility is key to the future unfolding of this kind of technology.

M. Pitkanen: I do not share the dualistic matter-mind view of Sarfatti and Bohm about reality. The self-referentiality of consciousness is a fact and probably one of the hardest challenges for quantum theories of consciousness. I see the self referentiality as resulting from quantum-classical correspondence. Quantum aspects of existence and even consciousness can be represented by (but not identified as) the topological structure of space-time surface. The possibility to represent some aspects of quantum jump sequences (selves) at spacetime level is basically due both to the nondeterminism of the fundamental variational principle and to inherited nondeterminism. of p-adic differential equations. Becoming conscious about one is conscious means quantum jump replacing the superposition of spacetime surfaces with a superposition in which surfaces represent something about the contents of consciousness before the quantum jump. What this means that the universe that we are exploring becomes more and more complex as we explore it: when we understand we create something which we do not yet understand. This is very much what mathematician is doing when he/she calculates: he/she is continually representing his/her contents of consciousness symbolically and this in turn is crucial for the evolution of contents of consciousness.

Fred Alan Wolf : Sarfatti's ideas are worth considering. He believes the quantum physics will not be enough to come to grips with this. I, on the other hand, think that quantum physics with perhaps some slight modification may be sufficient.
