

TGD Inspired View About Remote Mental Interactions and Consciousness-Related Anomalies: Part I

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Abstract

I have proposed a general vision about what remote mental interactions and related phenomena could be in TGD Universe around 2003. A lot of progress has taken place since then, and this motivates the reconsideration of this vision. The general vision is that both biology/consciousness, and remote mental interactions/related phenomena labelled as paranormal are predicted to share the same basic mechanisms, and that the proposed vision provides basic concepts and the language allowing to speculate and build simple models. One cannot of course take the proposed models too seriously at the level of details. In the first part of the article I will summarize the new ideas that have emerged since 2003, represent the basic question and ideas, and discuss parapsychological phenomena at a general level.

1 Introduction

The latest TGD inspired articles related to quantum biology, quantum mind, and remote mental interactions were published in JNLRMI around 2003. Several new ideas related to basic TGD, TGD inspired quantum biology and theory of consciousness have emerged during the subsequent 8 years. The article *Evolution of TGD* [48] provides a short summary about the development of the ideas.

This is the the first part of an article devoted to remote mental interactions. In the first part of the article I will summarize the new ideas that have emerged since 2003, basic questions and basic ideas, and summarize what parapsychological phenomena are at general level. There is also a more detailed representation at my homepage (see chapter *TGD inspired view about remote mental interactions and paranormal* of [39]).

In the second part of the article I will discuss some applications of the basic vision. The notion of conscious hologram is discussed from the point of view of remote mental interactions. The notion of magnetic body is in decisive role as it is also in the understanding of quantum biology in TGD framework.

TGD inspired model for OBEs relying on the notion of magnetic body is summarized. The idea is that OBEs could correspond to sensory experiences assignable to magnetic body rather than real body. Also the connections with the work of other researchers, such as Shnoll, Persinger, and Tiller are discussed briefly. The challenge of testing the vision is also considered.

The reader interested in details can read the chapter *TGD inspired view about remote mental interactions and paranormal* of [39]. This book contains also a chapter summarizing basic principles of Quantum TGD. This book contains also a chapter summarizing basic principles of Quantum TGD.

2 Brief summary of the basic vision around 2003 compared with the recent situation

To get perspective it is perhaps good to briefly summarize the basic vision about TGD inspired model for biology and consciousness as it was around 2003 according to the articles published in JNLRMI. The recent view about TGD inspired theory of consciousness is described in the chapter *Matter, Mind, Quantum* of [33]. The general vision was that both biology, consciousness, and remote mental interactions and related phenomena labelled as paranormal are predicted to share the same basic mechanisms, and that the proposed vision provides basic concepts and the language allowing to speculate and build simple models.

Several new ideas and concepts have emerged since 2003.

The most important ones are following.

1. Zero energy ontology (ZEO) giving justification for notions like negative energy photons propagating to the geometric past and the notion of causal diamond (*CD*) providing imbedding space correlate for the notion of self and predicting a hierarchy of fundamental time scales and predicting a connection between biology and elementary particle physics.
2. *Hierarchy of Planck constants* (see chapter *Was von Neumann Right After All* of [31]) giving rise to phases behaving as dark matter and suggesting the identification of living matter as ordinary matter controlled by dark matter in this sense giving rise to phases behaving as dark matter and suggesting the identification of living matter as ordinary matter controlled by dark matter in this sense.

3. The identification of *ATP as a correlate of negentropic entanglement* and information theoretic interpretation of metabolism (see chapter *Macroscopic Quantum Coherence and Quantum Metabolism as Different Sides of the Same Coin: Part I* of [35]).

2.1 TGD inspired theory of consciousness

The article *TGD inspired theory of consciousness and biosystems as macroscopic quantum system* [44] describes the basic assumptions and ideas TGD inspired theory of consciousness and of quantum biology. The basic vision is essentially the same although some simplification has taken place and the picture has become more detailed.

1. TGD inspired theory of consciousness can be regarded as an extension of quantum measurement theory by raising the observer from a status of something external to the Universe able to only induce state function reductions (in von Neumann's view) to something described by quantum physics. The crucial almost paradox like problem is the conflict between the determinism of Schrödinger equation and non-determinism of state function reduction. Similar closely related problems relate to the relationship between experienced time and the geometric time of physicist. Whatever the theory of consciousness is, it must solve these problems.
2. Quantum jump as a moment consciousness, self as sequence of quantum jumps somehow integrating to a flow of consciousness, self hierarchy, and the identification of subselves as mental images of self, represent the basic identifications. It seems possible to reduce self hierarchy to a hierarchy of quantum jumps: higher levels of self hierarchy would be analogous to bound states of elementary particles and self hierarchy would relate closely to the corresponding hierarchy at the level of physics.
3. Quantum classical correspondence requires space-time correlates for selves. Space-time sheets are natural correlates of selves at space-time level. At imbedding space level so called causal diamonds (*CDs*) introduced after 2003 in the context of zero energy ontology define this correlates. At the level of "world of classical worlds" (*WCW*) the correlate is sub-*WCW* assignable to the *CD*.

The notion of many-sheeted space-time forces to modify the notion of sub-system. Flux tubes connecting space-time sheets are natural correlates for entanglement. It is possible for space-time sheets without flux tube connections to contain topologically condensed space-time sheets which are connected by flux tubes although space-time sheets. This would correspond to a situation in which two selves are un-entangled but possess subselves which are entangled. The notion of finite length scale resolution is essential for this definition to make sense. This leads to the idea about sharing of mental images by quantum entanglement producing what might be called stereo consciousness.

4. The possibility of quantum jumps and state function reductions occurring in quantum parallel manner is also something new and also relates to the many-sheeted space-time: see the article *Biosystems as macroscopic quantum systems* [40]. The quantum jumps taking place at the scales of subselves and their subselves could give rise to the experience of a flow of subjective time. One must be however very cautious with this concept: it is not possible to be conscious about not being conscious so that continuous flow of subjective time might be an illusion perhaps created by the model of self as a continuous narrative. At the fundamental level there might not be continuous narrative. Already dreams represent states of consciousness in which this narrative is only piecewise continuous.
5. The identification of quantum jump as relating entire deterministic *quantum histories* as analogs of solutions of Schrödinger equation solves the problems related to the conflict of non-determinism of state function reduction and determinism of Schrödinger equation and classical field equations which in TGD framework define an exact part of quantum theory. Quantum measurement theory involves also the notion of classical variables. These can be identified as zero modes which by definition do not contribute to the metric of *WCW* and are therefore not quantum fluctuating variables. The entanglement between zero modes and quantum fluctuating degrees of freedom must be fundamental element of state function reduction and also sensory perception and conscious choice.

6. p-Adic physics as physics of cognition and intentionality (see chapter *p-Adic Physics as Physics of Cognition and Intention* of [33]) is a central element of this picture and forces a generalization of number concept. Reals and p-adic numbers characterized by prime $p = 2, 3, 5, \dots$ are completions of rationals and one can glue reals and p-adic numbers and their extensions along rationals and common algebraics to form a book like structure. The notion of adèle - well-known to mathematicians - seems to catch quite well this vision (see chapter *Quantum Adeles* of [33]).
7. Negentropy Maximization Principle (NMP) (see chapter *Negentropy Maximization Principle* of [33]) defines the basic variational principle of TGD inspired theory of consciousness and states that the gain of conscious information in quantum jump is maximal. There are variants of NMP depending on what one means with quantum theory.
 - (a) For the ordinary definition of entanglement entropy this means that the two systems involved become un-entangled. Interpreting the density matrix as fundamental observable this gives standard quantum measurement theory.
 - (b) The introduction of hyper-finite factors of type II_1 strongly suggested by the fact that WCW spinors correspond to this kind of von Neumann algebras leads to a further modification of measurement theory since state function reduction to a one-dimensional ray of Hilbert space is not possible in general but always happens to an infinite-dimensional sub-space (in the ordinary sense of the word). The state spaces can of course contain factors of type I for which ordinary measurement theory applies.
 - (c) For rational or even algebraic entanglement coefficients the entanglement entropy can be defined using p-adic norm for some p-adic prime p and can be negative and always is for certain primes p . Entanglement would carry genuine information and is expected to be stable under NMP. This leads to the vision about negentropic entanglement as a basic characteristic of living systems.

At space-time level one can also say that the - in general discrete- intersections of real and p-adic partonic 2-surfaces consisting of rational (or more generally, points in some extension of rationals) defined cognitive representations in the intersection of cognition and matter. This discretization would directly correspond to the fact that all cognitive representations have finite resolution and are necessarily discrete: computation represents a basic example of this. At more abstract level the partonic 2-surfaces represented by algebraic equations making sense both in real and p-adic sense can be said to belong to the intersection of matter and cognition and represent living systems. Quite surprisingly, the art of algebraic geometry which typically involves counting the numbers of rational points of algebraic surfaces would directly relate to fundamental biology!

The basic implication of this vision is the necessity to re-consider the existing views about the relationship between subject and geometric time. I summarized the ideas about time as they were around 2003 in the article *Time, space-time, and consciousness* [45]. There were several poorly understood issues and some of these issues are still far from well understood.

1. What is the precise relationship between geometric time and experienced time? How the experience about continuous flow of time emerges? (Is it an illusion: one cannot be conscious about being not conscious, dark moments of visual perception). What induces the arrow of psychological time inducing the apparent arrow of geometric time? Why the contents of sensory experience are restricted to so narrow a time interval whereas the contents of memory come from much larger space-time region. Note that the interpretation of the correlate of self as 4-D space-time regions provides a new vision about memory.
2. In the article *TGD inspired theory of consciousness* time-like entanglement and signals proceeding in the reversed direction of time was suggested to provide the basic mechanism of memory, intentional action, and (remote) metabolism. Libet's paradoxical findings about strange time delays of consciousness provide the basic support for this vision. The challenge is to give a more precise mathematical content for the notion of negative energy signal propagating backwards in time. Phase conjugate laser wave was proposed as its physical analog. The basic question is to understand how the arrow of geometric time emerges so that one can use these terms.

In TGD framework the notion of many-sheeted space-time challenges the notion of subsystem. One must also give a more precise mathematical content to the notions of U-process, state function reduction, and state preparation.

1. Quantum jump should consist of unitary process characterized by a unitary matrix U followed by a state function reduction in turn followed by state preparation. State function reduction should be a cascade like process proceeding from top to bottom as a splitting of systems to pairs of unentangled subsystems until negentropic or bound state character of entanglement does not allow splitting anymore (see chapter *Negentropy Maximization Principle* of [33]). The identification of the unitary process U and U -matrix remained however open questions at that time. ZEO leads to a rather detailed minimal vision about what happens in quantum jump (see chapter *About Nature of Time* of [33]).
2. What happens in quantum measurement? Non-quantum fluctuating zero modes of "world of classical worlds" (WCW) correspond to classical degrees of freedom in TGD and are excellent candidates for classical variables of quantum measurement - such as direction of the point of some "meter". With these zero modes quantum fluctuating degrees of freedom must entangle before state function reduction and measurement must induce state function reduction eliminating entanglement unless it is negentropic. Does state function reduction follow from macroscopic character of zero modes in the sense that there would be analogy with spontaneous magnetization which also selects single direction of magnetization rather than their quantum superposition.

And what is the role of cognition interpreted in terms of p-adic space-time sheets? Is p-adic-real algebraic entanglement carrying negentropy involved? At what level the state function reduction inducing a sequence of state function reductions in the sequence of entangled systems does take place: does the primary reduction take place at the level of cognition?

The answers to these questions are still more or less guess work.

2.2 TGD inspired quantum biology

Many ideas about basic mechanisms of quantum biology already existed around 2003. I mention only the notion of magnetic body and the hypothesis that living matter resides in the intersection of real and p-adic worlds implying that negentropic entanglement is a fundamental characteristic of living matter.

The assumption that living matter is ordinary matter controlled by dark matter - identified as a hierarchy of macroscopic quantum phases labeled by the value of Planck constant coming as integer multiples of ordinary Planck constant - has allowed to find a more detailed formulation for these intuitive ideas. The alert reader has perhaps noticed that the hierarchy of Planck constants and negentropic entanglement seem to provide two different manners to realize macroscopic quantum coherence. Are these two realizations independent of each other and if not, how do they relate to each other? This remains an open question to high extent.

1. High T_c super-conductivity was assumed to play a key role in living matter but the precise mechanism of super-conductivity was poorly understood. For the views at that time see the articles *Biosystems as macroscopic quantum systems* [40] and *Quantum model for sensory receptor* [43]. A detailed model for high T_c bio-super-conductivity was however lacking. The hierarchy of Planck constants allows to construct this kind of model superc1, superc2 applying also in the case of ordinary condensed matter systems. Rather remarkably, dark electrons at magnetic flux tubes play a key role in this model. Also negentropic entanglement could stabilize Cooper pairs applying also in the case of ordinary condensed matter systems. Dark electrons at magnetic flux tubes play a key role in this model. Also negentropic entanglement could stabilize Cooper pairs. Another new element not present at the time of writing of these articles is the new physics *model of cell membrane* as almost vacuum extremal of Kähler action (see chapter *General Theory of Qualia* of [35]) motivated by quantum criticality and the expectation that large values of Planck constant correspond to almost vacuum extremals if one accepts the TGD based explanation for the hierarchy of Planck constants as a result of dynamics rather than something fundamental. It must be emphasized that the existing high precision determinations of Planck constant do not

exclude the hierarchy since they do not detect dark matter. This leads to a picture about cell membrane as an analog of computer monitor with lipids representing pixels to which one can attach various qualia. These qualia need not however correspond ours which are assigned to sensory receptors motivated by quantum criticality and the expectation that large values of Planck constant correspond to almost vacuum extremals if one accepts the TGD based explanation for the hierarchy of Planck constants as a result of dynamics rather than something fundamental. It must be emphasized that the existing high precision determinations of Planck constant do not exclude the hierarchy since they do not detect dark matter. This leads to a picture about cell membrane as an analog of computer monitor with lipids representing pixels to which one can attach various qualia. These qualia need not however correspond ours which are assigned to sensory receptors.

2. In the article *Manysheeted DNA* [41] several ideas related to DNA were discussed.
 - (a) Homeostasis in many-sheeted space-time roughly states that supra currents at super-conducting space-time sheets determine the dynamical equilibria also at the space-time sheets containing ordinary matter. The strange findings about the behavior of cell membrane ionic currents support this hypothesis (they are quantal and flow even in absence of metabolic energy feed suggesting that Josephson currents are in question).
 - (b) Quantum spin glass degeneracy generalizing ordinary 3-D spin glass degeneracy to 4-D one meaning that strict determinism breaks down to piecewise one. Hence not only quantum states but also quantum jump sequences and therefore conscious experiences should have space-time correlates. These correlates would relate to conscious experience like written text to conscious thoughts and would provide a kind of feedback essential for symbolic memory. 4-D spin glass degeneracy provides also a justification for the hierarchy of Planck constants.
 - (c) A further key idea was healing by time reversal. The idea is that the reversal of the arrow of geometric time implies that second law holds in opposite direction of geometric time so that basically entropic process looks like negentropic one. Also the notion of magnetic mirror, topological self-referentiality, the identification of information molecules as quantum links in quantum web, the idea about molecular recognition mechanisms, the connection between metabolism and generation of quantum coherent states, scaling law of homeopathy were further ideas discussed in the article.

The developments since 2003 have enriched this picture with several new ideas.

- (a) ZEO and the notion of *CD* allow to assign the arrow of geometric time directly to the zero energy states rather than their dynamics. Dark matter as a hierarchy of phases with large value of Planck constant can be identified as controller of ordinary matter in living systems, and negentropic entanglement assumed to have ATP as a correlate allow to a more detailed articulation of these ideas.
 - (b) The idea about DNA as topological quantum computer (see chapter *DNA as Topological Quantum Computer* of [36]) with braids realized as magnetic flux tubes connecting with braids realized as magnetic flux tubes connecting DNA nucleotides with lipids of cell membrane is another key idea and means that DNA becomes the hardware of quantum computations with software represented by the braidings of flux tubes.
3. The article *Macrotemporal quantum coherence, quantum spin glass degeneracy, and number theoretic information concept* [47] described the vision about living matter as a macroscopic quantum system. The notion of negentropic entanglement and the idea about life as islands of rationality in the oceans of real and p-adic continua was described already in this article.
 4. The article *Biosystems as conscious holograms* [46] develops the idea about living matter as conscious hologram. One of the key mechanisms was time mirror mechanism finding a justification in ZEO. A model of remote mental interactions and an model inspired by the findings of William Tiller was proposed with key role played by the notion of magnetic body able to receive information from and control even in-animate matter. ZEO provides first principle justification for the time mirror mechanism.

The vision was applied to develop a model of biophotons. The *model of cell membrane* as almost vacuum extremal, which emerged later, led to a radical proposal: biophotons are nothing but large \hbar EEG photons which have suffered an energy conserving phase transition reducing the value of Planck constant to ordinary one.

5. The article *Quantum model for nerve pulse, EEG, and ZEG* [42] describes a TGD inspired view about nerve pulse and EEG. I would not speak about *ZEG* in the title now since the status of Z^0 radiation fields is still uncertain (classical Z^0 fields are however in an essential role in the model of cell membrane and sensory receptor).

Electronic super-conductivity and possibly super-conducting states assignable to biologically important ions are key elements of the model but the model of electronic super-conductivity was not convincing: it was assumed that super-conducting space-time sheets are at very low temperature. The model of electronic super-conductivity was not too convincing at that time and considerable progress has taken place with the advent of the hierarchy of Planck constants `super1, super2..`

In case of biologically important ions it had already become clear that TGD inspired nuclear physics (see chapter *Nuclear String Hypothesis* of [30]) allows fermionic nuclei with given charge to have bosonic companions with the same charge and therefore same chemistry. This would make possible to assign Bose-Einstein condensates and super-conductivity even to fermionic nuclei with given charge to have bosonic companions with the same charge and therefore same chemistry. This would make possible to assign Bose-Einstein condensates and super-conductivity even to atoms which are chemically equivalent with fermionic atoms.

EEG and its possible variants were identified as communications and control tools mediating sensory information to the magnetic body and allowing magnetic body to quantum control biological body. This means the presence of a completely new level in biological information processing. Again the hierarchy of Planck constants plays a key role in making possible for ELF photons with extremely small energy to have energies which are above thermal energy and thus have biological effects and carry information (see chapters *Dark Matter Hierarchy and Hierarchy of EEGs* and *Quantum Model of EEG* of [38]).

The aim of this article is to describe in some detail the recent view about remote mental interactions. Also connections with the work of other researchers are summarized.

3 Basic questions and basic ideas

The basic ideas of TGD inspired model for remote mental interactions and related phenomena such as OBEs and near death experiences are summarized in the chapter *Quantum model for paranormal phenomena* of [33].

I have not worked with this topic during last years, and I apologize for my very restricted views. The most important new ideas relate to the notion of magnetic body, ZEO, negentropic entanglement, and dark matter hierarchy. It would be interesting to deduce explicitly the implications of new ideas that have emerged since 2003 but the following discussion is just a commentary.

3.1 Basic questions

The general idea is that remote mental interactions are by no means paranormal in the sense that they would be in conflict with well-established laws of physics, as skeptics want to see them. Our personal magnetic bodies apply remote mental interactions to receive communications from biological body and to control it. Remote mental interactions having living matter as a target would correspond to a situation in which the personal magnetic body of operator is able to receive information from the biological body of target or control it. The target could also be water perhaps containing some organic matter as in Tiller's experiments. Also psychokinesis acting on inanimate targets such as computers can be considered but in this case the mechanisms of remote mental interaction cannot be quite same as in the case of biological targets.

The basic question is why the remote mental interactions having living target are so rare if they apply same mechanisms as living matter in general. A possible reason is that living matter has developed something analogous to an "immune system" preventing situations in which an organism becomes controlled by another. This would be very similar to what has taken place in the evolution of computers. The restriction of communication windows to narrow frequency ranges depending on species and even individual, and the counterparts of passwords realized as temporal field patterns could make this kind of immune system possible. Cyclotron frequencies would be central here and hierarchy of Planck constant would allow arbitrary low frequencies with energies below thermal energies at physiological temperature range. The first guess is that passwords using genetic code so that communications restricted to those occurring between the members of the same species become possible. The challenge is to invent plausible physical realizations for the passwords. One possible proposal inspired by the experiments of Gariaev and collaborators would realize the values of bit as two orthogonal photon polarization directions. Another realization would be in terms of a collection of frequencies interacting resonantly with the target DNA and inducing gene expression: no explicit knowledge of address of the target would be needed.

Second basic problem in many remote mental interactions such as the intentional effect on random number generator is "How can it happen?". How the mere intent can be transformed to action without any conscious knowledge about how it is achieved? Are there some selves in the self hierarchy which consciously how the intended effect can be achieved? The attempt to understand how neuro-feedback affect the behavior of single neuron leads to the same question.

1. The communications to the magnetic body also make possible feedback and this feedback could make possible learning. For instance, in psychokinesis (especially so in micro PK), this learning would be crucial and analogous to what occurs when we learn to drive a car. In healing this kind of feedback might help to find the healing frequency by trial and error.
2. It is quite possible that also multibrained and -bodied higher level collective selves actively participate in the process as a third party such that the remote mental interactions would act as a relay states. I have suggested similar explanation for Sheldrake's findings about learning at the level of species and Tiller's findings about the "transfer of intent". This could make possible coherent amplification effects (TM, prayer groups) and could make available information resources of all brains involved with the group. This could for instance explain the ability of a remote viewer to see an object on basis of data which need not have any meaning for her.
3. A fast amplitude modulation of alpha waves introducing higher harmonics to the carrier wave is a good candidate for mediating communication between brains and higher level multibrained selves. Mesoscopic 'features' in brain involve precisely this kind of amplitude modulation and might represent just this kind of messages. Interestingly, also speech is produced by a fast amplitude modulation of 10 Hz basic vibration frequency of speech organs (assignable to electron CD as a fundamental frequency) and kHz (quarks) frequency is a special frequency from the point of view of hearing.

Third key question relates to the metabolic aspects of remote mental interactions. One expects that negentropic entanglement between operator and target is involved. The hypothesis about the presence of ATP molecule at the magnetic flux tube connecting operator and target as a prerequisite for negentropic entanglement would reduce the energetics of remote mental interactions to basic metabolism. This allows to make quite strong conclusions about the character of these interactions. Here one must however remember that earlier model assumed much more general mechanism of metabolism involving transfer of particles to larger space-time sheets liberating or using zero point kinetic energy in this manner. It could be part of $ATP \leftrightarrow ADP$ mechanism or completely independent mechanism utilized by the prebiotic metabolism. It could be also involved with the remote mental interactions for which targets are in-animate.

Fourth question relates to mechanisms and here time mirror mechanism involving sending of negative energy photons to geometric past is the natural candidate for both intentional action, remote metabolism, and memory. Also its counterpart involving sending of positive energy signals to future can be considered. It must be emphasized that the reflection need not always occur. The negative energy photons could be just absorbed without any signal generated and this leads to ask what happens in the case of memory.

3.2 Key ideas of the TGD inspired model of remote mental interactions

Over the years a rather concrete TGD inspired model of remote mental interactions has developed.

1. The basic notions of the TGD inspired model are magnetic body as an intentional agent controlling biological body and receiving data from living body or even "dead" matter system with massless extremals (MEs) mediating these communications, zero energy ontology and the related notion of causal diamond (CD) serving as an imbedding space correlate of self and assigning to elementary particles fundamental macroscopic time and length scales as those of CD , the hierarchy of Planck constants making possible macroscopic quantum phases and zoom-ups of quantum systems, and the vision about living matter as something residing in the intersection of real and p-adic worlds and the closely related notion of negentropic entanglement crucial for the functioning of living matter and conscious intelligence in TGD Universe. Note that this means that life corresponds to number theoretical quantum criticality in a well-defined sense.
2. Zero energy ontology (ZEO) means a radical departure from standard physics. The creation of zero energy states from vacuum is possible and means that in principle (just in principle!) the claims of parapsychologists about ectoplasm and of yogis about the possibility to create of matter from nothing are consistent with the basic conservation laws of physics. In TGD inspired biology this process could take place routinely. Causal diamond (CD) is the imbedding space correlate for the zero energy state. Positive and negative energy parts of the state reside at its boundaries. p-Adic length scale hypothesis and number theoretical vision suggest that the proper time distance between the tips of CD comes as powers of two. For electron and quarks playing key role in the model of DNA as topological quantum computer this temporal distance would correspond to 1 second and 1 millisecond respectively suggesting a direct connection between elementary particle physics and basic bio-rhythms.

The translates and Lorentz transforms of CD s are also CD s and one can assign to CD s a moduli space further expanded by the introduction of the hierarchy of Planck constants. One expects that this moduli space is crucial for understanding of the geometric qualia (see chapter *Quantum Model for Sensory Representations* of [33]). The communications between subselves would be naturally based on resonance. CD s are characterized by resonance frequencies which in the rest system of CD come as harmonics of the fundamental frequency determined by the proper time distance. This would allow a universal coding of geometric data using frequencies. Both MEs and CD s could be regarded as being analogous to music instruments and this in fact explains basic facts about music experience. These resonance frequencies should play a key role in biology and also in remote mental interactions- even those in which target consists of "dead" matter since fundamental biorhythms characterize also elementary particles in TGD Universe.

3. p-Adic physics as physics of cognition and intentionality is an essential element of approach. Intentions are represented as p-adic space-time sheets. In the intersection of real and p-adic worlds these space-time sheets have a mathematical representation making sense also in real context so that one can say that these surfaces are in the intersection of real and p-adic worlds and the phase transitions transforming surfaces belonging to different number fields are possible. This makes possible transformation of intentions to actions and their reversals possible in the intersection of real and p-adic worlds. U -matrix indeed makes sense also for transformation representing the transformation of say p-adic space-time surface to a real one and is coded only by data assignable to the rational and common algebraic points of real and p-adic variants of partonic 2-surface (see chapter *Negentropy Maximization Principle* of [33]). Note that zero energy ontology makes possible also the transformation of intentions to actions as p-adic-to-real phase transitions without breaking of the conservation laws. Note that zero energy ontology makes possible also the transformation of intentions to actions as p-adic-to-real phase transitions without breaking of the conservation laws.
4. Negentropic entanglement, which can be both space-like and time-like in zero energy ontology, makes possible quantum superposition of macroscopically different configurations of the target system correlated with the states of operator system. The operator should be able to achieve the negentropic entanglement and intentionally increase the amplitude of the desired outcome in this superposition. Negentropic entanglement need not involve binding energy and I have

proposed this as a deeper level explanation for the nebulous notion of high energy phosphate bond crucial for metabolism in living matter. Quite generally, negentropic entanglement would make possible for the operator to transfer metabolic energy and momentum to the target. Remote healing involves often positive emotions like compassion and love suggesting that negentropic entanglement accompanies healing process. The hierarchy of values of Planck constant would make possible this process in long time and length scales.

5. Addressing of the target is key problem in remote mental interactions. Here password consisting of a collection of frequencies interacting resonantly with the DNA of living target and inducing remote gene expression dictated by the frequencies is one possibility. Gariaev's findings that scattering of red laser beam from DNA generates broad band of frequencies, which are biologically active, could be interpreted in this model. The photons would correspond to the same energy but wide range of frequencies corresponding to different values of Planck constant. These frequencies would define the address of the target, eventually some part of DNA inducing gene expression. The interaction would be by the superposition of the electric field of incoming radiation with the electric field of flux tube inducing the analog of Becker's healing current in turn loading metabolic resources and generating negentropic entanglement and also gene expression.
6. The notion of hologram is often used as a useful metaphor: Gariaev talks about DNA hologram and I have talked about conscious hologram. This notion obviously requires more detailed definition to be testable. What hologram does is that scattering of laser beam from it is effectively scattering from target. Magnetic flux tubes make TGD Universe an Indra's net: could it be that the scattering from object behaving like bio-hologram could actually take place from the target which it represents! Photons would travel from object to the target along flux tubes, scatter, and arrive along flux tubes and leave the object. The object, which actually acts as a relay station, would define pseudo-hologram. Also frequency coding of the address could be combined with this picture if the lengths of flux tubes are multiples of wavelength (proportional for Planck constant).

3.3 Some examples of remote mental interactions interpreted in TGD framework

Some examples about remote mental interactions with living target are in order.

1. In telepathy the communications from biological body of target would be based on EEG and its scaled analogs. Also ECG could be involved. In TGD Universe even electromagnetic field might be replaced with electroweak and color field below some scale in scale hierarchy defined by Planck constants.
2. In hypnosis magnetic body of operator would control the biological body of the target, which would be "possessed" and behave like a part of the biological body of operator.
3. It would be also possible to share sensory percepts and memories of the living target. The mechanism would be time mirror mechanism applying also to ordinary memory and sensory perception.

In the case of in-animate targets the modeling is not so straightforward. One could however assume that also now negentropic entanglement is involved and that the ATP of the operator is used. Note however the possibility of the more general mechanism at the end of the target.

1. In psychokinesis with inanimate target negentropic entanglement would be mediated by flux tubes containing ATP assignable to the operator. The metabolic energy of ATP of operator is transferred to the target. The increase in the rate of metabolism could therefore serve as a signature.
2. In the remote mental interaction with computer the intention is to affect the pattern of random numbers and the mere transfer of metabolic energy is not enough since the effect must also have a correct sign. The net effect is the change of the distribution of random numbers from expected and Tiller observes strange periodicities in the distribution. It seems that remote mental interaction must be able to affect the probabilities of the outcome so that they are not identical

as randomness would require. What could be the mechanism? Direct entanglement with the representation of bits is not plausible. While writing this article it occurred to me that there might be a connection with the model for Shnoll effect (see chapter *A Possible Explanation of Shnoll Effect* of [30]) which I developed for a couple of years ago and based on a deformation of probability distributions based on p-adic mathematics and quantum groups. What is remarkable is that the parameters characterizing statistical distributions vary slowly with periodicities assignable to the gravitational fields in solar system. Could it be that also the statistical effects of intentional action could be characterized by the same mathematics leading to purely number theoretical predictions? This will be discussed in more detail below which I developed for a couple of years ago and based on a deformation of probability distributions based on p-adic mathematics and quantum groups. What is remarkable is that the parameters characterizing statistical distributions vary slowly with periodicities assignable to the gravitational fields in solar system. Could it be that also the statistical effects of intentional action could be characterized by the same mathematics leading to purely number theoretical predictions? This will be discussed in more detail below.

3. In the intentional imprinting of Tiller creation of flux tubes connecting the magnetic body of operator and non-living target would take place. Intentional action induces changes such as change of pH and this could rely energetically on the use of ATP. Magnetic fields should be important and cyclotron frequencies might be important. When a sequence of random bits is used, periodicities with cyclotron frequencies are suggestive supporting the hypothesis involving magnetic flux tubes and Shnoll effect.
4. What could be the mechanism in the case of remote viewing? Magnetic body should receive from the target extrasensory input generating sensory percepts or more abstract cognitive mental images such abstract shape. Could the signal arrive from the target to the magnetic body of operator and therefrom to the biological body - maybe brain - of the operator to create genuine sensory percept? To have a genuine sensory percept backprojection to sensory organs is necessary and in TGD based model for sensory qualia the back projections to sensory organs are in a central role: the virtual world sensory input from brain and possibly from magnetic body to sensory organs used to build standardized mental images. Or is there any creation of sensory percept?
5. In the case of precognition the situation is not at all clear. In ZEO based vision the simplest view is that the "upper" light-like boundary of CD corresponds to the seat of sensory percepts realized as mental images. Memories would correspond to information arriving from the geometric past inside CD. Precognition would mean receiving information from the geometric future of CD. Is this possible? How this would be realized. The vision about generalized Feynman diagrams suggests that given CD surrounds a vertex of generalized Feynman diagram in certain scale and that larger CDs are present and precognition would involve time reversed signals at the level of next CD. There presence of larger CD and longer time scale would mean that prophets are indeed in certain sense "messengers of Gods".

Why we do not remember the geometric future? Is the reason that the contents of conscious experience is about the boundary of CD which performs the state function reduction?

4 Parapsychological phenomena

In this section various parapsychological phenomena are discussed in the general framework introduced in the previous section.

4.1 Extrasensory perception, precognition, and other parapsychic effects

The general model for paranormal effects relies on same basic ideas as the model of quantum biology.

1. The transformation of p-adic space-time sheets makes possible the transformation of intentions to actions (see chapter *p-Adic Physics as Physics of Cognition and Intention* of [33]). Since p-adic space-time sheets have literally infinite size in real sense, distance does not matter. The set of points in the intersection of p-adic and corresponding real space-time sheet obeying same

algebraic equations consists of rational and possibly also algebraic points common to real and p-adic variants of imbedding space.

Paraphychological phenomena involve the transfer of information and negentropic entanglement makes possible genuine information at quantum level as also breaking of the second law of thermodynamics in the time scale of CD in question. Hence remote mental interactions should involve the generation of negentropic entanglement irrespective of whether the target is living system or consists of "dead" matter.

2. The idea about field body serving effectively as an intentional agent is second element of the model. The topological light rays representing negative energy signals propagating into geometric past created by a transformation of p-adic space-time sheet to a real one might be said to represent the "desire" inducing neural activities in the brain of geometric past. This mechanism provides not only a model for how magnetic body uses biological body as a motor instrument but also for PK.

MEs acting as bridges between different organisms would mediate em oscillations allow a directed transmission of smaller MEs behaving effectively as particles moving with light velocity. These MEs could be both real and p-adic and -using the terminology of Qigong practice- would represent qi (action) and yi (intention) respectively. An essential element would be resonance: sender and receiver in should be accompanied by MEs characterized by the same fundamental frequency: only these MEs could resonantly connect healer and healee. Healer must have ability to continuously vary the healing frequency.

MEs would naturally correspond to pairs of positive and negative energy space-time sheets. They would be attached to magnetic flux tubes and magnetic mirrors consisting of two flux sheets would make possible sensory-motor loop.

3. Zero energy ontology justifies the notion of negative energy signals and brings in also CD s as correlates of selves and natural fundamental targets of remote mental interactions. Zero energy ontology and the new view about time allows to assume that sensory qualia are at the level of sensory organ (objections such as phantom leg phenomenon can be circumvented) and that symbolic representations of objects of perceptive field and their attributes reside in brain.

Sensory input generates sensory representations based on real space-time sheets possibly accompanied by p-adic cognitive space-time sheets. Field body can share these mental images by quantum entanglement and also receive sensory information as classical signals involving using frequency coding and coding by temporal patters. These latter representations would correspond to cognitive and emotional aspects associated with the sensory input. One could even say that higher level sensory representations are somatosensory experiences of field body. The intersection points of real and p-adic space-time sheet would determine the physical cognitive representation and would be always discrete. The analogy with the discreteness of numerics should be noticed. Since this model would apply also to extrasensory perception, the attribute "extrasensory" becomes somewhat misleading attribute.

4. Extrasensory perception could also result from the direct electromagnetic perturbation of the sensory magnetic canvas outside the body and the sounds generated by auroras and meteors might be genuine "extrasensory" perceptions of this kind (see chapter *Quantum Model of EEG* of [38]). The frequency spectrum for the sounds produced by meteors and detected both sensorily and electronically in in the range 37 – 44 Hz [3] , which is the range of thalamocortical resonance frequencies associated with sensory representations in magnetic sensory canvas model. The sounds are several orders of magnitude more intense than they should be unless em perturbations propagate to Earth in a channelled manner. Only few meteors generate these sounds. These observations suggest that a resonant amplification of the em perturbations by magnetic mirrors of the sensory canvas channelling the em field to the surface of Earth are in question.
5. One might argue that if memes are not universal, remote cognition is not very useful. If memetic and genetic codes are realized in terms of CD s of quarks and leptons, one would have universality. If DNA double strand provides the relay station through which sensory input and motor output of the magnetic body flows, one would achieve universality of communication and control mechanisms at the level of living matter. An interesting question is whether memes are really

species-specific as the morphic fields are in Sheldrake's theory. The ability of shamans to transform at the level of conscious experience to animals suggests that this might not be the case. There is also a famous real life story about a student who spend several days in the experiential world of dog. Various identification phenomena would very probably involve also magnetic mirrors acting as bridges between say shaman and animal (or possibly multibody collective self defining 'species self') and making possible to share the experience of animal. Same mechanism as in the case of long term memories would be in question but with personal memories being replaced with the experiences of another species.

The fact that p-adic space-time sheets have literally infinite size suggests that cognition and intentionality are cosmic phenomena and that there might be cosmic pool of shared cognitive mental images. Hence memes could be completely universal.

4.2 Psychokinesis

One can classify psychokinesis to various types depending on whether the target is living or "dead" and whether the effect on target is a mere transfer of energy and momentum or control action involving information transfer.

Below I briefly discuss an early TGD inspired model of PK, a general model of PK assuming time mirror mechanism of ordinary intentional action but applied by the magnetic body of the operator to a system different from the biological body, and a more specific model for machine-human interactions. Also concrete examples of various kinds of PK effects are discussed.

4.2.1 A possible model for psychokinesis with non-machine targets

In chapter *Wormhole Magnetic Fields* of [34] a mechanism of psychokinesis base a mechanism of psychokinesis based on the generation of wormhole magnetic field configurations making possible levitation was proposed. Although this mechanism was yet general it deserves a discussion and reader is recommended chapter *Wormhole Magnetic Fields* of [34] for details. Basic mechanism is the levitation of diamagnetic substances in an external magnetic field: the force results when the diamagnetic substance repels external magnetic field from its interior. The force is essentially the gradient of the net magnetic energy inside the volume defined by the object.

The mechanism is purely TGD based and relies on the generation of a pair of space-time sheets having opposite time orientations, and carrying opposite magnetic fields and opposite energy densities, and the subsequent interaction of the second space-time sheet with the object moved in the psychokinesis. Exactly the same mechanism applies in case of MEs (massless extremals) and could be used to generate coherent locomotion of organism resulting as a recoil effect when the second ME is absorbed by the body part. MEs provide a candidate for the mechanism of psychokinesis.

4.2.2 Mind-Machine interactions

Mind-Machine interactions represent a modern branch of parapsychological research and nowadays methodologically highly advanced. These interactions have been studied by several groups and individuals: I mention only the Princeton Engineering Anomalies Research (PEAR), which is a group directed by Prof. Jahn, the Anomalous Cognition Project of Dick Bierman, and the retropsychokinesis work of Helmut Schmidt. In the sequel some aspects of this work are discussed.

The generation of negentropic time like entanglement between operator and target leading to a superposition of pre-existing and desired zero energy states and a subsequent increase of the amplitude of the desired outcome could be the general mechanism of machine mind interactions. "How can it happen?" is a highly relevant question in the case experiments involving the attempt of an operator to affect the function of a machine like computer whose detailed function is not known to the operator. How the mere intent can be transformed to action without any conscious knowledge about how it is achieved? Are there some selves in the self hierarchy which consciously how the intended effect can be achieved? The attempt to understand how neuro-feedback affect the behavior of single neuron leads to the same question. 'How can it happen?' could have two answers. Either the operator learns to who to affect the outcome by the simple sensory-motor loop provided by MEs or there is third party who knows and corresponds to a higher collective level of consciousness.

1. Retro psychokinesis with random number generators

The analysis of experiments [9,10,18] discussed in the (see chapter *Time and Consciousness* of [35]) suggests that the geometric past can change in the time scale of a fraction of second. Both the work done at PEAR [16] and the work of Helmut Schmidt with retro psychokinesis [20] provide support for the change of the geometric past in much longer time scales. PEAR experiments demonstrate the anomalous effect also in the direction of future. For instance, the experiments of Schmidt done 1992 discussed in *New Scientist* [13] demonstrate that martial art students were able to affect the visual display determined by pre-recorded random numbers. The probability for this kind of deviations from non-randomness was about 1/1000. Henry Stapp proposed an explanation for this in his paper published in *Phys. Rev. A* [22] based on nonlinear quantum mechanics.

The change of also geometric past in the quantum jump between quantum histories implies the notion of a four-dimensional physical reality and forces to regard three-dimensionality of reality as illusion created by the 3-dimensionality of our sensory experience (recall the notion of the association sequence). This implies that our geometric past is changing all the subjective time and that communications to the geometric past and future are possible and are consistent with the weak causality violation hypothesis of Schmidt [20]. What this hypothesis implies that in the newest quantum history generated by RPK all separate records contain the pre-recorded random numbers are altered in the same manner in RPK. Schmidt has tested weak causality hypothesis by using two separate cassette tapes containing the pre-recorded random numbers, one used in the PK experiment and another one kept locked in a safe. The records were indeed found to be identical after the experiment.

The results of Schmidt suggest also classical signaling to the direction of the geometric past. Real space-time sheets with negative time orientation could serve as the geometric correlates for these signals.

2. The work of Princeton Engineering Anomalies Research group

The study of anomalies in human-machine anomalies provide a highly sophisticated and controlled manner to study psychokinesis in its various forms. For instance, in the experiments carried out in PEAR group (Princeton Engineering Anomalies Research) [16] operators try to affect various kinds of electronic, mechanical, acoustical, optical and fluid devices. In unattended calibrations these devices yield random output whereas in the experimental situation operator tries intentionally to affect the output so that non-randomness results. Each input that operator tries to affect consists of 200 bits formed from a random physical signal and operator can have either the intention to increase the number of 1:s (high), the number of 0:s (low) or have no intention at all (baseline). Operators can exert their efforts from a distance of thousands of miles, before or after the the actual operation of the devices. Over the laboratory's 20-year history, thousands of such experiments, involving about 100 millions of trials, have been performed by several hundred operators.

The observed effects can be summarized as the average for the sum of bits which is 100.026 for high and 99.984 for low. The effect is by a factor 3.6 higher than the expected margin of error. Effects are thus quite small, of the order of a few parts in ten thousand on average, but they are statistically repeatable and compound to highly significant deviations from chance expectations. Effects are highly operator specific and there are significant disparities between male and female performances. The random devices respond also to the group activities of large numbers of people and are especially sensitive to the effect of small intimate groups, group rituals, sacred rites, musical and theatrical performances, and charismatic events.

Time mirror mechanism suggests the following model for the machine-human interactions encountered in say PEAR experiments.

1. The effect of intention could be on the generator of random noise, on bit sequence represented in the computer memory, or even on the recorded value of the sum of bits. A possible mechanism in the latter two cases is the reversal of electromagnetically represented bit.
2. The general mechanism of intentional action involves negative energy signals inducing a change in the charge distribution determining the value of bit. Negative energy photon could induce a dropping of ions to a larger space-time sheet. Also the emission of negative energy dark W bosons (appearing in TGD based model of nerve pulse) could induce a change in the net charge. In both cases the sign of charge would correlate with the character of intention and for the first mechanism there would be asymmetry between "high" and "low" (proton, electron).

3. The work of William Tiller

[23] [23–26] has performed experiments involving intentional imprinting of targets such as water. The model for the findings of Tiller is discussed in the chapter *Bio-Systems as Conscious Holograms* of [35]. The imprinting manifested itself as temporal and spatial oscillations of pH and temperature. The surprising finding was conditioning: also the air around intentionally imprinted device exhibited these oscillations. Also computer could be conditioned. The Fourier transform of the correlation function for bit sequences of random number generator demonstrated peaks at harmonics of $f = 1/T$, $T = 113.778$ min. 2^n -multiple of .1 seconds for $n = 16$ would correspond to $k = 143$ and $T = 109.23$ minutes which is by about 4 per cent too small. The proposed assignment of cyclotron photons with motor action leads to ask whether large \hbar dark cyclotron photons with these frequencies could induce a periodic perturbation of the random bit sequence?

4.2.3 Could Shnoll effect and statistical effects of psychokinesis have common mathematical description?

In the remote mental interaction with computer the intention is to affect the pattern of random numbers and the mere transfer of metabolic energy is not enough since the effect must also have a correct sign. The net effect is the change of the distribution of random numbers from expected and Tiller observes strange periodicities in the distribution. It seems that remote mental interaction must be able to affect the probabilities of the outcome so that they are not identical as randomness would require. What could be the mechanism? Direct entanglement with the representation of bits is not plausible.

1. This brings in mind Shnoll effect (see chapter *A Possible Explanation of Shnoll Effect* of [30]) in which probability distribution $p(n)$ for an integer valued observable transforms from expected smooth distribution - say Poisson distribution - to a many-peaked distribution. The distribution could relate to microscopic observable but the modification of distribution seems to depend on gravitational field created by solar system so that astrophysical and microscopic dynamics couple at the level of probability distributions. I have proposed a mathematical model involving p-adic numbers and their quantum counterparts as a model for the effect but have not been able to understand this astro-micro correlation. Could it be that Shnoll effect allows to describe also statistical psychokinesis. This would lead to precise number theoretic predictions and the model would be testable in which probability distribution $p(n)$ for an integer valued observable transforms from expected smooth distribution - say Poisson distribution - to a many-peaked distribution. The distribution could relate to microscopic observable but the modification of distribution seems to depend on gravitational field created by solar system so that astrophysical and microscopic dynamics couple at the level of probability distributions. I have proposed a mathematical model involving p-adic numbers and their quantum counterparts as a model for the effect but have not been able to understand this astro-micro correlation. Could it be that Shnoll effect allows to describe also statistical psychokinesis. This would lead to precise number theoretic predictions and the model would be testable.

There is an interesting analogy with quantum computation in TGD framework. Individual bits or bit sequences correspond to outcomes of quantum computations inside CD and their distribution determines the outcome of the computation. Intentional variant Shnoll effect would mean that intentional action can affect this distribution. One could localize this intentional action to a CD containing the CDs defining bits.

It is however far from clear whether this model can be formulated as a modification for the probability for a given value of bit. It might well be that the effect is global rather than local and on the distribution of number of bits with a given value. Indeed, in TGD framework reality is 4-D and the sequence of bits produced by random number generator is what correspond to the event rather than single bit!

2. One can of course consider also a local model. A negentropic entanglement with the macroscopic quantum states of random number generator affecting the environment of system responsible for the random event could be in question and change the situation in such a manner that second value of bit becomes more probable. Could the magnetic fields associated with the flux tubes mediating the negentropic entanglement with RNG and interacting with the target make

second bit energetically slightly more favored? Could the negentropic entanglement prevent the normal state function reduction producing the random number and produce the random number as ATP is transformed to ADP so that operator would perform some fraction of state function reductions? How it is possible to have an effect with a correct sign without any precise knowledge about the functioning of RG?

4.2.4 Telekinesis and electrostatics

In the book "Mind at Large" edited by Tart, Puthoff, and Targ there is an article "An Investigation of Soviet Psychical Research" by Wortz *et al* reporting among other things the research related to the electrostatic aspects of telekinesis. The article mentions the work done by Vasiliev and associates with Nina Kulagina and the work of Adamenko with Alla Vinogradova, another highly gifted person in telekinesis. Kulagina and Vinogradova are said to have been able to move objects of.1 kg along table. Interestingly, according to the article PK able persons tend to be women. Adamenko has tried to understand the phenomenon theoretically and has proposed that the static charges of objects and electrostatic forces generated by the subject might explain the effects.

Adamenko's work

The objects moved by subject persons were located at a table which was a di-electric cube with of side length of.5 meters in Adamenko's experiments.

1. Vinogradova was able to induce an electric charge in cube and then move objects located at the cube. With biofeedback training also other subjects were able to replicate Vinogradova's feat.
2. To move the object the static friction (friction coefficient between.1 and.3) must be overcome. Adamenko theorizes that there is kind of buoyancy force caused by the flow of air molecules involved and that the electric field somehow induces this force.
3. The reported electric field was 10 kV/cm and corresponds to the voltage at which a di-electric breakdown occurs in a dry air. The reported movement of the air could correspond to a corona wind resulting at strong electric fields.
4. Adamenko assumes that the objects had either static charge or that they were polarizable and developed a dipole moment in the external electric field. The electrostatic interaction with the electric field induced by Vinogradova would have been the cause of the movement.

TGD based model

TGD based model for phenomena is based on the general mechanism of mind-matter interactions allowed by the many-sheeted space-time concept. There are three questions to be answered: How the table and possibly also object were charged?; How the motion of the object was caused?; How the object was lifted from table to circumvent friction force? *How the table and object were charged?*

The charging of the table is certainly crucial for the PK effect. Vinogradova could have emitted "topological lightrays" (MEs), as a matter fact high frequency (microwave) MEs propagating like particles within low frequency (ELF) MEs. Negative energy ELF MEs could have served as correlates for entanglement. Entanglement is however not necessary in this case since conscious telepathy is not involved. Microwave MEs would have induced bridges between the atomic space-time sheets of the object and super-conducting magnetic flux tubes of Earth. The bridges would have made possible ionic and electronic currents between these space-time sheets and led to the charging of the table and possibly of also object. A suitable intentional targeting of MEs would allow to control the charge distributions of the table and object and therefore the pattern of the induced electrostatic fields.

What could have produced the motion of the object?

The interaction of the object with the electrostatic field of the table is a possible explanation for the PK effect. The distribution of the charges of the table and object would allow to control the field pattern and thus the direction of the electrostatic force. This is however not the only mechanism. Ionic currents from the magnetic flux tubes to the atomic space-time sheets of the object produce recoil effect (momentum is conserved only in many-sheeted space-time, not for single space-time sheet),

and this could have been the fundamental mechanism of motion (essentially the mechanism of rocket motion). In both cases the subject would have produced only the ME bridges taking care of the control of motion but would not have provided the energy and momentum.

The experiments of Modanese and Podkletnov [5] provide support for the mechanism. Modanese and Podkletnov studied capacitor at a rather low temperature and at a voltage near the di-electric breakdown voltage. The second electrode was a super-conducting disk. The resulting discharge was large and coherent and accompanied by radiation pulses of unknown type. The pulses induced the motion of the air and kicked test penduli. The force was proportional to the mass of the penduli. The effect caused by the pulses did not weaken with distance. This supports the view that the pulses were TGD counterparts of the Tesla's scalar waves and induced temporary bridges between test penduli and magnetic flux tubes inducing the flow of ions and the recoil effect.

How to circumvent the friction?: a connection with the physics of lifters

Lifters exhibit the called Biefeld-Brown effect (see chapter *The Notion of Free Energy and Many-Sheeted Space-Time Concept* of [32]). Lifters are asymmetric capacitors consisting typically of a wire electrode and planar electrode, are in a voltage slightly above the voltage causing di-electric breakdown. Lifters move in the direction of the smaller electrode. Also the flow of air from the small electrode to the large one is involved. On basis of the experimentation and guide the findings of Juha Hartikka, I ended up with a simple model of lifters. What would happen is that there is an electric discharge in the form of small plasmoids (discharge sparks would be analogous to ball lightnings), whose emission from the small electrode causes the recoil effect. The emission of the scalar wave pulses could induce the motion of the air by Modanese-Podkletnov recoil mechanism. Since the table is charged, there should be a strong electric field also in the narrow space between the object and table. Therefore electronic discharges from the object could occur, and lead to a small scale lifter effect lifting the object slightly above the table. This does not require the object to carry a net charge.

Could the remote EEG sensor of Sergeyev be based on the same mechanism as PK?

In the same article also the remote EEG sensor invented by the mathematician Sergeyev claimed to remote sense EEG from a distance of 5 meters is described. Unfortunately, the information related to the invention of Sergeyev is classified. What is however known from the existing literature is that the sensor is surprisingly simple, consisting of a metal disk suspended into water and coated with a semiconductor. The immersion in water is reported to double the effectiveness of the sensor. According to the report, the ordinary EEG sensors can detect EEG only up to a distance of few centimeters since the noise of the environment masks the (Maxwellian) EEG at larger distances. Furthermore, the amplifying effect of water is not consistent with the high value of the di-electric constant of water if ordinary Maxwellian electrostatics is behind the sensor.

Sergeyev's explanation for the functioning of the sensor utilizes bio-plasma hypothesis. The use of the term bio-plasma is remarkable since professional physicists know that plasma state at the temperatures and densities of living matter is not possible in standard physics universe. In TGD framework super-conducting ions leaking from the magnetic flux tubes of the Earth's magnetic field can give rise to what might be called bio-plasma, and Sergeyev's sensor is indeed said to produce bio-plasmagram. Also maser (microwave laser) effect in bio-matter producing ions and electrons flowing into air is mentioned.

All this suggests that EEG MEs containing microwave MEs inducing a leakage of the ions from magnetic flux tubes to the atomic space-time sheets of the metal disk and in this manner generate plasma. The strength of the resulting electric signal would be modulated by the intensity of the net flux of EEG MEs so that information about EEG would indeed result. EEG MEs would not topologically condense at atomic space-time sheets but propagate as bridges connecting the boundaries of the magnetic flux tubes and atomic $k = 151$ (cell membrane thickness) space-time sheets. This would explain the dissipation free propagation. For positive energy MEs the effective phase velocity would be of the same order as the alpha wave phase velocity since these MEs would tend to "stuck" (in quantum sense). The basic sensing mechanism would be very much the same as explaining the generation of nerve pulse. Also Z^0 MEs could be involved and would usually have a very weak interaction with the environment. The ability of water to act as a many-sheeted maser, presumably crucial for the functioning of living matter, could explain why the water amplifies the effectiveness of the sensor.

Also the remote sensing of the pulsating magnetic fields produced by Nina Kalugina and having strength nearly equal to that of the Earth's magnetic field are mentioned in the article. The possible

significance of the pulsating magnetic fields for PK is still poorly understood in the TGD framework: the problem is that solutions of field equations representing this kind of field configurations are not known. One might however think that the pulsating magnetic fields carry also supra-currents, and that their presence intensifies the leakage of charged particles to the atomic space-time sheets of the remote sensor device.

4.3 Healing as rejuvenation?

The article of Lian Sidorov [21] and its references give a thorough view about remote healing and viewing. One particular healing method goes under name Qigong (see the article [14]). Qigong is a general term for a large variety of traditional Chinese energy exercises and therapies. Qigong is generally considered as a self-training method or process through Qi (vital energy) and Yi (consciousness or intention) cultivation to achieve the optimal state of both body and mind. The traditional Chinese medicine postulates the existence of Qi, which could be regarded as a kind of subtle energy circulating around the physical body.

The physiological, chemical and electromagnetic effects of both internal and external Qigong have been studied ([21] contains large number of related references). Also the effects of Qigong healing on cancer has been studied [14].

4.3.1 Negentropic entanglement as Qi?

In TGD framework the energy associated with MEs and supracurrents flowing along magnetic circuitry could be a natural counterpart of Qi. The positive metabolic energy assignable to negentropic entanglement or negentropic entanglement could be an alternative identification for Qi. If entanglement is entropic it corresponds to bound state entanglement and this entanglement of its negative metabolic energy could be seen as the counterpart of "sick Qi".

Yi could in turn would translate to p-adic cognitive representations representing also intentions, perhaps p-adic variants of MEs or even magnetic mirrors. Internal Qigong refers to self healing whereas external Qigong means directing Qi energy or intention to help others by opening Qi blockages or inducing the sick Qi to get out of body, or helping to achieve Qi balance. The transfer of metabolic energy by ATP-ADP process (see chapter *Evolution in Many-Sheeted Space-Time* of [36]) would be basically a transfer of negentropic entanglement in TGD framework and Qi blockage could be interpreted as a blockage preventing transfer of this entanglement (of metabolic energy in standard framework) would be basically a transfer of negentropic entanglement in TGD framework and Qi blockage could be interpreted as a blockage preventing transfer of this entanglement (of metabolic energy in standard framework).

Zero energy ontology in principle makes possible the creation of matter from vacuum as zero energy states. This process involves a generation of a new CD serving as a correlate for self carrying positive and negative energy parts of the zero energy state at its future and past boundaries. The standard physics interpretation would be as a quantum fluctuation in a space-time volume dictated by CD . At space-time level space-time sheets within CD would be the correlate. Also the transformation of p-adic space-time sheets to real ones and vice versa in the intersection of real and p-adic worlds becomes possible.

4.4 Healing as regeneration of negentropic resources?

De-differentiation of cells taking place in the healing of cancer cells resembles rejuvenation. But what does rejuvenation mean? The first guess is that it corresponds to time reversal and running of biological programs backwards so that the stage before the emergence of disorder is reached. This interpretation is attractive but during the preparation of this article I realized that it does not conform with the most recent view about what the arrow of geometric time is (see chapter *About Nature of Time* of [33]).

To begin with, one must understand how the arrow of psychological time is induced from quantum arrow. This question is not completely understood in TGD framework. There are several arrows of time: quantum arrow of time, arrow of the geometric time of 8-D imbedding space, and the arrow of the geometric time of 4-D space-time sheet of subsystem identifiable psychological time.

1. Quantum arrow of time has a nice explanation: for zero energy states either positive or negative energy states (but not both) can be chosen to have well defined single particle quantum numbers - they are prepared. The simplest manner to identify quantum jump and unitary process U would be as state function reduction taking place alternatively for positive or negative energy part of the state. One would have time-flip flop at imbedding space level: the arrow of 8-D imbedding space geometric time would alternate. This of course sounds weird unless one makes a sharp distinction between different times.
2. What about the arrow of the time at 4-D space-time level? What is clear that observer of space-time as Flatlander does not observe the change of the arrow of imbedding space time but experiences constant arrow of time reflecting itself as second law. In fact, entropy defines natural time coordinate for Flatlander. This can be understood if quantum average 4-D space-time surfaces associated with subsequent zero energy states effectively combine to form a multiply folded towel like structure. In quantum jump 4-D space-time surface can be said to turn downwards at the upper end of CD , return back to turn upwards at the lower end of CD , and so on. Flatlander would experience the flow of 4-D time as a continual increase of entropy manifesting itself as properties of the space-time sheet with which Flatlander identifies herself. The 4-D arrow of time would not change. Only by observing space-time sheets in different time scales would make possible for the Flatlander to discover that the 8-D imbedding space arrow of time alternates. Phase conjugate laser beams and self assembly in biological systems would represent examples of processes allowing to overcome the restrictions of being Flatlander. During last decades we have been indeed able to overcome these restrictions as the discovery of phase conjugate laser beams demonstrates [1]. In TGD framework massless extremals (MEs, topological light rays) provide a representation for the phase conjugate laser beams. Also the discovery of Italian physicist Fantappie that living systems are characterized by both entropic and syntropic processes demonstrates the presence of both directions for the arrow of time at imbedding space level [27, 28].

In this framework healing corresponds to rejuvenation if the age of cell is as entropy defining also a measure for the amount of differentiation that has occurred. By second law aging would be reduction of negentropy resources and healing as rejuvenation would mean the increase of negentropy of the system. This is possible if the notion of negentropic entanglement is accepted. The healing as increase of the negentropy of the system implying rejuvenation should take place in state function reductions and NMP (see chapter *Negentropy Maximization Principle* of [33]) would make them possible if the notion of number theoretic entanglement entropy is accepted.

4.4.1 How topological light rays and magnetic flux tubes relate to healing?

Massless extremals are excellent candidates for the space-time correlates of communication and control signals and depending on the sign of the energy can propagate in both time directions. Real bosons correspond to wormhole contacts connecting positive (negative) energy MEs whereas virtual bosons are identified the wormhole contacts connecting positive and negative energy MEs. In zero energy ontology it makes sense to speak about quantum jumps transforming p-adic MEs to real ones and about reflection of MEs in time direction so that positive energy ME transforms to negative energy ME or vice versa. Also MEs analogous to virtual particles are possible. They correspond to pairs of MEs with opposite time orientations so that the wormhole throats carry opposite signs of energy. In this case the classical momentum is not anymore light-like and although wormhole throats are massless the boson itself can be interpreted as a virtual off-mass-shell particle.

In quantum optics time reversal is known as a phase conjugation [1] and is one of the basic notions of holography. MEs act as both quantum holograms and receiving and sending quantum antennae (see chapter *Quantum Antenna Hypothesis* of [34]). MEs can generate reference waves of coherent photons interacting with other MEs and activating dynamical holograms of coherent light. If the reference wave is phase conjugated, the resulting hologram is time reversed.

What makes this so interesting is that MEs and magnetic flux tubes are the tools of quantum control in the TGD based view about biosystem as a symbiosis in which MEs control superconducting magnetic flux tubes controlling ordinary matter at atomic space-time sheets via the many-sheeted ionic flow equilibrium. The coherent light pattern emitted by ME resulting from the interaction of

ME with the reference wave (its phase conjugate) could act as a control command (time reversed control command) inducing process (time reversed process).

How topological light rays and magnetic flux tubes relate to healing?

1. In the original vision about healing as time reversal for biological programs phase conjugate reference waves would provide a simple and general mechanism of healing by time reversal allowing the living matter to fight against second law. This picture is however not consistent with the recent view about the arrow of time.
2. In the recent view about the arrow of time topological light rays generate non-local single particle excitations at the flux tubes carrying cyclotron Bose-Einstein condensates and the resulting negentropic entanglement induces healing.

4.5 Near death experiences

Near death experiences [29] are rather common. For instance, the victims of various accidents have NDEs. These experiences are known for centuries but it was the best-selling book "Life after Life" of Raymond Moody which brought these experiences known to the general public [19]. It is hard to imagine the testing of the or the authenticity of these experiences in controlled laboratory circumstances. This kind of experiences might however provide data bits important in the attempts to develop a TGD based view about consciousness, consider only the highly speculative notion of magnetic body.

4.5.1 What are NDEs?

NDEs seem to possess invariantly the same characteristic features. There are feelings of peace and joy, time speeded up, heightened sense, lost awareness of body, seeing bright light, entering another world, encountering a mystical being or deceased relatives and coming to a point of no return. The experiences seem to proceed in quite universal manner. First comes a loud buzzing or ringing noise and a long dark tunnel. Patient sees his own body from outside and does not feel any pain or agony anymore. Patient meets others and a being of light who shows his life in its entirety as a kind of playback to evaluate. Then comes the point of no return, and although patient feels peace, joy, and love, the patient has to return to continue his life. Often these experiences induce very profound changes in the subsequent life of the patient. The claims of Moody have been supported by subsequent research and hardly anyone, even the most foolhardy skeptic, denies the reality of these experiences.

The latest twist in the development emerged when University of Southampton research team announced the result of a one-year study of NDEs of victims of a heart attack supporting the view that consciousness and mind exist after the brain has ceased to function and the body is clinically dead. The resuscitated patients were various times clinically dead, with no pulse, no respiration and fixed dilated pupils. Independent EEG studies have confirmed that brain's electric activity, and hence brain function (according to standard dogmas of neuro science) ceases in this kind of situation. 11 per cent of patients who survived the heart arrest however recalled emotions and visions during this state. This announcement has created considerable excitement in various consciousness related discussion groups and the question whether some of the basic dogmas of neuroscience are badly wrong has been raised by the neuroscientists themselves.

4.5.2 Is consciousness after biological death possible?

TGD allows to develop highly speculative views about consciousness after biological death before comparison with other theories and detailed analysis of NDEs. The view involves unavoidably some vision about psychological time. Here TGD however can only propose alternatives. The following ones represent basic questions whose answers are not yet completely unique. What gives rise to the arrow of experienced time and induces the arrow of geometric time? How can one understand the localization for the contents of sensory and volitional consciousness? The following argument relies to one particular vision about the experienced flow of geometric time identifying it as a motion of a front of p-adic-to-real phase transition representing volitional action.

The basic notion is that of 4-D body involving both the physical body and the magnetic mirror structures associated with it. 4-D body is gradually carved quantum jump by quantum jump like an artwork via p-adic-to-real phase transitions representing the progress of front of volition to the

geometric future and by the reverse phase transitions deconstructing the 4-D body or its parts. This fractal trial-and-error construction of the 4-D body occurs in various time and length scales. Gradually increasingly stable 4-D body results. The volition is concentrated to the front of the p-adic-to-real phase transition so that the experience of 4-D body for which deconstruction processes occurs only in the time scales short compared to the duration of lifecycle, would be about entire lifecycle and in this sense 'timeless'.

The simplest view assumes that the front of volition does not propagate after the physical death. One could however consider also the possibility that the front of volition continues to propagate by transforming p-adic magnetic mirror structures to real ones: volitional life would continue in electromagnetic form. This could even make possible the communications of the deceased with the living ones since the resulting real magnetic mirrors could connect the deceased with the living.

4.5.3 Tunnel experience

The theory of Grof and Halifax [17] relies on the observation that NDE involves elements which might be assigned to the moment of birth. Perhaps NDE is reliving the moment of birth. The counter argument is that the newly born baby does not see anything unless she is able to perceive extrasensorily. 'Nothing but hallucinations' theories are of course no explanations at all and belong to the same category as 'consciousness as mere illusion' theories. In neuroscience framework also the wake-up reality is seen basically as a hallucination produced by brain and coupled with sensory input to guarantee correspondence with what is out there.

The tunnel is experienced also during epilepsy and migraine, during meditation and relaxed state of mind, and with certain drugs like LSD, psilocybin and mescaline.

It has been suggested that the physiology of brain could explain the properties of near death experiences [15]. The theory of Cowan [15] states that the tunnel results from a failure of the inhibition leading to brain induced activity yielding visual experiences. What is however questionable is why person would feel falling into the tunnel, to say nothing about meeting deceased relatives. Blackmore and Troschlenko have proposed a theory in which also the motion along tunnel could be understood as a visual illusion [12].

TGD based explanation for tunnel experience might be simply as a direct visual experience about magnetic flux tube structures resulting from the perturbation of the magnetic sensory canvas outside body. Thus a genuine ESP would be in question. Magnetic field obeys indeed same basic equation as incompressible liquid flow. Both retinas and pineal gland ('third eye' literally since it contains retinal pigments and serves as a genuine third eye in some species (see chapter *General Theory of Qualia* of [35]) are magnetic structures. The practically always present vortex in center ('third eye' in my private terminology) could correspond to the magnetic flux tube structure emanating from the pineal gland whereas the very dynamical flow could correspond to the contribution of retinas. If the magnetic mirrors are universal electromagnetic bridges connecting us to other living beings, in particular to our friends and relatives, the meeting of the 4-D bodies of the deceased relatives would happen at the level of fields.

The movement along the tunnel could correspond to the propagation of p-adic-to-real phase transition along this kind of magnetic mirror structure transforming it from p-adic to real: thus the tunnel would be created after the biological death. During lifetime these em bridges would be p-adic and biological death be followed via the transformation of these bridges to real ones.

4.5.4 OBE aspect

Blackmore explains OBEs [11] as resulting from the replacement of ordinary self-center experience of world with bird's eye of view model where brain sees own body from above. Bird's eye of view is only a memory model so that extrasensory perceptions are predicted to be impossible during OBEs. There is however some evidence that patients can report very precise visual perceptions during OBE. It has been indeed argued, that some other senses than vision, namely (see chapter *Quantum Model for Hearing* of [38]) [11], could create indirectly these perceptions. It is however difficult for even the most hard-boiled materialist to understand how a clinically dead person could be able to effectively see by hearing, since this feat is impossible for even completely healthy person.

The idea of Blackmore about bird's eye of view is very attractive as such and can be interpreted in TGD framework in quite different manner. Cognitive maps based on the canonical identification map

(see chapter *Fusion of p-Adic and Real Variants of Quantum TGD to a More General Theory* of [33]) typically exterior to inside and vice versa. Thus both a p-adic map of the external world realized inside brain and a p-adic map of body and its surrounding realized outside the body are possible and would give models of the external world and self. The inside-to-exterior map could provide a bird's eye of view about body and its immediate surroundings.

Both exterior→interior and interior→exterior maps could contribute to the conscious experience even under the normal wake-up consciousness and the exterior contribution would thus represent genuinely extrasensory contribution to the conscious experience. When the ordinary sensory input and volitional activity ceases as it does during NDE, the contribution of the model of the external world to the conscious experience becomes negligible. It is quite possible that during sleep the bird's eye of view component also dominates but that no memories about this period are generated for the simple reason that the brain functions necessary for the generation of the memories are not active.

The notion of magnetic sensory canvas implies that we actually "see" at ELF frequencies using dark photons travelling from biological body to the magnetic body. The same would apply to other senses. This implies the possibility of experiences without any sensory input or even without any neuronal activity. Metabolic energy would be however required to generate the dark photon beams with ELF frequencies but having energies above thermal energy at physiological temperatures. This representation could be generated by the entire body and would give rise to a three-dimensional vision about body as seen by the environment. There is some evidence for this kind of anomalous vision.

1. Yogis have reported altered states of consciousness in which they see their own body three-dimensionally, that is simultaneously from all directions.
2. Becker tells in his book "Cross currents" [8] about a young cancer patient who told that he can see the interior of his own body. The patient could locate the calcium deposit left as tumor vanished. This supports the view that ELF MEs could project from the entire body to the sensory canvas.
3. Also the OBE experiences, for instance those associated with NDEs, could have a similar interpretation. The sensory input from eyes and even the input from neural activity could be absent during NDEs so that the visual experience should be determined by the background ELF component emanating from the brain and body. The third person perspective associated with OBEs might be always present but be masked by the strong sensory input.

Sensory canvas hypothesis provides a more concrete view about the situation. p-Adic-to-real phase transition of a p-adic magnetic sensory canvas to real one could also be part of the fundamental volitional process. The magnetic mirrors connecting brain to sensory canvas should be there also in the absence of sensory input. Could it be that the out of body view is always involved but masked by the from the body view and after the biological death only out of body view remains?

The competition between bird's eye of view and sensory view has also EEG correlate. Delta waves in the EEG spectrum are natural EEG correlates for the external part of cognition. The reason is that this part of EEG frequency spectrum has a shape and intensity very similar to that for the so called sferics [4], which correspond to meteorological electromagnetic perturbations typically associated with thunder storms. The degree of the sensory alertness correlates directly with the the ratio of the EEG net intensities in the delta band and in higher EEG bands [4]. This is consistent with the competition predicted by NMP. Certainly in the NDE experiences studied by the Southampton team only delta band is present in EEG. Note that delta waves dominate also during deep sleep.

Also alpha band is a good candidate for communicating sensory information to higher level selves having magnetic sensory canvas receiving sensory input from several brains simultaneously. It is indeed alpha band in which detectable changes occur in remote vision and remote healing [21]. Could it be that higher than alpha consciousness somehow transforms to alpha consciousness in biological death and could it be that alpha consciousness relates with the fact the lowest Schumann frequency associated with the perturbations of Earth's magnetic field is in the alpha band? It might be that magnetic transition frequencies are involved with the 'vertical' communications from brain to the sensory canvas whereas Schumann resonances would be involved with the lateral communications between different sensory canvases. The fact that hypnagogic experiences involving also identification with other persons (personal experience) appear in the borderline between wake and sleep when dominating EEG frequencies are around 7.8 Hz supports this view.

4.5.5 Life review

Blackmore explains the life review as an effect analogous to the lively episodal memories generated by stimulating temporal lobes. This explanation leaves open what exactly happens in the stimulation of the temporal lobes and what episodal memories are. To say nothing about the systematic review and evaluation.

In TGD framework brain and perceptive field are four-dimensional and it is quite possible that episodal memories are multitime experiences involving input which comes from the moment of the geometric time when the recalled experience happened and happens again at the level of sensory representation but not as real life event since this would involve macroscopic volition and induce miracle life events in the geometric future. The notion of 4-D body makes this idea concrete. In the biological death 4-D body becomes in some sense mature (about possible de-construction processes in shorter time scales). The volitional contribution essential for the illusion that world is 3-dimensional is not anymore present and entire 4-D body is experienced as a whole. Perhaps this is just what life review is.

Since geometric memories are in question, the review is only a narrative since our geometric past changes all the subjective time and the review is about geometric past subjectively now. Life review would be a temporal counterpart of the OBE experience in the sense that one sees one's geometric life history from outside in a 4-dimensional sense. This is possible since p-adic cognitive representations are four-dimensional and four-dimensional bird's eye of view could begin to dominate at the moment of death.

Also genuine subjective memories about time interval equal to the wake-up period of self and of order lifetime could be in question. This requires the occurrence of what might be called a p-adic phase transition to higher level self with much longer subjective memory: this view is in accordance with the vision about the physical death as a birth to a life in 'other world'. p-Adic phase transition could mean that the p-adic magnetic mirrors after the geometric time after biological death correspond to higher value of p and quite concretely, have lengths which are longer than during the physical life. This makes possible both geometric and subjective memories in much longer time scale.

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