

Quantum Model of Paranormal Phenomena

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Abstract

The general quantum model for bio-systems leads to a general model for electromagnetic bio-control which applies to a very wide variety of hard-to-understand bio-chemical phenomena such as molecular recognition mechanisms, water memory, and homeopathy and leads to a generalization of genetic code explaining the mystery of introns. The same model generalizes to a model of paranormal phenomena such as psychokinesis, remote sensing, remote healing, telepathy, communications with deceased, and instrumental transcommunications.

a) Magnetic mirrors (ME-magnetic flux tube pairs) connecting the sender and receiver make possible a universal mechanism for the transfer of intent and action. p-Adic MEs represent the transfer of a mere intent and real MEs represent a transfer of action. p-Adic ME can be transformed to real ME either by receiver or some higher level magnetic self.

b) The transfer of intent gives rise to mechanism of remote interaction which can act both endo- and exogenously. Magnetic mirrors characterized by their fundamental frequencies make possible bridges between sender and receiver (say healer and healee) and allow a resonant interaction in which healer can initiate various control commands acting as 4-dimensional templates represented as holograms. Also smaller MEs can be send along the MEs serving as bridges (this is like throwing balls with light velocity!). c) The ME-magnetic flux tube pair connecting sender and receiver acts as a reference wave which can initiate an arbitrarily complex hologram representing biological program. Sender has the ability to generate and amplify the frequencies which induce holograms representing the control commands. In particular, sender can initiate complex biological programs without knowing anything about their functioning.

d) Magnetic mirrors make possible also 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 that 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.

e) It is quite possible that also multibrained and -bodied higher level magnetic selves actively participate in the process. This makes possible coherent amplification effects (TEM, prayer groups) and also makes 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. 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 fast amplitude modulation of 10 Hz basic vibration frequency of speech organs.

1 Introduction

The violent encounters with skeptics have demonstrated to me that surprisingly many skeptics refuse to even consider the possibility of taking paranormal phenomena seriously because they take the materialistic-reductionistic world view as the final truth. Usually the discussions reduce to the attempt to give me a label of a pseudoscientist because I do not possess an influential position in the scientific community; because I have not published my work in respectable journal; etc..., and it is very difficult to dig even a single bit of information relating somehow to the actual contents of my work. Regrettably this seems to be the case for most of arguments used by those who appear publicly as skeptics. Needless to say, skepticism in this sense has nothing to do with skepticism in the real sense of the word. Just the opposite, these 'skeptics' identify themselves as the mind police of the dominating materialistic-reductionistic science and see as their holy goal the identification and ridiculization of the scientific dissidents as pseudo scientists. For instance, I have been blamed for super-naturalism because I have been forced to introduce the notion of quantum jump between quantum histories forcing in turn to give up the notion of observer independent objective reality. The attempts to defend this vision by telling that this is the only possible logically consistent view about quantum jump forced by General Coordinate Invariance alone and solving the basic paradoxes of modern physics have been waste of time.

There are of course notable exceptions to this rule of thumb: Susan Blackmore represents an example of an intellectually honest skeptic who respects also the different world views and takes materialistic dogma only one possible view about world which must be also subjected to testing.

The basic objection against paranormal phenomena by skeptic researchers such as Susan Blackmore, is that there is no theory of paranormal phenomena making possible meaningful experimental tests so that the minimal working hypothesis is that these phenomena do not exist. The absence of a theory certainly makes experimental approach extremely difficult: a good analogy of the situation is provided by the high energy elementary particle physics where the enormous amount of data and noise makes possible only the detection of signatures predicted by various theories by comparing highly detailed Monte Carlo simulations of model world with the data.

Personally I however see this attitude as counter productive: I agree with someone who said that the worst form of ignorance is to regard un-explainable as a synonym of impossible. I find it also very entertaining to play 'what if this is true' games with thoughts rather than adopting the somewhat boring role of a serious scientist. These thought games also often lead to ideas which need not be even related to the original question. I however hasten to admit that my attitude does not derive from a mere open-mindedness and mere desire to play thought games but from the simple facts of life: TGD indeed provides a conceptual framework in which paranormal phenomena might be understood and studied; secondly, as an eternally unemployed scientific dissident I really do not have anything to lose anymore.

1.1 Development of ideas about paranormal

During years I have developed several ideas about paranormal phenomena and, believing that there must be very few general principles behind these phenomena, I try to combine these ideas into a single coherent conceptual framework in this chapter. For the convenience of the reader it is good to summarize the evolution of the basic concepts briefly.

1. On the experimental side the most important boosts came from the lecture of Cyril Smith about homeopathy in CASYS'2001 conference [62] and from the contact with Lian Sidoroff and from reading her articles related to remote vision and healing [63]. Also the work of Gariaev's group on wave aspects of DNA [33] was important for the concretization of the ideas. Of course, without the already existing view about living matter as symbiosis of MEs, superconducting magnetic flux tubes and ordinary biomatter at atomic space-times sheets, which was inspired the information about effects of ELF em fields on brain [44] and by the strange findings challenging the notions of ionic pumps and channels [21] these developments would not have been possible.
2. On the theoretical side the realization that p-adic physics provides the physics of cognition and intention was a decisive breakthrough. The lectures of Peter Marcer about quantum holographic brain provided an important stimulus leading to the realization that MEs (massless extremals) serve among other things also as quantum holograms. The ideas about magnetic mirrors (ME-parallel magnetic flux tube pairs) acting as electromagnetic bridges between living subsystems and about liquid crystal blobs representing and amplifying the rotational, vibrational, etc. spectra of molecules, are the most recent newcomers in the zoo of ideas.
3. The resulting concrete view is that living organisms at all levels of the hierarchy are connected by the magnetic mirrors serving as electromagnetic bridges between them and making possible high precision directed communication, remote sensing, sensory representations using magnetic sensory canvas, memory as communication between the geometric past and geometric now, and remote control. Even the claimed communications with deceased can be seen as being based on the same mechanism as long term memory. Besides classical signalling with light velocity quantum entanglement (also timelike) mediated by MEs is key element of model and makes possible sharing of experiences. By fractality the same basic mechanisms are at work in all length scales: water memory and our long term memory are the same phenomenon but in different length scales. Similarly, the miraculous molecular recognition mechanisms and remote healing and vision are also phenomena based on the same basic mechanisms.
4. A further strong support for the idea that biosphere is a fractal organic whole came from the realization that the notion of psychological time leads to paradoxes unless one assumes that psychological time corresponds to

the space-time region at which macroscopic volition is concentrated: this front of volition proceeding in the direction of future is where the p-adic-to-real phase transition changing intention to macroscopic action dominantly occurs. Psychological time must be also common to me and my fellow human beings, probably for entire biosphere: otherwise strange paradoxes result.

1.2 Topics to be discussed

The flow diagram for this chapter looks like following.

1. I propose a general vision about the mechanisms behind the paranormal phenomena based on the ideas briefly summarized. This involves the new, more precise view about psychological time, p-adic physics as the physics of cognition and intention, the notion of magnetic mirrors, LC crystal water blobs as mimicking electromagnetically molecules and amplifying signals em signals, field representation of the genetic information based on magnetic mirrors, a general model for remote mental interactions, and the proposal that stochastic resonance serves a universal amplification mechanism.
2. Some paranormal phenomena in biological length scales are considered: in particular ideas about the memory of water (discussed more thoroughly in [K5]), healing by time reversal, and a TGD model explaining the functioning of the delaWarr camera are discussed.
3. Parapsychological phenomena like extrasensory perception, precognition, psychokinesis, near-death experiences, and communications between living and dead are discussed: remote healing and vision are discussed also in t [K5].
4. A TGD based model for the instrumental transcommunication (ITC), in particular electronic voice phenomena (EVP), is developed in more detail (I am grateful for Adrian Klein for informing me about these phenomena).
5. Adaptive robots of Mark Tilden behave very much like living creatures and the possibility that this might actually be the case is considered.

I want to emphasize again to the blood-thirsty skeptics that I am not believer nor non-believer. These phenomena, be they actual or not, are extremely stimulating for a theorist with a trait to creative thinking and have helped me to understand what in the TGD universe is new and impossible in the reductionistic and materialistic universe of the skeptic. Certainly the ability to explain these not-finally established phenomena does not make TGD pseudo science. In the same way, the ability of TGD based vision to say something nontrivial about religious experience and consciousness after the physical death does not mean that TGD replaces scientific explanation with a religious dogma (also this point I have been forced to explain again and again to some of my very skeptic friends).

2 General view about paranormal phenomena

2.1 General view about psychological time

A natural resolution of the problems related to the preferred role of single moment of time for conscious experience is based on the idea that biological growth and self-organization is a 4-dimensional phase transition proceeding in the direction of the geometric future quantum jump by quantum jump. And, in particular, that the dominating contribution to the conscious experience comes from the front of the phase transition where the volition is. More concretely:

1. There is electromagnetic body serving as a template around which ordinary matter self-organizes by phase transition and at the same time modifies this template. The phase transition front proceeds from the moment of birth to the geometric future in a manner analogous to the polymerization process or to the gradual build-up of a protein in mRNA-protein translation process. Electromagnetic body could correspond to the electromagnetic part of the genetic information hypothesized to be coded by transversal magnetic mirror structures (massless extremals parallel to magnetic flux tubes [K5]). The motivation for this hypothesis comes from the TGD based quantum models for biocontrol and sensory representations, from the data about homeopathy and puzzles related to genome, from the mysteries of the biochemical self-organization, and from the experimental work related to phenomena like remote vision and healing. Among other things this model explains processes like molecular recognition which remain mysterious in the framework of standard biochemistry.
2. Each choice made during life cycle is analogous to an addition of a new protein in mRNA-protein translation process. There is a lot of freedom of choice associated with the addition of the new building blocks to a growing protein. The freedom to modify the already existing structure is however relatively restricted. The already existing part of protein can adopt a highly restricted repertoire of conformations but the ordering of the component aminoacids remains essentially fixed as also the chemical structure of the individual aminoacids. Translating this to the level of evolution of individual: presumably only the non-determinism associated with various sensory and cognitive representations is present whereas the non-determinism associated with say macroscopic motor actions and decisions affecting dramatically future is absent in our geometric past. Thus the classical (and also quantum) non-determinism is concentrated at the phase transition front propagating towards the geometric future quantum jump by quantum jump. As a consequence, also the contents of conscious experience are concentrated around the value of the geometric time characterizing the location of this front.
3. Quantum criticality of TGD universe suggests that also the reverse phase transitions can occur and could proceed most naturally towards geometric

past like the depolymerization of a protein (later a more convincing support for this hypothesis will be discussed). Fractality of the TGD universe in turn suggests that these phase transitions and their reversals occur in all length and time scales.

4. The idea that 4-D body is kind of a 4-D sculpture constructed gradually by trial and error process suggests that the 4-D growth process proceeds by trial and error and when dead end appears the reverse of the phase transition (counterpart of depolymerization) occurs (or can occur) and proceeds backwards in the geometric time to the moment when the wrong choice was made. Thus our life would not end at the physical death but would be an iterative process starting again and again from the moment when things went wrong.
5. Physical death means that the 4-D body becomes mature and could survive at least for some time in a state in which conscious experience does not contain the dominating input from the phase transition zone. Some kind of a meditative, timeless form of consciousness should be in question. This vision conforms with the idea that physical life is only one stage in much longer lassic process of conscious evolution. These 4-D bodies can in principle communicate with the living ones and long term memories about the deceased might represent one form of this communication. The communications would be based on the same mechanism as long term memories in general: by looking at magnetic mirror with length of order lightlife or more I can see, not only me of the past, but also my fellow (not only) human beings. At quantum level this means timelike quantum entanglement making possible to share experiences.
6. What is this fundamental phase transition giving rise to what we call life? We know that the front of phase transition corresponds to volitional consciousness. We also know that volition as a transformation of intention to action in TGD universe corresponds to the p-adic-to-real phase transitions of space-time sheets taking place in quantum jumps. Thus the natural conclusion is that p-adic-to-real phase transition is the fundamental phase transition inducing the biological self-organization. This phase transition could occur for massless extremals (MEs) and perhaps also for the flux tubes of wormhole magnetic fields (and thus for magnetic mirrors) representing the plan for the evolution of the biological system and induce biological self-organization of matter around the resulting electromagnetic hologram like templates.
7. At least the selves at the same level of self hierarchy possess same value of psychological time. It might even be that the entire living biosphere could be seen as a phase transition front proceeding to the direction of the geometric future. This conclusion is of utmost importance since it leaves no other possibility that to accept that even biosphere defines conscious

self and we correspond to only single level in the self hierarchy. In particular, the notion of collective consciousness is more or less 'a must' in this framework.

The fractality of TGD Universe suggests that there are phase transition fronts inside phase transition fronts each with their characteristic span with respect to the geometric time and age with respect to subjective time suffering the 4-dimensional analogs of cell decay and regeneration. One can imagine a fractal hierarchy of phase transition fronts in which subselves experience a common psychological time and experience the systems, whose psychological time is in the geometric future, more or less as dead because the degree of non-determinism in the geometric past of the four-dimensional body is low. Perhaps what we call non-living matter corresponds to life for which self-organization front is in the distant geometric future. Also the idea about gradual build-up of four-dimensional sculptures by 4-D phase transitions and their reversals at all levels of the self hierarchy looks attractive.

2.2 Paraphysics and p-adic-to real phase transitions

p-Adics-real phase transitions [H8] could provide a general explanation for a large class of paranormal phenomena. The very fact that experimenters usually do their best to eliminate subjective elements from the experimental arrangements might explain why paranormal phenomena are so poorly reproducible. Field bodies apply naturally to personal biological body basic mechanisms of remote mental interactions and the evolution of a kind of immune system preventing the access of foreign field bodies to personal biological body looks very natural. It is also quite possible that in the statistical averaging these phenomena indeed disappear and it might be more reasonable to concentrate on the character of the fluctuations around the average. An interesting analogy is the research of Shnoll related to the fluctuations of radioactive and chemical rates which demonstrated clear periodicities in fluctuations correlating with astrophysical periods [71]. Perhaps this approach might be applied also to the claimed paranormal phenomena.

p-Adic space-time sheets bring in mind the notion of ectoplasm often used in spiritistic circles. One could of course ask whether the claimed materializations of persons and material objects by mediums are real in *some* sense, and could be regarded as p-adic-to-real phase transitions. For instance, the communications between deceased and alive could be based on the transformation of memes to real sensory space-time sheets making possible collective sensory hallucinations (of course, hallucination is a somewhat misleading notion in this context). Similar anecdotal stories abound also around yogies and everyone knows the stories about ghosts. A possible interpretation of these space-time sheets would as field quanta. In zero energy ontology their generation would be indeed possible.

2.3 Magnetic mirrors

Magnetic flux tubes and MEs are basic structures in TGD based model of biosystems based on the symbiosis of MEs, magnetic flux tubes and ordinary biomatter at atomic space-time sheets. Magnetic flux tubes are topological field quanta of magnetic field whereas MEs ('massless extremals') are topological field quanta of radiation field, 'light rays'.

Magnetic mirrors formed by the magnetic flux tube-ME pairs occur in many different contexts in TGD inspired theory of consciousness. For example, magnetic mirrors of length of order lightlife appear in the model of long term memory. Classically: when I look at sufficiently distant mirror I see the me of the geometric past. Quantum mechanically: timelike quantum entanglement made possible by the magnetic mirror makes it possible for the self of the geometric now to share the experience of the subself of the geometric past. Magnetic mirrors are crucial for the model of the sensory canvas and there seems to be no sharp difference between different types of memory which suggests that there is an entire hierarchy of memories in various p-adic time scales. Magnetic mirrors play a key role in the model of frequency imprinting and provide a general molecular recognition mechanism. Magnetic mirrors allow also a generalization of manysheeted DNA so that magnetic mirrors represent genetic information in electromagnetic form [K5].

In accordance with the fractality of consciousness, the wide applicability of the magnetic mirror notion suggests that various functions associated with the magnetic mirrors are different aspects of the same basic phenomenon. Magnetic mirrors would thus provide sensory canvases, long term memory mirrors and recognition mechanism at all length scales. Even manysheeted DNA would possess sensory canvas and long term memories, perhaps an entire hierarchy of them. Taken the ideas of fractality and quantum hologram to extreme, one can even consider the possibility that our long term memories are average of those associated with genes associated with various neurons! Nothing precludes the possibility that magnetic mirrors can also serve as electromagnetic bridges between different organisms (even the notion of organism must be generalized if the idea of multibrained magnetic selves is taken seriously). This could make possible effects similar to observed at DNA level (such as self assembly and translation of RNA to proteins made possible by electromagnetic recognition mechanism based on em bridges).

2.4 How water represents and amplifies?

What the role of the atomic space-time sheets in the representations of frequencies provided by MEs and magnetic flux tubes might be, is suggested by the fact that the matter at the atomic space-time sheets should have the role of an amplifier of em fields associated with MEs.

1. The generation of space-time sheets containing water in liquid crystal form with a rotational frequency spectrum mimicking that of the homeopathic

potency is a further aspect of this mimicry and could amplify the otherwise weak signal molecular by amplifying the em fields associated with MEs serving as topological correlates for photons emitted in the transitions of the molecule. The water domain could be also seen as a mental image (subself) about the chemical at atomic space-time sheet. In principle all the rigid body aspects of the molecule can be mimicked in this manner. Mimicking water domains can also control the transitions of the biomolecules or vice versa.

2. Not only rotational spectrum but also vibrational spectrum (such as conformational vibrations of molecules) can be mimicked since any system near equilibrium reduces to a collection of harmonic oscillators: the sound waves propagating in LC water blobs would provide the representation. It is known that the water in cell interior and near to the cell membrane transforms routinely between sol and gel (LC) states in response to various stimuli: this transformation would have an interpretation as a formation of a conscious representation for something, perhaps some event or object outside the cell.
3. Note that by the scaling law $f_h/f_{ELF} = 2 \times 10^{11}$ proposed by Cyril Smith in [62], the characteristic neuronal frequency $f_{ELF} = 1$ kHz corresponds to $f_h = 10^5$ GHz and to a ME with a length of 3 micrometers, which corresponds to the thickness of the magnetic flux tube. Thus kHz frequency is maximal if ME is required to extend outside the magnetic flux tube. Perhaps this ME could be involved with a sensory representations at the cell level. For human vision the wavelengths of photons are in the range of $10^{-6} - 10^{-7}$ meters and corresponding ELF length scale is $10^4 - 10^5$ meters if scaling law is assumed.
4. The requirement that LC water blob has size not larger than about one micron implies that that the lowest ELF frequency corresponds to a time period of about $T = 1000$ years so that all time scales relevant for human consciousness are covered and MEs with frequencies relevant to human long term memories can be amplified by intracellular LC water space-time sheets. If the scaling law $f_h/f_{EEG} = 2 \times 10^{11}$ is taken literally, one obtains $f_h = 20$ Hz at the upper bound: this corresponds to the lowest audible frequency which suggests that also sound waves serve representative purposes.
5. Fractality suggests that LC water space-time sheets in turn form liquid crystals in longer length scale giving rise to secondary representations and that there exists entire hierarchy of these representations.

2.5 Field representation of the genetic information

TGD leads to the notion of mansheeted DNA in which DNA is accompanied by transversal magnetic mirror pairs which, besides coding 4 different DNA

nucleotides to pairs of polarizations, also give rise to field representation of the genetic information by classical em and Z^0 fields associated with MEs as well as by the holograms generated by the electromagnetic MEs in active state. What is remarkable that the sizes of these MEs are can quite well be of same order as body size. In fact, the known facts from homeopathy suggest that ELF frequencies f_{ELF} and high frequencies f_h with ratio $f_h/f_{ELF} \simeq 2 \times 10^{11}$ appear as pairs such that f_h imprinting implies f_{ELF} imprinting and vice versa [62]. f_h can vary up to body size whereas f_{ELF} corresponds to length scales with typical unit given by Earth size. The interpretation would be that MEs represent 'spirit' and 'flesh', that is code for magnetic sensory canvas or magnetic body and for physical body. Electromagnetic representation of genetic information solves the mystery of introns (the portion of chemically silent DNA is the higher the higher the organism is in the evolutionary hierarchy and is roughly 95-98 per cent for human genome): introns would not be electromagnetically silent.

The most naive guess is that the field representation is simply a 4-dimensional photograph about body part, that is dynamical hologram, and that the DNA in the cells which express the formation of a given body part contain this kind of representation. The cells in which the genes are expressed could contain this kind of representation serving as a template and biological control command. Thus body part would contain its own image in each of its cells. The time reversal (phase conjugate) of the 4-D hologram would in turn naturally act as a time reversal of the control command and provide a universal mechanism making possible healing and self repair. Entire hierarchy of representations in various length scales might be involved providing dynamical photographs about the planned evolution or various biomolecules, subcellular structures, cells, etc... This sounds utterly simplistic but one can ask what else? The representation for the development of the body structures must be based on very simple and concrete code since the cells building it during morphogenesis are very simple creatures and see only the light telling where to go!

2.6 General model for remote mental interactions

The properties of the magnetic mirrors suggest also a general model for the remote mental interactions (including phenomena like remote viewing and healing, telepathy and psychokinesis) defying standard science explanations. The article of Lian Sidorov [63] and its references give a thorough view about remote healing and viewing. One particular healing method goes under name Qigong (see the article [42]). 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.

In TGD framework the energy associated with MEs and supracurrents flowing along magnetic circuitry would be a natural counterpart of Qi. Yi would in turn would translate to p-adic cognitive representations representing also inten-

tions, 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 physiological, chemical and electromagnetic effects of both internal and external Qigong have been studied ([63] contains large number of related references). Also the effects of Qigong healing on cancer has been studied [42].

In TGD framework remote mental interactions can be understood using a model generalizing the vision about endogenous biocontrol so that the sender and receiver of the control signal can be different organisms. Thus independently whether the claimed effects are replicable or not, this kind of effects are more or less predicted by TGD framework.

The general model for remote mental interactions is following.

1. Magnetic mirrors connecting the sender and receiver make possible a universal mechanism for the transfer of intent (Yi) and action (Qi). p-Adic MEs represent the transfer of a mere intent and real MEs represent a transfer of action. p-Adic ME can be transformed to real ME either by receiver or some higher level magnetic self.
2. The transfer of intent gives rise to mechanism of remote interaction which can act both endo- and exogenously. Magnetic mirrors characterized by their fundamental frequencies make possible bridges between sender and receiver (say healer and healee) and allow a resonant interaction in which healer can initiate various control commands acting as 4-dimensional templates represented as holograms. Also smaller MEs can be sent along the MEs serving as bridges (this is like throwing balls with light velocity!).
3. The ME-magnetic flux tube pair connecting sender and receiver acts as a reference wave which can initiate an arbitrarily complex hologram representing biological program. Sender has the ability to generate and amplify the frequencies which induce holograms representing the control commands. In particular, sender can initiate complex biological programs without knowing anything about their functioning.
4. Magnetic mirrors make possible also 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 that 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.
5. It is quite possible that also multibodied and -bodied higher level magnetic selves actively participate in the process. This makes possible coherent amplification effects (TEM, prayer groups) and also makes 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. 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 [26] and might represent just this kind of messages [M5]. Interestingly, also speech is produced by fast amplitude modulation of 10 Hz basic vibration frequency of speech organs.

This model explains a wide variety of observations related to remote healing and vision [63]: these observations are discussed in [K5]. Since magnetic mirrors can connect also living organisms and 'dead' mater, say electronic instruments, the model can be applied to explain also phenomena like micropsychokinesis, causal anomalies related to machine-animal interaction, and so called instrumental transcommunications.

2.7 Stochastic resonance as a mechanism of amplification

EVP research support the view that certain background noise is necessary for receiving messages. On basis of this observation it has been proposed that stochastic resonance (the article [17] is an excellent review about the principles and applications of the stochastic resonance) is the mechanism of EVP. Stochastic resonance requires a bistable system (for instance, double potential well) or an excitable system having metastable states. An essentially nonlinear phenomenon is in question.

2.7.1 Stochastic resonance

Stochastic resonance works if the message to be amplified is represented as an amplitude modulation of a carrier wave with a basic frequency f and serves as a harmonic perturbation of a bistable system which is also subject to white noise. In the resonance, f must be one half of the average frequency $f(spont)$ for the jumps between two states of the bistable system: $f = f(spont)/2$. This condition has a simple physical interpretation: the height of the potential barrier separating the two potential wells varies periodically with a period which is half of the period defined by f , and the best opportunity to get to another potential well is to hop when the potential barrier is lowest possible. For the mechanical analog system the rate $f(spont) = r_0 A$ is proportional to an 'Arrhenius factor' $A = exp(-\Delta V/D)$, where ΔV is the height of the potential barrier and D characterizes the intensity of the white noise. $f(spont)$ is also proportional to a factor $r_0 = \omega\omega_b/\gamma$ where ω is the frequency of small oscillations at either bottom of the symmetric potential well, ω_b is the analogous quantity at the top of barrier, and γ characterizes the linear dissipative force (overcritical damping is assumed).

Thus, when the white noise has a correct intensity, a weak harmonic perturbation with a given frequency is amplified in the sense that the Fourier expansion of the system's time development regarded as jumps between the two states contains a peak at the multiples of the frequency of the amplitude modulated harmonic perturbation. Neuroscientists refer to this phenomenon as a

phase locking. The peaks for the higher multiples of the input frequency f are exponentially suppressed. The notion of stochastic resonance makes sense also in the quantum context: now quantum tunneling replaces the jumps induced by the stochastic noise.

2.7.2 Stochastic resonance and brain

There is a considerable empirical support for the hypothesis that stochastic resonance is responsible for both the so called temporal coding of the sensory inputs to neurons (see the references in [17, 25]) and for the ability of the brain to extract very weak signals from a noisy background. For instance, crickets seem to detect the signals caused by their predators from a strong background noise using this mechanism. More generally, stochastic resonance is a very attractive candidate for a quantum level neuronal mechanism for amplifying very weak EEG waves to a firing pattern in turn amplifying the original EEG waves amplified again by the stochastic resonance... citeeegII. Amplification of em fields associated with ELF MEs is analogous to physical growth would be basically in question and p-adic MEs (memes) could use any means to achieve this. The development of individual indeed involves the gradual emergence of higher frequency ELF waves above the delta band background.

2.7.3 Stochastic resonance and people seeing elves and auras

It is interesting to apply the stochastic resonance model also to other experiences usually believed to be hallucinatory and purely brain generated. Some of us claim to have the ability to see elves and auras, and an interesting question is whether one could artificially induce this kind of ability by tuning the noise level of the visual perceptive field suitably. My own strange and often frightening OBE type experiences induced by the noise of refrigerator or central heating batteries could be partially understood in terms of stochastic resonance. From the visual hallucinations during my great experience I remember the strange conviction that this what I see is always present in the visual field and that I have in some strange manner only become conscious about its presence, much in the same manner as one suddenly becomes conscious of a well-defined pattern in the autostereogram containing only what looks random points.

A stochastic resonance created by the brain itself and making possible the perception of an already existing weak visual input would conform with this interpretation. The same general explanation might apply as such to the case of EMDR experiences: the EMDR method could optimize the level of the background visual noise making possible to amplify weak signals always present in the visual and other perceptive fields. Finally, the claimed encounters with the deceased induced by the presence of a medium could also be explained by the ability of medium to induce a situation in which an actual weak visual signal is amplified to a conscious perception.

It is easy to guess the reaction of a skeptic to these unconventional interpretations, and it might well be that pattern completion indeed generates information

which it is not actually present originally. It is however good to remember that until quite recently the dominating theory about dreams was that cortex does its best to cook up something from a random input coming from the brain stem. For a non-skeptic person with some spiritual traits and taking his/her dreams as an essential part of the personal subjective existence this kind of interpretation seems highly absurd and even humiliating. The revision of this view has been forced by the accumulating knowledge supporting the view that dreaming is a cognitive ability learned before the age of eight, and also by the observation that dreaming as a virtual world life has an obvious survival value. Continuing in spirit of this section, one might even see the role of brain stem as a producer of the background noise making possible the amplification of the weak signals from the higher levels of the self hierarchy to dreams (at least in some cases).

2.7.4 $1/f$ noise amplifying itself via white noise?

What are the physical correlates of the MEs representing memes and being perhaps amplified by both brain and by the electronic instruments in ITC? Besides white noise there is also $1/f$ noise encountered practically everywhere [18]. The origin of the $1/f$ noise is poorly understood. In TGD framework $1/f$ noise could be seen as a signature of real mindlike space-time sheets (giving rise to sensory qualia). $1/f$ noise is a good candidate for the physical correlate for the real counterparts of memes realized as MEs with the information represented by an amplitude modulated carrier wave. Also EEG could be seen as resulting from the amplification of $1/f$ noise (delta band for EEG resembles the spectrum of the so called spherics [31]). The real counterparts of these opportunistic memes would correspond to amplitude modulated ELF waves using all possible means of self expression and using also stochastic resonance mechanism to amplify remote mental interactions (this brings in mind the mysterious sea in the scifi novel 'Solaris' of Stanislaw Lem!).

3 Paranormal phenomena in biological systems

3.1 Memory of water

The prediction that cognition is present in all length scales means quite a dramatic deviation from the standard prejudices of the standard skeptic. One of the basic implications suggesting itself is a new view about evolution. The chemical evolution might quite well have preceded by a cognitive evolution of water culminating in the discovery leading to the use of biomolecules as tools to generate p-adic-real transformations making possible to use them as both sensory and motor organs. In this view the visions about life emerging from sea and from the self-organization of clay induced by a water flow acting as an external energy feed, could be seen as special cases of the same phenomenon. The cognitive evolution of water leads to the point where tools, proteins or some of their predecessors, are discovered. As in human cognitive development, and in accordance with the fractal view about cognition, the next discovery would

have been the discovery of symbols and would have led to the emergence of the genetic code.

Memory is perhaps one of the simplest mental functions. Homeopathy, which could be understood as evidence for water memory, has for a long time been one of the evergreens in the skeptic's list of pseudosciences. An interesting twist in the story came when Benveniste reported about evidence for water memory in *Nature* [28]: no errors were found in the experimental setup of Benveniste but the attempts to replicate the experiment failed. Benveniste lost his laboratory, his funding and his reputation. Then came Prof. Madeleine Ennis and the independent experiments performed in four laboratories gave completely unexpected support for the observations of Benveniste. The reactions of the skeptics in my own country have been highly emotionally charged, to put it mildly. One of the arguments, represented quite seriously, has been that these experiments do not even deserve a serious inspection because skeptics have honoured Benveniste twice with a special Nobel of pseudoscience!

3.1.1 The experiments of Benveniste and Ennis

Citing freely the article of *Guardian* [51], the story goes as follows. In 1985, Benveniste began experimentation with basophils, which are human white blood cells involved in allergic reactions. Basophils possess tiny granules containing substances such as histamine, partly responsible for the allergic response. The granules can be stained with a special dye, but they can be decolourised (degranulated) by a substance called anti-immunoglobulin E or aIgE. The sensational claim of Benveniste was that he continued to observe basophil degranulation even when the aIgE had been diluted out below a detectable concentration, but only as long as each dilution step, as with the preparation of homeopathic remedies, was accompanied by a strong agitation. In 1988 Benveniste managed to publish his work *Nature*, speculating that the water used in the experiments must have retained a "memory" of the original dissolved aIgE. Water memory could provide the long waited hard evidence for homeopathy. Celebration was short-lived. Spearheaded by a *Nature* team that famously included a magician (who could find no fault with Benveniste's methods - only his results), Benveniste was pilloried by the scientific establishment. A British attempt (by scientists at London's University College, published in *Nature* in 1993) to reproduce Benveniste's findings failed. Benveniste has been striving ever since to get other independent laboratories to repeat his work, claiming that negative findings like those of the British team were the result of misunderstandings of his experimental protocols.

Then Prof. Madeleine Ennis and the pan-European research effort entered the stage. A consortium of four independent research laboratories in France, Italy, Belgium, and Holland, led by Professor M. Roberfroid at Belgium's Catholic University of Louvain in Brussels, used a refinement of Benveniste's original experiment that examined another aspect of basophil activation. The team knew that the activation of basophil degranulation by aIgE leads to powerful mediators being released, including large amounts of histamine,

which sets up a negative feedback cycle that curbs its own release. So the experiment planned by the pan-European team involved comparing inhibition of basophil aIgE-induced degranulation with "ghost" dilutions of histamine against control solutions of pure water. In order to guarantee that no bias was introduced into the experiment by the scientists from the four laboratories involved, they were all "blinded" to the contents of their test solutions. In other words, they did not know whether the solutions they were adding to the basophil-aIgE reaction contained ghost amounts of histamine or just pure water. The ghost histamine solutions and the controls were prepared in three different laboratories that had nothing further to do with the trial. The whole experiment was coordinated by an independent researcher who coded all the solutions and collated the data, but was not involved in any of the testing or analysis of the data from the experiment. Hence there was not much room for fraud or wishful thinking.

The results were a complete surprise. Three of the four labs involved in the trial reported a statistically significant inhibition of the basophil degranulation reaction by the ghost histamine solutions compared with the controls. The fourth lab gave a result that was almost significant, so the total result over all four labs was positive for the ghost histamine solutions. There was still one possible loophole for a human factor to enter the game. The basophils were stained with a dye and then hand-counted those left coloured after the histamine- inhibition reaction. Perhaps the human error might enter at this stage. So a previously developed counting protocol that could be entirely automated was applied. The activated basophils were tagged with a monoclonal antibody that could be observed via fluorescence and measured by machine. The result, to be shortly published in *Inflammation Research*, remained the same: histamine solutions, both at pharmacological concentrations and diluted below detectable concentrations, lead to a statistically significant inhibition of the basophile activation by aIgE, confirming the previous work in this area.

3.1.2 Is water constructing cognitive representations about the molecules it contains?

There is no need to emphasize that the results of the experiments of Benveniste and Ennis could force a thorough re-evaluation of the basic assumptions of biochemistry and pharmacology. The results are not so difficult to understand if one takes seriously the possibility that biomolecules are accompanied by their own cognitive representations. One can also assume that these representations are formed when biomolecules are dissolved in water. I have already earlier [J5] proposed this kind of model but without any special reference to the connection between p-adic physics and cognition. The treatment of the water during the dilution (involving strong shaking at each step) could imply that the cognitive space-time sheets representing the dissolved molecules remain in the diluted water and provide a representation of the properties of the molecule relevant for the effect caused by the molecule.

The most plausible candidates are frequencies and more generally, electro-

magnetic field patterns associated with MEs. The p-adic-to-real transformations of these MEs could in turn lead to the homeopathic effect. Benveniste and his group report [29] that it is possible to code the electromagnetic signals characterizing the information about the effects of the biologically active molecule in a digital form and transmit the information via, say, internet to another side of the globe, and that the effect of the reconstructed electric signals is the same as of the biomolecule itself. This is of course by no means mysterious even in the standard physics framework: charged particles experience the effects of the biomolecules via the electromagnetic fields generated by them, and it is quite possible that the molecule can be fooled to believe that other molecule is present by using only that part of em field to which it responds strongly.

This said without any intention to irritate skeptics, I find it rather strange that skeptics are fighting even against Maxwell who has been dead and buried for more than a century. Benveniste and collaborators report that the presence of the water is essential for the formation of the electromagnetic representation of biomolecule in terms of frequencies, and my belief is that here the new physics emerges and relies on MEs. Probably also amplification phenomenon by quantum phase transitions are involved. Rather remarkably, the important frequencies are reported to be in the range 20-20.000 Hz which is the range of audible frequencies and also the most relevant frequency range in the TGD inspired model of qualia relying strongly on the observations about the effects of ELF em fields on living matter by Blackman and others [44] (see [M3]). Thus the later experiments of Benveniste and his group provide direct support also for the basic ideas of TGD based theory of qualia. I have proposed an analogous mechanism as an explanation of the so called phantom DNA effect in [J5]. In [K5] a mechanism of homeopathy and water memory based on the model of biocontrol in terms of many-sheeted ionic flow equilibrium is briefly discussed.

The analysis of the data provided by Cyril Smith in his lecture in CASYS'2001 conference in Liege [62] led to a detailed model for the frequency imprinting and entrainment and to the idea that space-time sheets associated with liquid crystal water blobs provide real world representations for the rotational, vibrational, etc. spectra of molecules [K5]. This is however only one kind of representations and should be regarded more like symbolic, externalized representations analogous to written language rather than cognitive or sensory representations. Of course, DNA would involve also this kind of externalized representations. MEs and perhaps also magnetic flux tubes could be also in p-adic state and provide thus cognitive representations for external world.

The $f_h/f_l = 2 \times 10^{11}$ scaling law [62] states that the imprinted frequencies appear in pairs having a constant ratio such that the presence of the high frequency f_h implies the presence of the low frequency f_l and vice versa. TGD explains the ratio of the frequencies as the ratio $\Delta E/E_c$, where $\Delta E = \pi^2/2mL^2(137)$ is the reduction of the zero point kinetic energy for a singly ionized ion dropping from $k = 137$ atomic space-time sheet to a magnetic flux tube having much larger size, and $E_c = eB/m$ is the cyclotron energy of the ion. There exists a simple mechanism explaining why f_h implicates f_l . A photon with frequency f_h kicks an ion from the magnetic flux tube to the atomic space-time sheet wherefrom it

drops back to a high n cyclotron state at the magnetic flux tube. This state in turn decays by the emission of photons with energies coming as multiples of E_c . The mechanism transforming f_l to f_h requires more assumptions and it seems that several frequencies f_l can be mapped to f_h .

There is also a deep connection with the TGD based model of metabolism in which the liberation of the metabolic energy takes place via the dropping of proton to the magnetic flux tube of magnetic body with strength of $\simeq .2$ Gauss which is $2/5$ times the nominal value $.5$ Gauss of Earth's magnetic field ($.49$ eV of zero point kinetic energy is liberated as a usable energy per single proton). The dropping is followed by the 'kicking' of the proton back to the atomic space-time sheet by using the metabolic energy (this involves simultaneous generation of ATP molecule which is essential for the process but does not really act as universal energy currency as usually believed).

3.2 Healing by time reversal

Temporal reflection of the p-adic MEs is allowed by p-adic conservation laws and generates a time reversed ME, which in turn can be transformed to real ME by the p-adic–real phase transition. The creation of the time reversed MEs is possible at least in the case that MEs appear in pairs of opposite time orientation having vanishing net energy.

In quantum optics time reversal is known as a phase conjugation [20] and is one of the basic notions of holography. MEs act as both quantum holograms and receiving and sending quantum antennae [J4]. 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 are at the highest level 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 mansheeted 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). Conjugate reference waves would thus provide an incredibly simple and general mechanism of healing by time reversal allowing the living matter to fight against second law. This would be like a general initiating a war by just nodding or shaking his head.

Of course, one can ask what one precisely means when one says that biological program runs backwards.

1. Does the program run in standard direction of the geometric time but the commands are realized in the reverse order?
2. Or is also the direction of time's arrow changed? Both options are possible. The latter option is suggested by the idea about 4-D body being constructed iteratively by constructive phases during which p-adic-to-real phase transition proceeds towards the geometric future and by

de-constructive phases during which real-to-p-adic phase transition proceeds towards the geometric past and what followed from wrong decision is undone. Miraculous healings in which healing occurs instantaneously could be understood if this interpretation is correct.

There is also some empirical support for the idea about healing by time reversal coming already from the period when only Soviet scientists knew about phase conjugation. In 1960's and 1970's French Antoine Priore built and tested electromagnetic healing machines of startling effectiveness [76]. Tom Bearden has in this website document "The Priore Machine and Phase Conjugation" which I recommend for an interested reader for a more detailed exposition [77] besides the material that can be found from the homepage of Tom Bearden.

In hundreds of rigorous tests with laboratory animals, Priore's machine cured a wide variety of the most difficult kinds of terminal, fatal diseases known today. Many of the experiments and tests were done by prestigious members of the French Academy of Sciences. The operation of the Priore machine was incomprehensible for both the inventor and orthodox French scientists. Into a tube containing a plasma of mercury and neon gas, a pulsed 9.4 GHz wave modulated by a frequency of 17 MHz was introduced. The waves were produced by radio emitters and magnetrons in the presence of a 1200 Gauss magnetic field. Experimental animals were exposed to this magnetic field during irradiation, and the mixture of waves (about 17 or so) coming from the plasma tube and modulating and riding the magnetic field passed through the animals' bodies.

Interestingly, the magnetic field used corresponds to magnetic length of order 10^{-7} meters. It is equally interesting that a combination of magnetic fields and radiation was involved: this conforms nicely with the vision about biosystems as many-sheeted ionic flow equilibrium controlled by MEs. It is known that phase conjugated waves can be produced in plasmas. The so called four-wave interaction of waves of equal frequency is the simplest manner to amplify weak wave in the effective dynamical diffraction grating defined by the interference of two waves propagating in opposite directions. If a phase conjugate wave with a correct frequency results in this kind of situation, it could act as a reference wave acting with ME and initiate a complex time reversed biological programs at subcellular level.

In particular, it could induce the time reversal of the 'develop-cancer' program controlling the development of the cancer cell population and lead to healing. p-Adic length scale hypothesis inspires more detailed guesses about the mechanism of healing. The p-adic length scale $k = 157$ corresponds to a magnetic field of .2 Tesla if Earth's magnetic field .5 Tesla corresponds to $k = 169$ (flux quantization for cylindrical flux tubes). This corresponds to the same p-adic order of magnitude as .12 Tesla magnetic field. The cyclotron frequency of proton in the magnetic field of .12 Tesla is 1.8 MHz, which is however by an order of magnitude below the 17 MHz modulation frequency. The zero point kinetic energy of ion of mass number A at space-time sheet k is $E_0 = n \times \pi^2 / (2Am_p L^2(k))$ (n is some numerical constant not far from unity). For proton at $k = 151$ space-time sheet one has $E_0 = n \times 2^{-15}$ eV, which

corresponds to the frequency $n \times 7.5$ GHz, which is not too far from 9.4 GHz. This would suggest that the flow of protons between $k = 151$ space-time sheet associated with chromomose's basic structure and $k = 157$ space-time sheet associated with chromosome's coiling, is involved with the healing mechanism. A correction of the genetic error responsible for the cancer program by time reversal might thus be in question.

According to the quantum model of metabolism [K6], ADP-ATP cycle corresponds to a cyclic flow of protons between some larger space-time sheet (say $k = 169$) and $k = 137$ atomic space-time sheet. The so called $F_0 - F_1$ machine transforming ADP to ATP drives the biological Karma's cycle kicking protons to the atomic space-time sheet, where they dissipate their energy and drop back to the magnetic flux tubes liberating their zero point kinetic energy of about .5 eV. One is led to postulate the existence of metabolisms associated with other ions and between other space-time sheet pairs, and the universal energy currencies of these metabolisms are characterized by the zero point kinetic energies of the ion in question.

Another crucial frequency is the cyclotron frequency of the ion: cyclotron frequency MEs are space-time correlates of quantum entanglement, and the MEs with frequencies corresponding to zero point kinetic energies propagate along these MEs and induce self-organization at the receiving end. Standard metabolism is a particular example of this general process, and there might exist analogs of $F_0 - F_1$ machines corresponding to other metabolisms.

Healing process could correspond to the functioning of these machines in a time reversed mode: the generator becomes a motor. Even ordinary metabolism might become time reversed temporarily during healing process. Remote mental interaction would be also involved since negative energy MEs can be regarded as space-time correlates for the generation of bound state entanglement. The liberation of binding energy as a usable energy would replace ordinary metabolism in the time reversed mode. Perhaps the fact that metabolism is minimized during rest, would allow also $F_0 - F_1$ generators to temporarily run in the time reverse mode. Four-wave interaction is believed to be involved with the generation of the phase conjugates of microwaves. The direct irradiation by the phase conjugates of a microwave beam at critical frequency might be a simpler manner to induce the healing process at DNA level.

By its extreme generality this mechanism could apply to almost any disease which is a disease of the highest level quantum biocontrol. This mechanism could be also used to induce de-differentiation of cells. The de-differentiation of cells to stem cells could be controlled by a similar mechanism. One can also wonder whether this kind of mechanism could make possible eternal youth (or rather eternal life) at cell level. An interesting question is whether the phase conjugates of EEG waves or time reversals of nerve pulse patterns could induce time reversals of brain functions.

3.3 DelaWarr camera and field representation of genetic information

In CASYS'2001 symposium Peter Marcer [30] told about the British engineer George DelaWarr who built a remote imaging camera in the 1950s (radionics is the term used). Using only a test object provided from the subject such as a small blood, sputum, or hair sample, this device is reported to photographically image the subjects internal conditions at a distance, with a high degree of accuracy. A unique feature of the DelaWarr system is claimed to be that it is able to detect diseases in the pre-clinical stages prior to detection by conventional techniques such as physical examination, X-ray, CT scan, or Magnetic Resonance Imaging. The photographs taken by DelaWarr camera at fifties were treated by Susan Benford by modern image processing techniques and she claims that these photographs contain the information needed to reconstruct three-dimensional holograms [30]. The proposed explanation was that the test object (adjunct) contains a hologrammic representation about the patient.

The functioning DelaWarr camera looks highly mysterious even when one takes seriously the idea that DNA generates holograms of the body parts it codes for. Therefore it is better to introduce the ingredients of the model as questions rather than hypothesis.

1. Was the intent of the photographer all that was needed and did other levels levels of the self hierarchy take care of the rest as they do when I make the decision to raise my hand? Could the intent of the photographer have generated a reference wave at some very special frequency acting on the adjunct and activating a hologram giving rise to a photograph about the desired body part or inducing a sequence of events leading eventually to the generation of the photograph?
2. Was the visible light giving rise to the photograph generated in the adjunct? Does the DNA of each cell of body and thus also of the adjunct contain electromagnetic representations for the body parts and are these representations more or less equivalent with holograms? Certainly direct hologrammic images about body parts would provide the simplest manner to realize the field part of the genetic code as proposed.
3. Did the adjunct serve as a relay station (somewhat like thalamus in brain) mediating the information from the patient via magnetic flux tube-ME pairs to the camera projecting it to the camera as a coherent light generating an ordinary photograph? Was the image realized as a coherent light propagating along the MEs connecting adjunct and patient serving as bridges?

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 [H8] space-time sheets makes possible transformation of intentions to actions. 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.
2. The idea about field body serving effectively as 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 oscillations and 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.

3. Sensory input generates sensory representations based on real mind-like space-time sheets possibly accompanied by p-adic cognitive space-time sheets. Zero energy ontology and 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.

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 patterns. These latter representations would correspond to cognitive and emotional aspects associated with the sensory input. One could even say that cognitive and emotional 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.

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 [M5]. The frequency spectrum for the sounds produced by meteors and detected both sensorily and electronically in the range 37 – 44 Hz [16], 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.

4. One might argue that if memes are not universal, remote cognition is not very useful. An interesting question is therefore whether memes are really species-specific. 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

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 [J5] 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 to see [J5] 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 TGD based general view about PK

A general TGD based explanation psychokinesis relies on the same fundamental mechanism as ordinary intentional action, long term memory, and remote metabolism. The model applies more or less as such also to telepathy and could also allow to understand the notion of water memory explaining homeopathic effects.

1. The basic mechanism of PK and retro PK relies on quantum jumps transforming the p-adic space-time sheets representing intentions to real space-time sheets representing desires represented as negative energy signals to the geometric past. These signals modify the output of say random number generator to a non-random one. Magnetic flux quanta would realize the bridges along with the negative energy signals would propagate. The mechanism would favor retro PK if the operator is in active role. Genuine PK is also possible but in this case target would be active sucking metabolic energy provided by the operator.
2. Negative energy signals could consists of dark phase conjugate photons or even massless W bosons since TGD allows scaled up variants of electro-weak gauge bosons with large Planck constant and arbitrarily small mass scales. Dark W bosons are especially interesting since they can induce charged entanglement and purely non-local charge transfer mechanism and have been proposed to play a key role in the generation of the nerve pulse.
3. Magnetic flux quanta are the bridges making possible (presumably) unconscious feedback so that the operator can unconsciously learn how to affect the machine. How intentions can have effect on system whose functioning is unknown to the operator is actually the basic mystery of, not only psychokinesis, but of remote healing and remote mental interaction in

general, as also of the phenomena labelled as instrumental transcommunications (ITC). The learning by feedback, much analogous to that happens when we learn to drive bicycle, would solve this mystery. The effects of group activity could be understood if groups tend to form collective selves so that coherent amplification of the effect occurs.

4. The ability of the PK able person to imagine the desired effect is important and could correspond to the ability to generate p-adic space-time sheets representing the intention. The desire about the action represented by the corresponding real space-time sheet should induce the effect optimally. In personal discussions with a PK-able psychic I indeed learned that he always tried to imagine in every possible detail how he moved the physical object (say a box of matches). The role of imagination is important also in remote healing [63]. Perhaps the p-adic pseudo constants made possible by the non-determinism of p-adic differential equations should be in a good approximation genuine constants.
5. The optimal targets are initial value sensitive. This favors quantum critical systems such that several values of Planck constant are possible with large values of \hbar assignable to negative energy signals mediating the desire of the PK-able person. PK requires energy and this favors systems, which can utilize standardized metabolic energy quanta liberated in the dropping of particles to larger space-time sheets. Water would be an optimal system from the point of PK and retro PK. Homeopathy might indeed involve PK like aspects. Benveniste's experiments [28, 29] gave support for the notion of water memory but could not be replicated when the experimenters did not know in which bottles the treated water was. The preservation of water memories represented in terms of many-sheeted lasers for with $1/0$ corresponds to a population inverted state/ground state, requires metabolic energy feed and the system might suck this metabolic energy from the biological body of the experimenter [K5].
6. As noticed, this model is extremely general and seems to apply to almost any paranormal phenomena. For instance, the claimed re-incarnation cases could be understood in terms of the general mechanism for long term memory. The person who remembers having lived in past could share mental images of a person in the geometric past by time like entanglement (episodal memory), or could be able to communicate with negative energy signals to the brain of a person on geometric past memory recall and thus receive declarative memories. It is quite possible that survival of fittest in our culture has led to an evolution of an immune system preventing sharing of mental images and communications with other brains.

4.2.3 Machine-mind interactions

Machine-mind interactions represent a modern branch of parapsychological research and nowadays methodologically highly advanced. These interactions are studied several groups and individuals: 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.

1. *Retro psychokinesis with random number generators*

The analysis of experiments [45, 35, 36] discussed in the [H5] suggests that the geometric past can change in the time scale of a fraction of second. Both the work done at PEAR [54] and the work of Helmut Schmidt with retro psychokinesis [61] 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 [41] 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 [24] 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 [61]. 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 signalling 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) [54] 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

Tiller [67, 68, 69, 70] has performed experiments involving intentional imprinting of targets such as water. 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. This obviously represents a different kind of machine mind interaction. Could large energy dark cyclotron photons with these frequencies induce a periodic perturbation of the random bit sequence?

4.2.4 Robots, chickens, rabbits and men

The interaction between random number generators and humans or animals is one form of psychokinesis. For a few years ago the issue 62 of "Network", the journal of the Scientific Medical Network [55] contained a report about the experiments carried out by Dr. Rene Peoch, working at Fondation ODIER at Nantes. In these experiments chickens and rabbits apparently influenced signals composed by a random-number generator for a robot close to them, and human subjects apparently influenced the movements of the robot even though its signals had been generated by a random-number computer program six months earlier.

Chickens stayed close to the robot "imprinted" on it as their mother and followed it about. The robot had a random-number generator inside it controlling its movements, which checks showed to be truly random. The chickens were then removed and one placed so it could see the robot but could not follow it. Under these circumstances the robot spent measurably more time close to the chicken than away from it. The effect was that the chick was influencing the robot's generator. The generator was then removed to a computer away from the experimental area. The same effect occurred. "Non-imprinted" chickens however had no apparent effect on the robot.

In the rabbit experiment, baby rabbits were frightened by the robot and kept away from it. When the rabbits' movement was inhibited, the robot's movements became non-random and it kept away from them. However, when one rabbit was starved and food was placed on the robot, this behavior was reversed and the robot brought the food to the rabbit. It was found that humans likewise could influence the robot.

Also humans were invited to influence the robot as before, but in fact it was being driven by a code generated six months earlier and recorded on a CD, now being played back. The robot was influenced as in the contemporary study. The CD was then examined and it was found that the first half of its code was indeed non-random, but the unused code was truly random. This gave the effect that the computer somehow "knew" six months earlier not only that half the code would be used for such an experiment, but also the general direction of the movements that would be required.

The interpretation of the reported results in terms of psychokinesis and human-animal-machine symbiosis suggests itself. The experiment with humans can also be interpreted as a dramatic verification for the prediction that in quantum jumps between quantum histories also the geometric past changes: the recent experiment suggests that the change occurred in a time scale of six months. If the crucial assumption about the randomness of the random number generator is correct, the effect is also very strong. This could mean that we are changing our geometric past all the subjective time in macro-temporal time scales, as indeed suggested by the paradigm of four-dimensional brain. A further suggestion is that this hypothesis can be indeed tested empirically by developing further these experimental arrangements.

To better comprehend what might be involved, recall that in TGD subjec-

tive time and geometric time are not one and the same thing. Accordingly, subjective memories are memories about conscious experiences and geometric memories are memories with respect to the geometric time for which time is in a precisely same position as space: geometric memories give prediction of the future and past changing quantum jump by quantum jump like weather broadcasts (except that one usually is not interested in the predictions of what weather will subjectively be in geometrically last summer). The crucial point is that the contents of say computer files representing purely geometric memories (such as number sequencies) can change in the quantum jumps whereas the possible subjective memories about their contents can remain unchanged. This peculiar contradiction between subjective and geometric memories, which I have christened as 'tribar effect', serves as a possible experimental test for the reality of notions of the subjective and geometric time. These experiments are bound to involve human memory as a subjective element: nothing however prevents several human subjects store to their memory the original memory to guarantee objectivity in a statistical sense.

If the randomness of the original random number series produced six months before the experiment involving human-robot interaction has not been checked, it can be argued that random number generators (if genuine) accidentally produced a number series which was not random in the time scale involved. This problem could be circumvented by modifying the experiment by checking already six months earlier whether the number series is really random or not. Humans can indeed remember whether the series is genuinely random or not although they are not able to remember long number series. On the other hand, if the non-randomization effect appears only under special conditions (effect is present for the imprinted chickens only), one has even without the check good reasons to believe that machine-mind interaction has occurred.

An important question of principle is whether the random number generators are genuine or whether the numbers are generated by some algorithm yielding only pseudo random numbers. If genuine randomness is due to quantum phenomena at atomic or molecular level, then intentional action could affect physics at atomic and molecular level. Of course, the success of p-adic mass calculation and interpretation of p-adic physics as physics of cognition and intention forces the same conclusion. If some algorithm produced them and there is no noise affecting the outcome, the only changes which can occur is the modification of the algorithm or of the initial conditions for the algorithm. In the latter case the production of the desired behavior might however be impossible since the algorithm need not even allow the needed regular behavior of the random number sequence. This of course could be checked.

p-Adic space-time sheets representing intentions/memes should be transformed to their real counterparts realized as negative energy signals and able to interact with random number generators. If the p-adic memes are actually chicken's intentions mediated by magnetic mirrors and transformed to real ones when intention is realized, the interaction mechanism is basically ordinary electromagnetic interaction with the machine. The question about the detailed mechanism allowing chicken's volition to affect the geometric past of the robot

allows endless variety of answers. One possibility suggested by the more precise views about psychological time is that the robot has primitive consciousness and that the p-adic-to-real phase transition of robot proceeding to the direction of geometric future is undone by the reverse real-to-padic phase transition down to the moment when the random numbers were generated and regeneration of them occurs and gives rise to a new chicken friendly behavior. Again trial and error might be involved.

The results of experiments, if replicable, suggest that animal-machine anomalous interactions might be much stronger than human-machine interactions, perhaps because animal is totally confident that the desired interaction happens (Blessed are the meek since they will inherit the kingdom of Heaven!). One could imagine experimental arrangements analogous to the chicken-robot experiments in which the chicken is replaced by a human who genuinely believes that the robot can do what (s)he wishes: this could be achieved by telling the subject person that machine is programmed to deduce her/his wishes, from say EEG. Various modifications of the imprinting mechanism could be applied in more complicated situation. The results might be also used as guidelines in the attempts to generate artificial life. The systematic use of genuine random number generators as control tools of robotic motion suggests itself as a basic principle to guide the attempts to build artificial life. This would optimize the flexibility of the robot behavior so that it could be affected by the p-adic intentions.

4.2.5 Adaptive robots as an electronic life form?

The construction of artificial life by building initial value sensitive robots might be a possible breakthrough application of the p-adic cognition. What would be needed is just initial value sensitivity: p-adic memes would take care of the rest.

Mark Tilden is a wellknown builder of robots working in the nuclear physics laboratory of Los Alamos. Tilden builds his robots by using pieces of used electronics. The robots do not run any computer program so that the basic philosophy is more or less a diametrical opposite of AI. Rather, the wiring of the robots is such that in a new situation robot tries for different behaviors. For instance, if robot leg gets stuck, the robot changes the orbit of motion of leg. What is remarkable that the robots seem to behave like living organisms in some aspects.

Unfortunately, I do not have any scientific articles about Tilden's work apart from short description in his homepage [64]. In fact, I encountered competely accidentally about Tilden's work by reading an article in the Finnish version of Reader's Digest August 1998 after having seen Stetsoned Tilden and his tiny robots in a popular science program in Finnish TV telling about the recent situation in robotics, AI, and artificial life. The robots of Tilden have surprising abilities to adapt and compete for energy which they get from the sunlight. Robots seem to literally fight for the sunlight. For instance, an electronic fellow called Turbot, kills other robots from his territory and collects them to form a wall against the invasion of other invaders!

The claimed adaptive feats of these robots suggest that a primitive lifeform is in question and this is also the belief of Mark Tilden. A general handwaving explanation for the adaptive behavior is that these systems are at the borderline between chaos and order and adaptive behavior 'emerges'. Of course, what 'emergence' means is a complete mystery in the deterministic physics with quantum effects absent in macroscopic length scales.

That primitive life form might be in question, fits nicely with the TGD view. First of all, all forms of self-organization involve quantum jumps and consciousness, and the question is only how important is the role of cognitive consciousness in the behavior of the system. Cognitive consciousness can become important only if the system is sufficiently flexible and initial value sensitive so that the realization of intentional motor actions becomes possible by p-adic-to-real transformations inducing critical perturbations to the initial-value sensitive behavior.

The in-built flexibility of the robot behavior (a strict opposite of pre-programmed behavior), and initial value sensitivity make in principle possible self-organization by quantum jumps and effective quantum control. For instance, robots could contain modules controlled by genuine random number generators which would be affected by p-adic memes. If p-adic physics is physics of cognition, Nature itself guarantees, that robots form cognitive representations, and by the flexibility of their motor system, they are able to transform cognitive representations to motor actions. If p-adic space-time sheets are indeed memes floating around and waiting for the opportunity to materialize themselves to action, the robots of Tilden could provide an excellent opportunity for a meme to reincarnate!

The extreme generality of the p-adic physics means that one cannot exclude the possibility that electronic systems could quite generally develop p-adic cognitive representations about itself. If so, can one guarantee that the old electronic components recycled by Tilden do not differ cognitively from electronic components coming directly from fabric? If they do, two identical robots built from old and new components might behave differently. Thus a test for whether the robots have mentality and some kind of developing personality is whether two physically identical robots behave differently under similar circumstances.

Quite generally, one can identify p-adic cognitive representations as the mechanism which gives the physical system personality and allowing to distinguish even between two electrons p-adically: of course, Fermi statistics does not allow a state consisting of two electrons in states differing only cognitively. Quite generally, this kind of test could be the counterpart of Turing test allowing to deduce whether physical system has cognitive self or not.

4.2.6 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 [75] 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. The same mechanism should be at work as a microscopic and incoherent version in the case of lifters.

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

Lifters exhibit the called Biefeld-Brown effect [G2]. 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 Sergeev be based on the same mechanism as PK?

In the same article also the remote EEG sensor invented by the mathematician Sergeev claimed to remote sense EEG from a distance of 5 meters is described. Unfortunately, the information related to the invention of Sergeev 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 dielectric constant of water if ordinary Maxwellian electrodynamics is behind the sensor.

Sergeev'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 superconducting ions leaking from the magnetic flux tubes of the Earth's magnetic field can give rise to what might be called bio-plasma, and Sergeev'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 Near death experiences

Near death experiences are rather commonly experienced, say by the victims of various accidents. 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 [52].

1. *What NDEs are?*

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 neuroscience) 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.

2. *TGD based view about life after death very concisely*

It is good to summarize the latest TGD based view about consciousness after physical death before comparison with other theories and detailed analysis of NDEs. The view, which is certainly not the only possible one can imagine, is supported by the improved view about psychological time.

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 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 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 would make possible the communications of the deceased with living since the resulting real magnetic mirrors could connect the deceased with the living. On the other hand, the repertoire of possible p-adic magnetic mirror structures would be very wide because of the p-adic non-determinism.

Since magnetic mirror structures are fundamental for the field realization of the genetic code, one can quite well consider the possibility that this process induces also the self-organization of the ordinary living matter around the magnetic mirror structures. This would have interpretation as a reincarnation. Buddhas able to resist the temptation to reincarnate would continue their life at the field level. Interestingly, the development of physics from Newtonian physics of the material bodies to Maxwellian physics of fields would mirror the evolution of consciousness from concrete biological life to life at the field level.

3. Astral plane theories for NDEs

There are several theories of NDEs. A theory enjoying popularity in New Age circles is based on the notions of the astral projection and next world stating that we have another body that is vehicle of our consciousness which leaves the body at the moment of death. Although completely respectable as such, this kind of theory is not based on existing or even postulated physics, and is therefore hard to test. The notions of 'higher vibrational level' and 'astral plane' are simply devoid of a physical meaning.

In TGD framework the idea about 'vibrational levels' generalizes in an astonishing concreteness to an entire hierarchy of electromagnetic life forms and electromagnetic bodies whose sizes vary to astronomical length scales [K3, M5]. In this framework the idea about brain as a seat of consciousness is an illusion resulting from the fact that sensory data is mostly about the immediate region around body. Of course, even the idea that consciousness (as opposed to its information contents) can be localized to some part of space-time, is basically wrong in TGD approach.

A possible test for the astral projection theories is a weighing of the body after death to deduce the weight of the astral body (assuming of course that astral planes obey ordinary physics!). If 'astral planes' correspond to the p-adic space-time sheets, this test of course does not make sense. Magnetic mirror structures are obvious candidates for astral body and are real but their separation from body is impossible so that this kind of measurements do not make sense. The notion of 4-D body also suggests that the physical body remain in the geometric past in the physical death wherefrom it can communicate with the living ones via the magnetic mirrors of magnetic body which continues to be generated by p-adic-to-real phase transition.

Extrasensory perception via astral bodies is a second possible test. This test might make sense if extrasensory perception can be generated by patterns of ELF em fields as supposed in the TGD inspired model of qualia. Magnetic mirrors connecting organisms to each other and also to 'nonliving' matter make possible ESPs. Also direct electromagnetic perturbations of the magnetic sensory canvas can give rise to ESPs: in [N1] the possibility that the strange sounds produced by meteors [16] could correspond to ESPs is discussed.

4. *Tunnel experience*

The theory of Grof and Halifax [47] is based 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, phencyclidine and mescaline. I have also personal 'tunnel experiences' every-dayly: when I close my eyes in a half-meditative state achieved by writing at computer terminal, I can see a dim flow consisting of points. Typically this flow enters to or emerges from a tunnel. It can be rotating spiral like flow or simple sink or source. Source or sink can be also linear structure. Earlier this experience was not stable and tends to fade away all the time, and after few minutes I was not anymore able to achieve it. Situation has changed quite recently: I can have the experience almost anytime in peaceful state of mind. During my great experiences this flow was much more complicated and completely visible and formed a stable background of the ordinary visual experience and of hallucinatory visual images.

There is however no experience of entering into the tunnel in this case so that the tunnel need not be the same as encountered in NDEs. It has been suggested that the physiology of brain could explain the properties of near death experiences [22]. The theory of Cowan [22] 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 Troschienko have proposed a theory in which also the motion along tunnel could be understood as a visual illusion [39].

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

[K3] 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 physical death. During lifetime these em bridges would be p-adic and physical death be followed via the transformation of these bridges to real ones.

5. *OBE aspect*

Blackmore explains OBEs [37] 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 hearing [37], could create indirectly these perceptions. It is however difficult for even the most hardborn 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 [E6] 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 during NDE, the contribution of the model of external world to the conscious experience becomes negligible. The ability to experience tunnel unstably during relaxed wake-up consciousness with eyes closed is consistent with the interpretation that these two components are competing. 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. My own remembrances about the long depressive period after the great experience caused by the extreme dullness of the normal wake-up consciousness suggest at least to me that these kind of memories might make it too painful to continue

the daily life.

The notion of magnetic sensory canvas implies that we actually see at ELF frequencies. Same applies to other senses. This implies the possibility of experiences without any sensory input or even without any neuronal activity. The needed ELF MEs acting as sensory projectors would be generated in the dropping of ions from atomic space-time sheets to the magnetic flux tubes of magnetic body carrying field strength .2 Gauss (Earth's magnetic field has nominal value .5 Gauss). If the ion drops in high n cyclotron state the subsequent decay of the state by cyclotron transitions generates a bundle of parallel ELF MEs giving rise to the sensory projection. This representation can 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" [27] 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.

What has been said applies also to other senses. Interestingly, I often wake-up partially and realize that I hear my own snoring as an outsider. Sometimes I have an experience which might be interpreted by saying that the hearing in the first perspective is superposed with the hearing in the third person perspective. The third person hearing has a time lag so that a kind of double breathing results.

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 physical 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

[31], which correspond to meteorological electromagnetic perturbations typically associated with thunder storms. Could sferics be the electromagnetic correlates of discarnates?! The degree of the sensory alertness correlates directly with the ratio of the EEG net intensities in the delta band and in higher EEG bands [31]. 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 [63]. Could it be that higher than alpha consciousness somehow transforms to alpha consciousness in physical 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.

6. 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 physical 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 physical 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.

7. Positive emotions

With the motivation coming from the OBEs associated with the temporal-lobe epilepsy, it has been suggested that brain-stress near NDE episode leads to the release of neuropeptides and neurotransmitters (in particular endogenous endorphins) which are responsible for positive emotional states like joy, peace, and love. Again the question concerns about the deeper mechanism. Presumably these neurochemicals are only correlates for the experiences in which extra-sensory component of the experience begins to dominate. It has been also suggested that the lack of oxygen is what gives rise to the NDE experiences [37]. The observations of the Southampton team seem to exclude these explanations. Of course, one could claim that some core parts of brain are working even when the patient is clinically dead (no respiration, no heart beat, dilated pupils) and that these functioning parts of brain are able to generate NDE. If so, spiritual experiences would represent the lowest possible levels of consciousness, and even reptiles would have them: perhaps a vulgar skeptic could applaud here but I do not find this idea very convincing.

In TGD framework clinical death naturally implies that extrasensory component of the conscious experience begins to dominate. This picture is consistent with the view about brain as p-adic-real transformer rather than the seat of the entire conscious experience. The dominance of the positive emotions would simply mean that the negative emotions coming from sensory input would be absent.

8. Other worlds

The experiencing of 'other worlds' requires a considerable amount of hand weaving in the standard neuroscience framework. Blackmore claims that imagined worlds are experienced as real because these experiences are the most stable. I believe that Blackmore is right in the sense that mental images (sub-selves) correspond to self-organization patterns which are stable asymptotic states of self-organization. I do not however believe that this is an essential point, and certainly Blackmore's explanation fails if the interpretation of the Southampton team about NDEs is correct.

In TGD framework the other worlds might correspond to the emergence of magnetic mirror structures which correspond to higher value of p-adic prime than during the physical life. They would have much longer lengths and give rise to much longer subjective and geometric memories. Note that the MEs

associated with magnetic mirrors are classical representation for light (which brings in mind Tibetan book of death!) so that one could say that the deceased becomes a light being in a well-defined sense. The meeting of the light being might mean an ability to communicate with and sensorily experience the presence of other light beings, natural if the deceased herself has transformed to a light being (but having still 4-D body in the geometric past, this is perhaps why angels have human body!).

Note also that the absence of sensory and corresponding cognitive mental images during NDE is analogous to the empty mind free of mental images which is the goal of the meditation practices. Perhaps soul could be identified as a self having no subselves, 'irreducible self' as suggested in[H3].

9. After effects

The after effects induced by the spatio-temporally extended consciousness in which one sees one's own life from outside are often dramatic. It is difficult to reduce these after effects to brain pharmacology.

My own great experience had many aspects common to NDEs and induced profound (not at all pleasant!) changes in my own life. In my case the direct experience of the higher levels of reality made possible the realization how magnificent the almost-boring everyday reality really is when seen through sharpened senses, how pathetically narrow the zone of wake-up consciousness is, and how ridiculously little the celebrated big science tells about reality. This realization resulted in a strong conviction that I am on a right track, and has given the courage to work these fifteen years as a ridiculed scientific dissident in a country in which vulgar skepticism is in the role of a scientific state religion and vulgar skeptics have taken the role of the mind police of science.

4.4 Are communications between living and deceased possible?

The vision about psychological time suggests that the life after the physical death could be purely electromagnetic so that the memes and memplexes represented by p-adic cognitive space-time sheets (magnetic mirrors say) associated with the organism continue to transform to their real counterparts after the physical death. Since these magnetic mirrors can connect the 4-D body of the deceased to living physical bodies, communications between deceased and living become possible and the mechanism of communications is same as the mechanism of long term memories. It is also possible that the transformation of the magnetic mirror structures to real form induce generation of biological organisms around them and this would give rise to re-incarnation.

In the language used in the spiritistic circles, 4-D bodies of the deceased together with the magnetic mirror structure associated with them also after the physical death would correspond to 'discarnate' or 'ethereal' entities belonging to the 'etheric level'. Perhaps the proper interpretation for p-adic space-time sheets representing thoughts and intentions is as not-yet-born entities.

Since the p-adic copies of all real physical systems are possible, even the most far-fetched claims of psychics about materialization and communication phenomena could in principle make sense. It however seems that what is materialized by p-adic-to-real transition is the plan for organism represented by magnetic flux tube structures.

4.4.1 Mediums and materializations

In spiritualistic circles mediums have been traditionally seen to mediate communications between deceased and alive. This includes also claimed materializations of physical objects besides the bodies of the deceased. Often direct voices emerging from empty space are claimed to be heard during the sittings: trumpets and accordions flow in the air and produce music. Analogous direct voice phenomena are associated with the claimed poltergeist phenomena. The explanation goes that medium is able to somehow to draw 'ectoplasm' from her (quite often her) own body and from the bodies of the participants which then materializes as the bodies of deceased and as material objects.

For a physicist this explanation is empty as long as a physical and mathematical definition of the ectoplasm is lacking. In TGD frame work mediums could be seen as persons able to act as relay stations communicating with both deceased and with the participants of the sitting via magnetic mirror bridges. Perhaps these bridge already exist or in p-adic form or are generated during sitting (recall the inherent non-determinism of p-adic physics) and medium helps to transform them to real form so that communications along these bridges become possible.

The transformation of the p-adic space-time sheets to real ones is of course the natural candidate for the materialization process. Accordingly, ectoplasm could be identified as p-adic space-time sheets or their materializations. My own great experience, which involved several parapsychological elements, was a parade of deep ideas, and one of them was the notion 'flogiston' as something new for the existing physics and absolutely essential for the living matter. According to the vision, living organisms were fighting and killing to get 'flogiston', and the greatest minds had been able to get it (even steal!) more than the lesser souls. I have considered several identification of this mysterious 'flogiston' and p-adic space-time sheets are certainly the most elegant identification I have ended up hitherto.

One cannot exclude the possibility that the transformation of the p-adic plan for a material body represented by magnetic mirror structures could induce a self-organization of the ordinary matter around this template to form material objects or at least mimics of them. This is essentially what biological growth is assumed to be. I however find it difficult to take seriously materialization of entire physical objects by p-adic-to-real transitions (the phenomenon would have enormous technological impact!). It would seem more probable to me that memes transform directly to real space-time sheets causing what are usually regarded as hallucinatory experiences, which is now however completely real communication. If this can happen, it could happen also collectively so that all

participants have the same paranormal experience. This does not look strange if one accepts the possibility of magnetic sensory canvases receiving sensory input from several brains and also inducing hallucinatory perceptions.

Usually the spiritistics sittings have been held in the darkness and this allows excellent opportunities for a fraud. On the other hand, alpha band in EEG begins to dominate in darkness and might make possible the communications. There are several reasons to think that it is fast amplitude modulation of alpha frequencies producing harmonic multiples of the alpha frequency, which could be the communication mechanism between our level and higher levels of self hierarchy. The so called mesoscopic features appearing in EEG correlates and corresponding to 1-2 cm areas of cortex [26] could be direct physical correlates for these communications [M5]. The model of bicameral mind based on the notion of semitrance relies on the same idea [N5]. Note that the minimization of the sensory input (sittings are arranged in dark room) might be just what is needed for the extrasensory input to dominate.

4.4.2 EMDR method as a mechanism to communicate with deceased

Near-death experiences are not the only manner to get convinced about life after death. So called eye-movement desensitization and reprocessing (EMDR) discovered by Francine Shapiro [60, 40] induces what could be interpreted as after-death communications. The experiences of subject persons can be induced by this therapy in highly reliable manner: according to [40] 98 per cent of patients willing to participate the therapy had after death communication experience. It does not matter what the religious convictions of the subject person are and the experiences are actually rather easy to induce. It does not matter if the loss is traumatic or not or whether it is recent or occurred for decades in past. The experiences resemble near death experiences (light tunnels, beautiful landscapes) and involve spiritual contact with the deceased. The EMDR technique involves getting the patient to move his or her eyes in a particular rhythmic fashion while at the same time attending to a particular aspect of the traumatic memory. How EMDR works is poorly understood as yet: possibly the fact that the shifting of eyes leads to increased brain processing is of importance. Notice that rapid eye movements REM are also involved with dreams.

A possible explanation is that EMDR experiences could involve communication with the 4-D bodies of the deceased ones located possibly in the geometric recent or past via the magnetic mirrors associated with them. One might think that rapid rhythmic eye movements induce fast modulations of some alpha frequency and generate the above mentioned features which somehow help to get a contact with deceased, perhaps rhythmic eye movements somehow induce the p-adic-to-real transition of the p-adic magnetic mirror bridges. Essentially the same mechanism as involved with long term episodal memories would be in question: the only difference would be that the magnetic mirrors now mediate information not from own 4-D body from the 4-D body of the deceased.

5 TGD based model for instrumental transcommunications

5.1 Introduction

The so called instrumental transcommunications (ITC) and electronic voice phenomena (EVP) [58, 43] belong to the borderline of even paranormal phenomena, and skeptically oriented scientists probably find it rather difficult to take the claimed phenomena seriously. Personally I do not have any strong opinions and I am just interested in finding whether TGD view about paranormal phenomena might allow the claimed phenomena. Quite generally, ITC can be defined as messages communicated by some conscious entities other than humans using various kinds of electronic instruments. Electronic voices (EVP) are only a special case of the claimed communications and can be realized as signals appearing in a magnetic tape, as voices heard directly from radio receivers, or even phone calls from dead. Also images appearing in a computer screen are reported. The article of Ralf Determayer in the ITC journal [43], whose chief editor Anabela Cardoso is also ITC experimenter, helps to get an overview about the ITC phenomena.

Friedrich Jurgenson is usually mentioned as the pioneer of EVP. In 1959 Jurgenson recorded bird song in the morning to a tape recorder and to his surprise found that the tape contained also something else. He started a systematic research of the voices which he interpreted as messages from deceased. This work materialized in two books, "Voices from Space" and "Radio-link with the Dead". Kostantin Raudive, professor of philosophy and psychology and a student of Carl Jung met Jurgenson in 1965, got interested in the phenomenon, and started an intensive recording and study. He published his results in book "Breakthrough" [58]. As a matter of fact, Jurgenson and Raudive had predecessors, Raymond Bayless, Attila Szalay published 1959 an article about the phenomenon in Journal of the American Society of Psychical Research, few months before Jurgenson made his discovery. Later begun experimenting also with other forms of EVP and ITC [43]. EVP involves recorded phone calls from deceased, direct radio voices, voices both heard by experimenter and tape recorded, and "paranormal" voices not heard but recorded. ITC involves also other communication modes such as reception of images via computer screen. If one takes seriously all these reports, it would seem that both analog and digital communications are involved.

5.1.1 EVP and ITC very briefly

My own knowledge about EVP and ITC is very restricted. According to the articles published in ITC journal, for instance the articles [43, 56, 57] there seems to be a consensus about the following aspects of ITC.

1. The role of the experimenter is important. The ability to receive messages is learned only gradually. The receiving system which works for one experimenter does not work for another. For instance, if two radios are

used simultaneously they usually work at different frequencies. This all suggests that experimenter serves as a kind of medium, relay station, or "radio link".

2. The naive idea about spirits serving as radio stations is not probably correct [56, 57]. The voices from radio receivers tend to be located in silent periods containing only the background noise and somehow the sender is able to use the energy of the noise to generate the message. This suggests that stochastic resonance in which a weak signal is amplified using noise to provide the energy might be involved. The transformation of noise to voice raises the question about the possible breaking of the second law of thermodynamics, and TGD indeed allows breaking of second law below p-adic time scales [K6].
3. The spectral analysis of the electronic voices by Paolo Presi [57] shows that usually the voices have an acoustical structure similar to that of human voices. The temporal sequence of vowels, their duration, the duration of the pauses, and the accent of certain vowels of the voices determine a speech rhythm similar to ours. The transfer of information is based exclusively on the sequence of the vowel formants and the integration, made by listener, of the missing consonants. Consonants are produced by a sudden interruption of the air flow coming from the lungs or by an obstruction of the vocal tract. The spectrograms contain no fundamental frequency [56, 57] unlike speech for which the fundamental frequency defines the pitch. In principle this does not mean a loss of information but together with the absence of the consonants would mean that the primary source of the message is probably not speech organs. This makes hoax as an explanation of the voices less plausible.

5.1.2 Questions

There are several questions to be answered. 1. *How could one tell whether the ITC messages are real or not?*

Brain tries to generate standard percepts from sensory inputs: by looking at clouds at the sky one realizes that brain almost inevitably tends to see faces or other patterns. Therefore this question is highly non-trivial. One can try to answer the question by analyzing whether (say) the electronic voices have spectra resembling that of human voices, and carry the minimum information to be recognized as a speech. It is relatively easy to distinguish an artifact produced by an intelligent life-form (say quartz clock) from a "dead" matter (say a piece of rock). In the similar manner, the differences between the electronic voices and "dead sounds" provide a criterion for whether they are produced intentionally. The information content of the signal is an obvious criterion for this but it is far from trivial, how to define and measure the information content.

Standard real-number based statistical physics allows only the notion of entropy. Entropy is always non-negative so that the information defined as

negentropy would be non-positive always: the best one can achieve would be to know nothing! TGD inspired theory of consciousness strongly encourages a number theoretic modification of the standard notion of information, which is based on Shannon's definition of entropy [H2]. The resulting p-adic entropies (one for each prime p) obey the same axioms as the Shannon's entropy but can have both positive and negative values, and depending on the sign can be interpreted as measures of either dis-information or information. These information measures might apply to the analysis of EVP messages. The conclusion of Paolo Presi [56, 57] on basis of his analysis is that the voices represent a real attempt to communicate. In the following I will assume the messages are real and look whether TGD based view about remote mental interactions allows to model the phenomenon.

2. What could we speculate about the senders of the messages?

In TGD Universe everything is conscious and consciousness can be only lost by quantum entangling. Thus everything is living, and the question is only about how effectively system can control its own state and the state of its environment and about the time scale of the control.

1. Ordinary humans could send these messages unconsciously: human brain and body act as both receiving and sending electromagnetic antennae and in view of the topological quantization of classical em field, it would not be too surprising if these electromagnetic messages could be received electronically under some conditions.
2. TGD predicts that our electromagnetic bodies will survive so that the conscious experience of a discarnate receives a contribution from the 4-dimensional body of the deceased (life review reported in near death experiences) plus a contribution from electromagnetic body still existing.
3. Also the magnetosphere is predicted to be a conscious entity containing collective multi-brained selves.
4. The model for crop formations [N2, N3] leads to rather detailed ideas about exotic life-forms residing at various boundary layers of the magnetosphere, where energy currents driving self-organization are strong. In particular, the mantle-core and core-inner core boundary layers are good candidates for the seats of lifeforms (intra-terrestrials, ITs) quantum-controlling the liquid and/or liquid-crystal phases of quartz or iron from very cold and super-conducting space-time sheets.

3. What is the communication mechanism? TGD based model of remote mental interactions is based on same mechanism as communications inside biological organisms. The mechanism involves quantum entanglement having low frequency MEs (massless extremals, "topological light rays") as a space-time correlate, and remotely induced self-organization based on high frequency MEs

propagating along low frequency MEs like mass-less particles. If magnetic mirrors act as bridges between the deceased and the experimenter and between the experimenter and the electronic instrument so that the experimenter takes the role of a relay station (or medium), the phenomenon ceases to look totally implausible. Long term memory, telepathy, remote healing,...., and communications with exotic life-forms and deceased become special cases of the same general phenomenon. For instance, TGD predicts mechanisms for how body and brain seem can act as lasers in wavelength range extending from ELF range to visible and UV wavelengths. This kind of laser action could amplify the incoming signal, say microwaves at GHz region, which could be detected in turn by the electronic instrument with which the experimenter has quantum entanglement bridges, and then transformed to sounds.

4. How the sender can handle modern information technology to generate the desired messages?

In case of a tape recorder or telephone the electric signal is only em variant of sound wave but in case of radio situation changes. The carrier frequency of the sound changes and amplitude modulation can be replaced with frequency modulation. If signal is to be transformed to visual images, a transformation to binary code is needed. The question is where this technological knowhow comes? There are two possibilities.

1. A feedback from the electronic instrument via the brain of experimenter listening say the magnetotape and thus trial-and-error learning of how to send desired messages becomes possible. The simplest feedback is based on the sharing of the mental images of the experimenter by quantum telepathy. TGD allows also history editing, which means that the message to the instrument in the geometric past is modified again and again so that a repeated listening of the message could make it more comprehensible.
2. The existing knowledge about remote mental interaction suggests that they often involve magnetospheric multi-brained selves acting as kind of relay stations. For instance, remote viewer knows only the coordinates of the target, which as such are completely meaningless numbers to her: it is enough that the person who gave the coordinates of the target to the viewer knows their meaning. If ITC occurs in this manner, the information about how to translate the message to say bit sequences in the computer memory might be available. A direct remote mental interaction with the electronic system might be involved at least in some cases and the question is how the proposed general scenario allows to realize this.

5. How the intention of the sender is realized as action?

Remote mental interactions involve also the transformation of intention to action. In TGD framework this corresponds to p-adic-to-real transformation for some space-time sheets. Natural candidates are systems for which the energy of the resulting real system is small so that external energy feed can provide it. If

the primary message comes from the magnetic body of the deceased, p-adic MEs are perhaps the most natural candidates for the representations of intentions. These p-adic MEs must first be transformed to real MEs; the real MEs interact with the magnetospheric self; the real MEs originating from the magnetosphere interact with the brain and/or body of experimenter, which in turn interacts with the receiving instrument.

Detailed models for the transformation of the p-adic ME to a basic signal (represented by light or sound) or directly to an electric signal (say in magnetic tape recorder) are not possible at this stage. The mere occurrence of this transformation involves an active volition, and here the role of the experimenter who believes and wants that the transformation occurs, might be decisive. If this is the case, the phenomenon might be also regarded as a particular form of psychokinesis and disappear if the experimenter has a skeptic attitude. Also feedback via the brain of the experimenter to the sender is required and is strongest when the experimenter listens or sees whether the message is there and possibly recognizes it.

5.2 Universe as a conscious hologram and a general mechanism remote mental interactions

The idea about brain and perhaps all bio-matter, and even Universe, as a hologram in some sense (see for instance, the articles of Miller and Webb [50] and of Gariaev *et al* [34]) has a long history but the question in which precise physical sense this holds true has remained without a satisfactory answer. The notion of conscious hologram provided by TGD approach allows to understand bio-control and remote mental interactions as particular cases of the same basic interaction. The notion of conscious hologram leads also naturally to the notions of magnetic body and magnetospheric sensory representations.

5.2.1 The general model of remote mental interactions

The mechanism of remote mental interaction involves two parts. The entanglement, which made possible by low frequency ME in even astrophysical length scales, means that sender and receiver of the message become effectively a single system. This is enough to explain remote viewing as sharing of mental images implied by the fusion of mental images of viewer and target system. The active remote realization of intention requires high frequency MEs propagating like mass-less particles along the low frequency ME and inducing the leakage of the supra currents from larger to smaller space-time sheets, dissipation and possibly also amplifying laser action. This mechanism works also in ordinary bio-control: remote mental interaction is now between some biostructures such as cells or organs.

The scaling law of homeopathy, stating that high and low frequency MEs accompany each other and the frequencies are in some fixed proportions, plus p-adic length scale hypothesis make the hypothesis highly predictive. There is no need to emphasize that the reduction of both homeostasis and remote

mental interaction to the same basic mechanism gives support for the reality of the remote mental interactions.

5.2.2 The notion of conscious hologram

The concrete Maxwellian idea about hologram plate resulting as a result of interference of the reference beam and light scattered from an object can serve only as a guiding metaphor. First of all, coherence occurs only in what are called coherence regions and the problem is that Maxwellian theory does not really provide a first principle definition for the coherence regions. In quantum theory similar problem is encountered. Secondly, in living matter it is not at all clear whether reference beam exists at all. Third, living matter is a dynamic granular structure and far from a homogeneous hologram plate. Fourth, the idea about storing memories, one of the basic motivations of the hologram paradigm, has its own problems although multi-holograms are certainly possible.

In TGD framework topological quantization provides a precise first principle description of coherence. Topological field quanta are the coherence regions of the classical field and classical decoherence means the splitting of the space-time surface to topological quanta. This process gives rise to the granular structure of matter and space-time sheets in various length scales are excellent candidates for basic units of hologrammic structures at the this level of the p-adic length scale hierarchy. At quantum level bound state quantum entanglement having join along boundaries bonds as a space-time correlate is responsible for the macroscopic and macrotemporal quantum coherence. The notion of conscious hologram combines two dual aspects of consciousness to single concept: macrotemporal quantum coherence due to the generation of bound state entanglement and giving rise to co-operation on one hand, and the dissipative self-organization giving rise to Darwinian selection and competition on the other hand. In nutshell, the notion of conscious hologram follows from the topological field quantization.

1. Classical fields and matter form a Feynmann diagram like structure consisting of lines representing matter (say charged particles) and bosons (say photons). The matter lines are replaced by space-time sheets representing matter (elementary particles, atoms, molecules,...), and virtual bosons are replaced by topological light rays ("mass-less extremals", MEs). Also magnetic flux tubes appear and together with MEs they serve as correlates for bound state quantum entanglement.
2. The classical fields associated with MEs interfere only at the nodes, where they meet, and one has a hologram like structure with nodes interpreted as the points of a hologram. Thus one avoids the loss of information caused by the interference of all signals everywhere. This aspect is crucial for understanding the role of em fields in living matter and brain. The MEs corresponding to 'real photons' are like laser beams entering the hologram and possibly reflected from it. What is new that the nodes can be connected by 'virtual photon' MEs also analogous to laser beams. Hence also

'self-holograms' with no laser beam from external world are possible (brain without sensory input). The hologram has a fractal structure: there are space-time sheets at space-time sheets and high frequency MEs propagating effectively as mass-less particles inside low frequency MEs serving as quantum entangling bridges of even astrophysical length.

3. The particle like high frequency MEs induce 'bridges' between magnetic flux tubes and atomic space-time sheets at the receiving end. This makes possible the leakage of supra currents from magnetic flux tubes to atomic space-time sheets analogous to the exposure of film producing hologram. The leakage induces dissipation, self-organization, and primitive metabolism as a cyclic flow of ionic currents between the two space-time sheets, and thus a Darwinian selection of the self-organization patterns results. The low frequency MEs are responsible for the bound state entanglement, macroscopic quantum coherence and co-operation whereas high frequency MEs are responsible for self-organization and competition.
4. Also the notion of laser action finds its place: many-sheeted space-time provides natural mechanism of laser interaction: when the system is irradiated with coherent light with a frequency which corresponds to the energy difference for the ions at the space-sheets corresponding to different p-adic primes, induced dropping of the ions to a larger space-time sheet occurs and implies a stimulated emission. Thus the light beam can be amplified.
5. At the level of conscious experience the fusion of subselves gives rise to a fusion of mental images. In case of right and left visual fields this fusion gives rise to stereovision analogous to what results in hologram. In the general case kind of stereo consciousness results if the mental images are sufficiently similar.

5.2.3 Magnetic sensory canvas hypothesis

The magnetic sensory canvas hypothesis is perhaps the most radical hypothesis of TGD inspired theory of consciousness. It states that sensory representations are realized outside brain at magnetic flux tube structures associated with brain and have sizes measured perhaps in the size scale of Earth. The realization is based on the same mechanism as remote mental interactions: the simple feeling of existence mental images fuses with the more complex mental images produced in brain.

Possible extra-sensory perceptions induced by atmospheric phenomena might provide support for this hypothesis. Auroras are known to induce sounds not detected by electronic means: could these be extrasensory perceptions induced by auroras on sensory canvas. Also meteors could induce sounds [16]. If one takes very seriously the model for sensory representations, one can imagine that the meteors could kick electromagnetically the magnetic flux tube-ME pairs

of sensory canvas and force them to resonantly oscillate at harmonics of the thalamocortical resonance frequencies in interval 37-44 Hz.

These magnetic mirrors might also mediate the electric perturbations to Earth in a channelled manner so that no attenuation would be involved. The mirrors could mediate un-attenuated or even amplified ELF waves also to electronic instruments. And what is of special interest now, if electronic instruments couple to the magnetic sensory canvas, machine-man interactions would become possible. The test is to look whether meteors induce sounds heard without time lag due to finite propagation velocity of sound and whether also electronic instruments detect these sounds.

Amazingly, there is evidence just for this kind of strange effects. For centuries it is known that meteors can generate audible 'pop' like sound. Sound is heard instantaneously so that either we hear it as ESP through magnetic sensory canvas or ELF em waves are transformed to sounds at Earth and heard after that. Quite recently also electronic instruments have detected these sound [16]. Amazingly, the frequencies were 37-44 Hz range contrary to the expectation that they would be in the range 20-20.000 Hz and have much weaker intensity. The generation of sounds with the observed intensity is theoretically possible only if the electric perturbations from ionosphere have propagated to Earth as essentially unattenuated (along magnetic mirrors) or being even selectively amplified (magnetic mirrors as wave cavities).

Thus there is some support, not only for the sensory canvas hypothesis, but also for the machine-mind interactions at thalamocortical resonance frequencies. One could also look whether there are correlations between human EEG and electromagnetic perturbations of electromagnetic instruments in thalamocortical frequency range (and perhaps also at the higher harmonics of it). This interaction might be of fundamental technological important since it might make possible to control electronic instruments directly by thought.

5.3 Who are the senders?

In TGD Universe everything is conscious and consciousness can be only lost. Therefore it is possible to imagine several kinds of senders.

5.3.1 Deceased and/or living humans?

In some messages the senders tell that they are deceased. There are two possibilities: either the senders live in the geometric now in some other than the usual physical form or they live in the geometric past where their physical body still exists. Both options seem to be possible.

1. The conservation of magnetic flux suggests that the magnetic flux tube structure associated with the electromagnetic body survives the physical death so that both the 4-dimensional physical body of the deceased in the geometric past and also electromagnetic body in geometric present would exist. If the p-adic MES associated with the electromagnetic body

continue to transform from p-adic to real form, electromagnetic bridges between the 4-D body of the deceased and physically living creatures or electronic instruments could make possible ITC.

2. Also the entanglement with and signals from the geometric past from the physical bodies of the deceased must be considered (say the communications by Kostantin Raudive). TGD based model of long term memories (all memories, even water memory) is based on the mirror idea: when I remember I look at me at a magnetic mirror located at a huge distance of light years. Therefore I see the me of the geometric past in the mirror [H6]. Magnetic mirrors can however connect me to some other person and this means communications with the persons having 4-D body in the geometric past, receiving their memories. This communication is more probable between persons have had (and still have) a close relationship generating the required magnetic mirror bonds.
3. Also the brains and bodies of living could act as sending antennae and generate unconsciously ITC messages. Thus one cannot expect that all messages would have a deep spiritual tone.

5.3.2 Magnetospheric selves?

The model for the sensory representations realized at magnetic bodies of astrophysical size inspires the hypothesis that also the magnetosphere of Earth acts as sensory magnetic canvas and is a living, conscious system. Magnetosphere could be a seat for multi-brained conscious entities receiving information from human and other brains and bodies serving as neurons of these life-forms. Various EEG frequencies correlate for various parts of the magnetosphere by resonance conditions. Especially interesting seats for em life-forms are various boundary layers of the magnetosphere, such as the plasma sheet at the night side magnetosphere and magnetopause serving also as a kind of magneto-immune system.

Remote mental interactions such as remote viewing involve aspects which suggests that they proceed via the mediary of multi-brained selves providing information necessary for the localization of the target not possessed by the remote viewer herself. Also ITC might involve these collective levels of consciousness. Empirical support for the notion of multi-brained collective levels of consciousness comes from the experiments of Mark Germine [46].

An operator and a subject person were involved. The stimulation of the subject person consisted of a sequence of identical sounds containing now and then an odd-ball stimulus (now silence). The odd-ball stimulus generated an event related potential (ERP) visible in EEG and reflecting the conscious reaction. The operator was in a second room and by simple toss of coin decided whether to observe the stimuli in the computer monitor or not. The stimuli appeared in the computer monitor one second before they were heard by the subject person. What was found that when the operator saw the odd ball stimulus from the computer monitor, the ERP was weaker on the average. An 11 Hz periodicity was the major component in the difference profiles. The simplest explanation

is that the brains of both the operator and of the subject person belong to a larger multi-brained self and that the evoked response represented partially the reaction of this self. When this multi-brained self had already seen the stimulus through the operator's eyes, it was not so surprised to hear this stimulus again through the ears of the subject person, and ERP was weaker. The appearance of the 11 Hz periodicity suggests that this frequency is an important correlate for the entanglement of the subject person's mental images with those of the multi-brained magnetospheric self.

5.3.3 ETs and/or ITs?

The interior of Earth contains almost empty and cold space-time sheets and the magnetic flux tube structure in the core of Earth serves as a kind of thalamus like relay station. The cavity resonance frequencies associated with core and inner core are in the range 14-15 Hz and 40-50 Hz and correspond to two important frequencies of EEG. Thus also the interior of Earth might be important for consciousness.

The general TGD based view about life implies that various boundary layers containing strong energy currents driving self-organization are optimal for the emergence of life. The mantle-core and core-inner core boundary layers containing possibly liquid-crystal phases of quartz (glass) and iron, are especially interesting seats for life-forms controlling the hot liquid-crystal phase from larger space-time sheets which are very cold and super-conducting. A support for these speculations comes from the strange findings associated with crop circles. In particular, Chilbolton and Crabwood crop formations [73, 74] can be interpreted as messages providing information about these life forms: even the genetic codes of these life-forms can be deduced and a general model for our genetic code emerges as a by-product [N2, N3]. One cannot exclude a quantum symbiosis between us and these life-forms based on a telepathic sharing of mental images, and this kind of symbiosis conforms with shamanistic and religious mythologies and the Freudian super-ego-ego-id trinity. Therefore one must consider the possibility that the senders of ITCs are ITs (intraterrestrials). Of course, quantum entanglement mechanism allows also ETs as the senders of the messages.

5.4 Knowhow problem

How it is possible to code the information sent by the discarnate entity to say computer picture. It is difficult to imagine that the sender would be able to same as a group of IT specialists and computer engineers. There are two manners to overcome this problem.

5.4.1 Higher level multibrained selves acting as relay stations

Higher level multi-brained magnetospheric selves could act as relay stations entangling the sender of the message with the experimenter in turn entangled

with the electronic instrument. The knowhow about how to encode the primary signal to various forms such as AM or FM modulated radiowave or even signal represented as a binary code could be possessed by some brains of this higher level self.

5.4.2 Feedback and history editing

The proposed model is consistent with the fact that EVP and ITC skills develop only gradually and require patience and that some persons are more gifted than others. The generation of the magnetic mirror bridges between senders and experimenter and experimenter and electronic instrument require time. Also the sender must learn by feedback how to code desired messages to the electronic instrument. The simplest form of feedback is a sharing of the mental images generated by say the listening of the magnetic tape in the experimenter's brain.

History editing provides quite a science fictive sounding manner to make corrections to the message. Each quantum history changes the geometric past so that history editing becomes possible in principle. There is an experiment in which a chicken confined to move in small area became imprinted to a robot [55]. The motion of the robot was coded to a random number sequence half year before. After the imprinting the motion the robot tended to stay near the chicken which suggests that the bleak chicken was able to alter the random number sequence and thus edit history in a time scale of half year. Our long term memories are unstable and can be altered by suggestions. In TGD framework also this can be regarded as history editing applied to the sensory representations of the brain of the geometric past.

During the listening period the sender of the message could receive the information about the conscious experience of the experimenter by the sharing of the mental images induced by the message. The sender could make a quantum jump to a new history which would imply a modification the message to the electronic instrument located in the geometric past (the geometric past changes in each quantum jump in TGD framework), the experimenter would perceive the improved message, and so on. This iterative loop would lead finally to a message which generates the experience of recognition of message in the receiver. During repeated sessions sender would learn the code and would be able to send messages more easily.

5.5 Experimenter as a medium and amplifier of the signal

Experimenter could act as receiver of the ITC signal, amplify it, and send it further to the receiving instrument. Experimenter might also make possible feedback from the instrument to the sender. Both various experimental findings and TGD based view about bio-systems lend support for this hypothesis.

5.5.1 Magnetic mirror as electromagnetic bridge

The experimenter in ITC seems to play a role similar to that of the medium in spiritistic sittings. The idea about experimenter as a relay station between electronic instrument, making possible both the sending of the classical message to the instrument, and receiving the conscious response of the receiver during the reading/listening session, might indeed help to understand ITC at general level.

Magnetic mirrors are by definition magnetic flux tubes accompanied by MEs parallel to them. The Alfvén waves, which represent oscillations of magnetic flux tube analogous to those of violin string, resonate with the classical em wave propagating along ME and amplify the signal. To be precise, one should speak about a mirror pair: the mirrors are the points of magnetic flux tube where ME is attached to the flux tube. The existence of magnetic mirror bridges between experimenter and electronic instrument would not be surprising. MEs and magnetic flux tubes represent topological field quanta of electromagnetic field and it would be more surprising if they would not interact with electronic instruments since these instruments interact already in Maxwell theory with external electromagnetic fields. What is new is that MEs make possible channelled transfer of energy and information: in Maxwell's theory signals would be transmitted to all directions as 'mass communications' and distance would be the limiting factor unlike in case of MEs. The presence of kind of interaction would suggest that humans and electronic instruments are already now in an intense interaction and that the electronic revolution is more like a symbiotic process in which both machines and men are active participants.

The generation of electronic (and also acoustic) signal requires energy. Magnetic mirror quantum entangles the discarnate, experimenter, and the electronic instrument. Only bound state entanglement is preserved in quantum jump and thus binding energy is liberated when bound state entanglement is generated. This energy is usable energy and could provide the energy needed to generate the signal. If stochastic resonance is involved, the noise acts as an amplifier of the signal. In the case of an acoustic signal the body of the experimenter could generate the sound and energy could come from metabolism.

5.5.2 Body and brain as antennae

TGD based view about living systems indeed predicts that brain and body act as receiving and sending quantum antennae in a very wide range of frequencies. For instance, EEG can be regarded as radiation emitted by brain acting as an antenna. TGD predicts that EEG MEs are accompanied by high frequency MEs, most probably at microwave frequencies and induces self-organization at magnetic body and thus give rise to sensory representations. For instance, microwave hearing [32] lends support for the hypothesis that brain is a receiving microwave antenna. The microwave frequency spectrum relevant for microwave audition is in the range .2 – 3 GHz. A receiving antenna can also act as sending antenna and it is known that at the sunset a microwave static of unknown

but presumably biological origin emerges and correlates strongly with the so called taos hum [78]. Taos hum is a humming sound heard during night time, which can become intolerable and has no identified origin. The most plausible explanation of taos hum is as a special case of the microwave hearing.

5.5.3 Are alpha waves in special role?

The general communication mechanism between the sender and experimenter could be based on fast amplitude modulation of alpha waves involving higher harmonics of ~ 10 Hz wave (this is like adding small ripples in long wavelength water wave). This mechanism could in fact be equivalent with the propagation of higher frequency MEs inside 10 Hz ME serving as the quantum entangler. Schumann resonance frequencies correspond to cavity resonances in size scale of Earth and thus might mediate telepathic communications between different selves. The lowest Schumann frequency of about 7.8 Hz is especially interesting in this respect.

Our speech uses the same mechanism (10 Hz frequency is the basic vibration frequency of speech organs, which is not the fundamental frequency which is above 20 Hz) and so called features [26] identified recently in EEG patterns can be also regarded as a fast amplitude modulation of the alpha wave (low amplitude higher harmonics of the alpha wave appear as ripples of the alpha wave). The structure of the mesoscopic features of EEG [26] suggests that the harmonics up to the 8:th harmonic of alpha wave are present. This amplitude could modulate a carrier wave which should have frequency above 80 Hz: the presence of the carrier wave is however not absolutely necessary (the fundamental frequency defining the pitch of the voice and produced by speech organs indeed tends to be absent in EVP [57]). Interestingly enough, the frequency interval for so called taos hum is in in the interval 40-80 Hz [M5].

These features could communicate information to higher level multibrained selves. It has been found, that healer's alpha wave activity intensifies during healing process and magnetic emissions in ELF range have been observed. Also correlations and synchronization between alpha wave activities of Qigong masters and healees has been reported [63]. If the brain of the experimenter serves as a relay station, the deceased (identifiable as the electrommagnetic body remaining after the physical death or as the physical body in the geometric past) could use the same code as it has used while controlling its own material body from magnetic sensory canvas during life time to both send and receive mental images. If magnetic sensory canvas is able to produce visual hallucinations and dreams it might be also able to produce visual images by sending similar commands to the brain of the experimenter serving as a relay station and preserving the topological structure of images.

5.5.4 Could the body and brain act as lasers?

According to the experimental findings of Peter Gariaev and his group, the irradiation of DNA by visible laser light induces radiowave emission at frequencies

ranging from ELF frequencies to MHz range [34]. The TGD based model of the phenomenon relies on the hypothesis brain and body could act as a laser in a wide range of frequencies extending from EEG frequencies up to UV. The idea is simple: when an ion drops from a smaller to a larger space-time sheet it liberates the difference for the energies of the initial and final state. For free ions this energy is in the simplest situation essentially the difference of zero point kinetic energies. For magnetic flux tubes it is the difference of magnetic energies, which is very small and can correspond to even ELF frequencies. This leads to a many-sheeted laser mechanism: if the system is irradiated with a radiation, whose frequency is same as for the radiation liberated in the dropping, stimulated emission occurs and incoming coherent radiation can be amplified. The difference with respect to the ordinary laser is that the ions does not drop from a higher to a lower energy state of an atom but from a smaller to a larger space-time sheet. The many-sheeted laser could make possible for a body and/or brains to amplify the incoming ITC signal represented by high frequency MEs propagating along low frequency MEs generating the entanglement.

5.5.5 Stochastic resonance

An important question is how the message is amplified and filtered from the background noise possibly present. A possible answer to this question is stochastic resonance. Stochastic resonance could occur in the receiving instrument and/or in the brain of the receiver. ITC, in particular EVP research indeed supports the view that certain background noise is necessary for receiving messages. On basis of this observation it has been proposed that stochastic resonance (the article [17] is an excellent review about the principles and applications of the stochastic resonance) is the mechanism of EVP.

Stochastic resonance requires a bistable system (for instance, double potential well) or an excitable system having metastable states. An essentially non-linear phenomenon is in question. Signal is in a role of the harmonic external force: the output of the bistable system is interpreted as a transformed signal. If one takes seriously the claim about the positive effects of the white noise on tape recordings, bistable system must reside either in the electronic system transforming sound signal to an electric signal or in the brain of the experimenter serving as a relay station between the sender and electronic instrument in the proposed model.

TGD Universe is quantum spin glass which means that any system should be characterized by fractal spin glass energy landscape containing valleys (energy minima) inside valleys inside... This of course means that there is plenty of bistable systems. TGD also predicts new kinds of dynamical degrees of freedom not predicted by standard physics, so called zero modes, which typically characterize the shape and size of 3-surface and also so called Kähler field (essentially Maxwell type field) of space-time surface. These new degrees of freedom could provide the required new degrees of freedom possibly making also the relevant parts of electronic instruments bistable systems.

1. Does the brain of the receiver contain the bistable systems?

Skeptic would argue that the noise used to promote the receipt of the messages is what cheats the brain of the poor pseudoscientist to recognize a feature which is not actually present in the incoming signal. The skeptic might be quite right although after listening to some of the recordings I have a tendency to believe that there are actual messages there. One could however turn around the argument of the skeptic. Perhaps it is indeed the brain of the experimenter where the bistable system resides and amplifies the very weak signal from the sender and sends it to the electronic instrument in electronic form. Stochastic resonance in the experimenter's brain would be involved also with the receipt of the feedback signals from the instrument by the sender of the message. This model has several satisfactory features.

i) The model is consistent with the latest facts about brain science [17, 25]. The model is also universal in the sense that it does not require discarnate entities to be ingenious electric engineers: they can learn by trial and error how to generate desired messages by affecting the electronic instrument.

ii) The model would explain why some experimenters are better than the others in receiving messages. They are like crickets able to distinguish very weak input from the high noise. If feedback from the experimenter's brain to the sender is involved this in turn helps the sender to learn to generate desired messages. The model is also consistent with the fact that the highly tuned system which works perfectly for a particular experimenter, does not work for the other experimenters. Note that the magnetic mirror bridges between the experimenter and the electronic instrument are an essential part of the system.

The hypothesis could be tested by purposefully building EVP and ITC instruments for which the background noise can be varied.

2. Do electronic systems contain bistable systems?

The hypothesis that the electronic system contains the bistable system is subject to so strong additional constraints that it does not look too plausible in the standard physics framework. If the leakage of ionic currents from the magnetic flux tubes to the wires of the electronic induced by MEs gives rise to the electronic signal, stochastic resonance is perhaps not needed since the background noise is very weak. It must be however emphasized that many-many-sheeted space-time plus spin glass degeneracy might provide new physics mechanisms of transforming the ITC signal to an electronic signal.

The very fact that the electronic information transfer systems should not induce large distortions of the signal, requires that the system is effectively linear. Bistable systems are highly non-linear systems unless the signal fed into the system represents a sufficiently strong external force in which case the system is analogous to a one-dimensional particle in an external harmonic force: the archetypal model is the potential well $V(x) = -x^2 + x^4$. In the case of magnetic tape the direction of magnetization would naturally represent the two potential wells and hopping of the particle between wells would correspond to the changing direction of magnetization. Thus, if bistable systems are involved, ordinary signals

must represent strong external forces for which the system is effectively linear and non-linearity can be important only for very weak signals. In case of EVP this requires that possible messages should be contained by the portions of the magnetic tape, where ordinary signal is reduced to mere noise and the noise is sufficiently weak. Already this requirement might kill the hypothesis.

To test this option, one should find whether the electronic system transforming the sound to electric current contains portions modellable as bistable systems fed by an external signal for sufficiently weak input signals. If this is the case, then model could be tested by varying the intensity of the external noise to see whether this has any effect on the probability of receiving the messages.

5.6 How the signal is transformed to a signal in electronic instrument

One should also understand how the transformation of the ITC signal to the signal appearing in electronic instrument such as tape recorder, telephone, or radio receiver occurs.

5.6.1 Direct radio signal

The simplest situation is direct radio signal. It is known that the voices tend to appear in the silent portions of radio signal containing only noise. This is of course natural since in this manner the masking of the signal can be avoided and might allow also stochastic resonance. If the sender or magnetospheric multi-brained conscious entity has managed to code the signal to AM or FM radiowave, and if the brain or body of the experimenter has managed to amplify it and redirect it to the instrument, then the transformation to an audible signal is not a problem.

5.6.2 "Paranormal" signal to a magnetic tape

The first possibility is that primary messages appear as ME having a Fourier decomposition resembling sufficiently that of the sound wave, and giving rise to the required vibrations of atoms. MEs are the basic candidates for the carriers of these waves and the Fourier spectrum of the voice with respect to frequency could be coded into the Fourier spectrum of em or Z^0 fields associated with ME. Hence ELF frequency range would be in question. Phase information is crucial: anyone can easily verify that a reversed speech usually consists of a gibberish despite the fact that the Fourier spectra are same for speech and reverse speech. This suggests an amplitude modulation of the carrier wave or fast amplitude modulation producing ripples to the carrier wave as a candidate for the representation of the information contained by ME.

The sound frequency range involved with the sounds heard by humans is in the interval 20 – 20.000 Hz meaning the lengths of ME would vary between Earth radius and 10 kilometers. This spectrum is also claimed to be important for water memory and the mechanism of homeopathy [28].

A concrete model for the process might look like following.

1. The signal is first transformed to an electric current, which subsequently induces a shortlasting magnetization of a soft electromagnet which in turn induces a permanent local magnetization of hard ferromagnet (magnetic tape). The strength and sign of the local magnetization depends on the strength of the current which in turn codes the strength of the sound signal. A similar transformation to an electric current occurs also for the signal in case of visual ITC.
2. A concrete manner to generate the electric current inducing the magnetization would be by inducing a leakage of a supra current from magnetic flux tubes to the atomic space-time sheets of the current wire responsible for the magnetization of the soft electro-magnet. This leakage could be induced by microwaves by a mechanism discussed in [K5]. The modulation of the microwave by sound wave would imply the modulation of the current automatically. An analogous mechanism could be at work for the radio receiver.

5.6.3 Transformation of em signal to sound signal before entering the tape recorder

Classical EVP suggests that the basic signal enters to the magnetic tape as an electric signal. On the other hand, the experimental results reported by Alec MacRae [49] are consistent with the assumption that real sounds generate the signal and that electromagnetic signal does not generate a signal in the microphone. The latter conclusion comes from the observation that Faraday cage around microphone does not affect the communication. In TGD framework this conclusion cannot be made since Faraday cage is not expected to affect MEs. The acoustic insulation of another microphone however weakens the voice so that it seems that a genuine acoustic signalling is in question. This does not of course imply that the generation of real sounds is the only mechanism: in the presence of feedback the best communication mode available could be used.

TGD based model for the real sounds generated by meteors heard both directly and recorded by microphones is based on electromagnetic signals coming along magnetic mirrors associated with the sensory magnetic canvas and acting as wave guides and transformed to ordinary sounds via the coupling with objects at the surface of Earth. Whatever the details of em signal-sound transformation are, it certainly exists, and could be involved also now: the electromagnetic signal could come either from the magnetic sensory canvas of the experimenter, of the sender, or from the magnetosphere containing the multi-brained self serving as a relay station. Higher harmonics of the frequencies 37-43 Hz appearing in case of meteors [16] would be however required to generate the voices or shorter magnetic mirrors should be involved.

One can imagine several mechanisms for the transformation of the primary signal to sounds.

1. The mechanism transforming electromagnetic signal to sound wave could rely on piezo-electricity and frequency resonance. Quartz crystals are excellent piezo-electrets and used in radio receivers and senders. Also body acts as a piezo-electret and the body of the experimenter could transform the signal to sound. Human body could act also as a Z^0 -piezo-electric transforming the Z^0 signal to an ordinary sound. The so called oto-acoustic sounds (audible sounds emanating from ears) could result in the same manner. Also material objects of the acoustic environment could serve the same purpose.
2. The phenomenon of microwave hearing suggests that brain and/or body could also transform microwave signals propagating along ELF ME to ordinary sounds.

5.7 Tests for the model of ITC

Most tests of the ITC reduce to tests for the general mechanism of remote mental interactions, which should be also at work in length scales below body size (bio-telepathy) and for sensory representations realized at the magnetic body. This is good news in the sense that good models usually explain many apparently unrelated phenomena and bad news in the sense that predictions are not ITC specific.

1. Tests for the motion of electromagnetic bridges.

1. Since the development of the magnetic mirror bridges between experimenter and electronic instrument takes time, the replacement of the magnetic tape in EVP with identical one, might make the performance poorer.
2. One could test the importance of the magnetic flux tubes by varying the strength of the local magnetic field (note that magnetic tape has a natural coupling to the magnetic flux tube structures of Earth's magnetic field) to see whether Earth's magnetic field plays a role in the effect. One could test whether the appearance of ITC messages and perturbations of magnetic field appearing at Schumann frequencies correlate. The correlations of paranormal phenomena with sunspot activity are well-known and could be tested in case of ITC.
3. Maxwell's electrodynamics, which is not equivalent with TGD, would suggest that MEs cannot penetrate Faraday's cage so that ITC would not be possible inside Faraday cage. In many-sheeted space-time this argument is lost because MEs by definition are em bridges outside the atomic space-time sheets where the Faraday cage acts. If MEs cannot penetrate Faraday cage, the TGD based model for sensory representations would fall down since it would predict that person in ideal Faraday cage could not have sensory experiences! Be as it may, one can test this aspect by putting the experimenter and/or the instrument in Faraday cage.

4. One should also test directly whether body and brain act as laser like amplifiers of em radiation at, say, audible frequencies. The work of Gariaev [34] shows that irradiation of DNA with visible light produces radiowaves also at audible frequencies. The work of Blacman and others [44] shows that the irradiation with ELF waves at EEG frequency range induces biological effects.

2. *Tests for the ionic leakage mechanism.* For instance, the appearance of ions not originally in the system by the leakage of the supra currents and the dissipative effects caused by the leakage would be a good signature for the effect. These tests are discussed in [K5]. In the recent case one such system would be the current wire inducing the magnetization of the magnetic tape.

3. *Tests for the ideas about the communication method.*

1. In remote healing the changes of alpha waves in EEG are reported to correlate with the intentions communicated by the healer. Alpha waves dominate when sensory input is absent, in particular the closing of eyes stimulates alpha waves. This is consistent with the fact that EVP requires silent and dark room. A possible test would be to record the EEG of the experimenter and look whether there is a clear change in the activity in alpha band both when the tape is on and when the tape is listened to and find whether there are recognizable changes of alpha activity. In particular, one could see whether alpha activity changes at the time when the message appears to the magnetic tape. The lowest Schumann frequency 7.8 Hz is especially interesting in this respect. On basis of the experiments of Mark Germine, also the 11 Hz frequency is interesting [46].
2. The sounds detected from meteors [16] are in the thalamocortical 37-44 Hz frequency band [M5] suggesting that magnetic sensory canvas mediates ELF perturbations to both brains and to electronic instruments at this frequency range. One could in principle test whether thalamo-cortical resonance band in the EEG of the experimenter contains something correlating with the received message.
3. Are persons able to receive the ITC messages also able to hear microwaves.
4. Are the sounds in EVP are received electronically or acoustically. Both mechanisms might be involved. Alec MacRae has demonstrated and in his experiments signal is received as a sound [49]. One could also test whether the pitch of the sound correlates with the acoustic environment (big room–small room).
5. One could test the role of the stochastic resonance by varying the level of the acoustic or radio noise. Here explicit formulas for the noise optimal for a signal of given frequency are available [17].

4. *Tests for the notion of magnetospheric selves.*

The notion of magnetospheric selves might be crucial for the solution of the knowhow problem and the experiments of Mark Germine [46] can be seen as a pioneer work in the testing of this hypothesis.

5. *Tests for the notion of history editing.* History editing is not necessary for understanding of ITC but one could test whether it is involved. Let an outsider, presumably not able to act as a relay station, listen to the magnetic tape first and document whether he/she received any message. Suppose that he/she detects no recognizable message. Next let the experimenter listen the same tape, and report what he/she found: during this session the feedback mechanism could transform the message to a recognizable form by affecting the geometric past at the moment the magnetic tape was on. Suppose that the experimenter indeed recognizes a message. Let an outsider listen the tape again to see whether there is any recognizable message now. If the proposed mechanism is correct, the outsider who did not hear any message in the first trial, should hear now a clear message. Note that one cannot replace external person with a computer since the computer records change in quantum jumps too! Note also that even the geometric memories of the external person might change if they are comparable to mechanical records: genuine subjective memories are required. Also the repeated listening of the tape by the experimenter could improve the quality of the message and the above experimental arrangement could be iterated.

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