

Quantum model for sensory representations

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Abstract

There are very general objections against the idea that ultimate sensory representations are realized inside brain. For instance, any computer scientist, unless informed about materialistic dogmas, would argue that the processing of the sensory data must be separated from its representation. How this could occur if sensory and other representations are realized inside brain, is however difficult to see.

In TGD approach these objections lead to the view that the magnetic flux tube structures associated with the primary and secondary sensory organs define a hierarchy of sensory representations outside brain with magnetic flux tubes serving as the sensory canvas to which place coding by magnetic transition frequencies generates sensory subselves and associates with them various sensory qualia and features by quantum entanglement. Thus brain could be much like a RAM memory containing a collection of features in random order and the ordering would be induced by the sensory map to the magnetic sensory canvas.

MEs define this sensory projection and EEG MEs correspond to our level in this hierarchy of projections. The sizes of these sensory selves are of order ME sizes ($L(EEG) = c/f(EEG)$) and thus of order Earth size at least. Thus TGD based view about sensory representations is a diametrical opposite of the standard view in which sensory representations are miniatures.

One can also understand long term memories in this framework. To remember something in the geometric past at distance T is to look at a magnetic mirror with length $L = cT/2$. At quantum level quantum entanglement is involved and means sharing of mental images between recent me and the me of the geometric past (or some other self responsible for the memory representations). This requires that magnetic sensory canvases involved with long term memories have astrophysical sizes with light year being the natural length unit. For magnetic fields this indeed makes sense.

One must distinguish between representations at the personal magnetic sensory canvases (our magnetic bodies) and at the magnetic body of Earth (magnetosphere). The latter could be responsible for collective levels of consciousness and for the third person aspects of our consciousness and make magnetosphere a gigantic magnetobrain having living organisms as sensory receptors and motor organs. Resonance conditions for the sensory projector MEs fix the model for the magnetospheric sensory representations to a quite high degree and lead to a rather detailed correspondence between EEG bands, structures of brain, and structures of the magnetosphere.

1 Introduction

There are very general objections against the idea that ultimate sensory representations are inside brain. For instance, any computer scientist, unless informed about materialistic dogmas, would argue that the processing of the sensory data must be separated from its representation. How this could occur if sensory and other representations are realized inside brain, is however difficult to see.

In TGD approach these objections lead to the view that the magnetic flux tube structures associated with the primary and secondary sensory organs define a hierarchy of sensory representations outside brain with magnetic flux tubes serving as the sensory canvas to which place coding by magnetic frequency generates sensory subselves and associates with them various sensory qualia and features by quantum entanglement. Thus brain could be much like a RAM memory containing a collection of features in random order and the ordering would be induced only by the sensory map to the magnetic sensory canvas.

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One can also understand long term memories in this framework. To remember something in the geometric past at temporal distance T is to look at a magnetic mirror with length $L = cT/2$. At quantum level quantum entanglement is involved and means sharing of mental images between recent me and the me of the geometric past (or some other self responsible for the memory representations). This requires that magnetic sensory canvases involved with long term memories have astrophysical sizes with light year being the natural length unit. For magnetic fields this indeed makes sense.

Are our sensory representations at the magnetic flux tubes of Earth's magnetic field or are personal sensory canvases needed? Since space travellers experience the world very much like us and have survived, the most plausible conclusion is that the magnetic sensory canvas is personal. The direction of Earth's magnetic field would only fix the orientation of the flux tube structure defining the personal sensory magnetic canvas. Pyramidal neurons contain magnetic crystal and also haemoglobin molecules are magnetic and their alignment with the local magnetic field of Earth would make this possible.

The flux tube structure associated with Earth's magnetic field is expected to define sensory canvases of Mother Gaia and smaller magnetospheric selves. It is quite conceivable that these canvases contain also sensory (and other) representations of the information from brain and body. The intersections of the projector MEs projecting to the personal sensory magnetic canvas with the magnetic flux tubes of Earth's magnetic field provide the simplest realization for these representations. These representations could be responsible for the third person perspective which is also an integral part of our consciousness: the mechanism providing the third person aspect would be sharing of the mental images by quantum entanglement. Out-of-body experiences and near death experiences could be one particular manifestation for this component of consciousness. The magnetospheric representations could be also responsible for long term memory representations.

The chapter "Quantum model for sensory representations" of [28] provides a general vision about magnetic sensory canvas hypothesis. In the chapters "Quantum model of sensory representations" and "Magnetospheric sensory and motor representations" of [28] this vision is discussed further.

2 Are the ultimate sensory representations realized outside brain?

There are very general objections against the idea that ultimate sensory representations are realized inside brain.

a) Any computer scientist, unless informed about materialistic dogmas, would argue that the processing of the sensory data must be separated from its representation. How this could occur if sensory and other representations are realized inside brain, is however difficult to see.

b) The motion of eye or head does not induce the sensation that the world is moving although the sensory image moves around the cortex. Rather, brain acts like a (possibly moving) canvas at which the sensory input is projected and monitored by an external observer. This very simple observation is a strong objection against the idea that the ultimate sensory representations reside inside brain.

These objections lead to the view that the magnetic flux tube structures associated with the primary and secondary sensory organs define a hierarchy of sensory representations outside brain. Magnetic flux tube structures would serve as the sensory canvas to which sensory images are projected from brain and possibly sensory organs and even neurons. MEs serve as projectors and place coding by magnetic transition frequency associated with ME wakes-up sensory

subelves at various positions of magnetic flux tubes having varying thickness and associate thus various sensory qualia and even more complex attributes to the objects of the perceptive field.

EEG MEs correspond to our level in this hierarchy of projections. The simplest possibility is that the sizes of these sensory selves are of the order of EEG ME sizes ($L(EEG) = c/f(EEG)$) and thus can be of the order of Earth size (Schumann frequency 7.8 Hz corresponds to the circumference of Earth)! Thus the ultimate sensory representations are magnetic giants in TGD and diametrical opposites of the neurophysiological dwarfs of standard neuroscience populating also TGD brain.

One can also understand long term memories in this framework. To remember something in the geometric past at temporal distance T is to look at a magnetic mirror with length $L = cT/2$. At quantum level quantum entanglement is involved and means sharing of mental images between recent me and the me of the geometric past (or some other self responsible for the memory representations). This requires that magnetic sensory canvases involved with long term memories have astrophysical sizes with light year being the natural length unit. For magnetic fields this indeed makes sense.

The known strange effects of large scale perturbations of Earth's magnetic field on consciousness (say, statistics about the effects of magnetic storms in mental state and tectonic activity inducing UFO experiences) provide a rich palette of anomalies supporting this view. The model for magnetospheric sensory representations at the magnetic body of Earth provides rather detailed view about how magnetic storms can affect our consciousness (see the chapter "Magnetospheric sensory representations" of [29]). The conservation of magnetic flux makes the magnetic flux tube structures of (say) Earth size very stable: thus physical death presumably means only that our magnetic body redirects its attention to something more interesting. Near death experiences discussed in more detail in the chapter "Biological realization of self hierarchy" indeed support this view.

Imagination very might involve p-adic-to-real phase transitions transforming p-adic imagery to nerve pulse patterns which would usually generate sensory experiences at our level of self hierarchy. The genuinely p-adic aspect of imagination could be analogous to the free choice of initial values in a computer simulation and transformed to their real counterparts initiating neural activity. As in case of imagined motor actions, these imagined sensory experiences must however be amputated at the step that would give rise to a genuine sensory experience. This means that the MEs waking-up magnetic subelves on the sensory canvas outside body are not activated during imagination. The motor output and the ultimate output giving rise to our sensory experience are very closely related: just like printing or some control activity and picture on the monitor screen in case of computers. Imagination is like simulating without any kind of output outside computer by selecting initial values using random number generator.

3 Personal and magnetospheric sensory canvases

Are our sensory representations at the magnetic flux tubes of the Earth's magnetic field or are also personal sensory canvases needed? Since moon travellers have experienced the world very much like us and have survived, the most plausible conclusion is that the magnetic sensory canvas is personal. The direction of Earth's magnetic field would only fix the orientation of the flux tube structure defining the personal sensory magnetic canvas. Pyramidal neurons contain magnetic crystal and also haemoglobin molecules are magnetic and their alignment with the local magnetic field of Earth would make this possible.

3.1 Resonance conditions

Resonant amplification is expected to be of a crucial importance for the representations.

a) The requirement that ME acts like a resonant wave cavity fixes the representation to a high degree. The requirement is that the fundamental frequency $f = c/L$ of ME of length L equals to the magnetic transition frequency at the sensory canvas in question (personal sensory canvas or Earth's magnetosphere):

$$f = c/L = f_m .$$

This condition alone implies that various parts of the magnetosphere correspond to various EEG bands. For the personal magnetic canvas the condition $L = kS$, where S is the transversal thickness of the magnetic flux tube parallel to ME, guarantees resonance condition for all points of ME.

b) In case of magnetic mirrors (ME plus parallel magnetic flux tube) a further amplification mechanism is possible. Since a magnetic flux tube parallel to ME is present, also Alfvén waves, which correspond to the oscillations of magnetic flux tube, are present and satisfy the same dispersion relation as the waves associated with ME, and thus can amplify further the em (or Z^0) fields of ME since magnetic energy can be fed to the system responsible for the sensory representation. Continual transformation of energy to magnetic energy, magnetometabolism, might indeed be key aspects of magnetospheric consciousness.

c) The cavity resonances associated with the spacetime sheet complex defined by Earth (inner core, outer core, mantle,) allow transversal communications and amplification. Besides 7.8 Hz Schumann resonance associated with the entire Earth, also the 40 Hz (14 Hz) resonance associated with Earth's inner (outer) core of the Earth deserve to be mentioned since they are important EEG resonances. Of course, also the 'harmonics' of these resonances are important.

3.2 Magnetic mother Gaia

The flux tube structure associated with Earth's magnetic field is expected to define sensory canvases of the magnetic Mother Gaia and lower level magnetospheric selves defining a hierarchy of collective consciousnesses. It is quite conceivable that these canvases contain also sensory (and other) representations of the information from brain and body. The intersections of the projector MEs projecting to the personal sensory magnetic canvas with the magnetic flux tubes of Earth's magnetic field provide the simplest realization for these representations. For the magnetospheric representations the resonance condition $f = c/L = f_m$ for the projector MEs is extremely stringent since magnetic transition frequencies f_m are determined by Earth's magnetic field now and a map between EEG bands and magnetospheric regions emerges.

These representations could be responsible for the third person perspective which is also an integral part of our consciousness: the mechanism providing the third person aspect would be sharing of the mental images by quantum entanglement. Out-of-body experiences and near death experiences could be one particular manifestation for this component of consciousness. The magnetospheric representations could be also responsible for long term memory representations. Magnetospheric selves define kind of conscious copies (several of them(!), like copies of data files but not identical) about me and they, as well my personal magnetic body, should continue their existence after my physical death. These mental images of magnetic Mother Gaia are living creatures.

It is possible to construct a rather detailed quantitative theory for the magnetospheric sensory representations (see the chapter "Magnetospheric Sensory Representations" of [29]), and a surprisingly detailed structural correspondence between brain and magnetosphere emerges. In particular, highest level sensory representations about us are predicted to reside at the plasma sheet at the night-side of the Earth's magnetosphere serving as magnetospheric counterpart of

the insula with which self model is often assigned. Amazingly, there is empirical evidence that plasma sheet contains 'features' like 'wings' and 'eyes' coded to the velocity distribution of ions in plasma sheet [Frank *et al*].

4 Cortex as a collection of attributes assigned to the objects of perceptive field represented on magnetic canvas

One of the basic problems related to the understanding of the information processing in brain is how various attributes are assigned to the object of the perceptive field. What is known that brain recognizes features and these features/attributes seem to be located in a more or less random looking manner all around cortex. This brings strongly in mind random access memory or computer game in which various little program modules realized as records in random access memory represent collection of standard sound effects. A strong hint is the empirical evidence for the view that the resonance frequencies associated with the autocorrelation functions of nerve pulse patterns, and thus presumably also coding EEG frequencies, are same for the features associated with a given object of the perceptive field. The challenge is to understand how the picture based on a collection of MEs projecting features to the magnetic canvas could allow to understand what is behind these observations.

4.1 Brain constructs features

The view about MEs associating attributes to the object of the perceptive field by waking up subselves in the magnetic flux tube structure serving as a sensory canvas suggests an elegant interpretation for these facts.

a) Cortex can be regarded as a collection of regions specialized to represent various kinds of standard features. Features need not be simple qualia: arbitrary complicated collections of them, such as familiar faces are also possible features. Even entire dynamical processes could serve as features.

b) Basic feature-regions are like computer records containing besides the standard feature data also information about the position of the object of the perceptive field with which this feature is to be associated. The information about the position could be variable but a more attractive view is that also this information is completely fixed. Thus feature records would be fixed triplets ($feature, d, \Omega$) where d and Ω code for the distances and direction angles of the object of the perceptive field to which the feature is assigned. Frequency coding could be used to wake-up these feature selves and this could give rise to the sensory representation.

c) Features must somehow be represented by MEs. The activated ME associated with the feature record codes the direction and distance of the object of the perceptive field to which this particular attribute is to be associated. Basically the direction and frequency of ME code for the direction and distance of the object of perceptive field. Feature becomes conscious when magnetic quantum phase transition occurs. The distance dependence of the magnetic flux tube thickness makes possible the cyclotron frequency scale coding of the distance.

MEs (records) form pre-existing dynamical radial bundles (files) associated with a fixed feature and a specific ME (particular record in file) is activated selectively by frequency coding. The radial bundle of MEs has a natural interpretation as a topological field quantization for the classical radiation field.

4.2 MEs are either active or passive

Projector MEs should be in two states: active and passive. In active states MEs should correspond to em MEs. In passive state they could correspond to either p-adic MEs or Z^0 MEs. It is yet too early to choose between these options.

a) For the p-adic option p-adic-to-real phase transition would transform passive em ME (intention) to active em ME defining sensory projection. One might argue that since sensory representations do not involve intention about sensory experiencing something, this option cannot be correct.

b) For the Z^0 option color rotation would transform Z^0 ME to em ME and might be induced by a reference beam of configuration space photons. There are some arguments supporting the view that Z^0 MEs are responsible for the communication of motor commands from the sensory canvas to brain and body and involve the transformation of p-adic Z^0 MEs to Z^0 MEs. In fact, the Z^0 MEs generated by p-adic-to-real transformation in the p-adic-to-real phase transition front could serve could in turn become sensory projectors in the color rotation. Thus 'sensory' would follow 'motor' rather at the level of the sensory magnetic canvas.

4.3 Model for the sensory projectors

It is perhaps worth of trouble to consider a more detailed just-for-definiteness model for the mechanism behind sensory projections.

a) There is a radial bundle of pre-existing MEs (file consisting of records) associated with each feature with a fixed distance d such that these MEs are transformed to em MEs when activated and in turn waking up magnetic 'position-self' and assigning the feature with it. Feature files with a fixed distance d of object could form linear stripe like structures for which d corresponds to linear distance along stripe and coded to EEG frequency of MEs varying with this distance. Thus there is a coding of the distance of the object by the distance along the linear structure. These stripe like regions could in turn correspond to linear or at most two-dimensional regions coding for the variants of feature, such as colors. One-dimensional coding by frequency is in principle always possible. Strictly speaking, topographic organization of records is not necessary but is presumably present.

b) The problem is to selectively activate a ME corresponding to a given distance and orientation. Frequency coding is a universal manner to achieve this. Each distance corresponds to a frequency interval such that the ordering of the intervals reflects the ordering of distances. The direction angles for the object of the perceptive field corresponding to a fixed distance are coded by the frequencies in the corresponding frequency interval. Therefore a given EEG frequency activates definite ME. Note that the frequency activating ME, is variable in some range, and is not the same as the frequency at which ME activates magnetic quantum phase transition.

c) There is an important consistency constraint on this picture. If the orientation of the cortex changes, the frequency coding for the orientations is altered and the perceptive field is experienced to rotate if ME is fixed to the reference system of head. Thus feature files should not corotate with head but should be fixed to a kind of a compass needle. This suggests that ME bundles are anchored to the magnetic crystals filling the brain whose orientations are fixed by the orientation of Earth's magnetic field.

d) Second important point is that the radial bundles of MEs and magnetic flux tubes must form dynamical units. For instance, MEs and magnetic flux tubes could be parallel and thus maximize the probability for a contact interaction. This would also bring in TGD counterparts of Alfvén waves (oscillations of magnetic flux tubes) as amplifiers of resonance.

Only in this manner the sensory experiences can be private and the contribution from the other brains remains negligible. Note however that people in very intimate contact could gradually share their magnetic sensory canvases: the anecdotes about gradually developing telepathic communications between the teachers and students of the meditative practices could involve this kind of sharing of computer screen between several users.

There are certainly variants about this basic option. For instance, the sphere

defined by the orientation angles could be decomposed into sectors of fixed solid angle coded spatially so that ME bundles would span only a fixed solid angle. The extreme situation is the one in which the direction angles are coded spatially. Thus one would have three-dimensional gridlike structure coding the directions and distance of MEs. In this case each point would contain only single ME which does not mean very effective information representation capacity. By the fractality of consciousness, this architecture is expected to be realized at various length scales. Perhaps even at the length scale of genes.

4.4 Spectroscopy of consciousness

In the proposed coding EEG MES would contain essentially all information about perceptive field and the spectroscopy of consciousness (see the chapter "Spectroscopy of Consciousness" of [29]) would be realized in a strong sense. There is indeed evidence for the spectroscopy of consciousness. According to [15] the EEG at skull correlates strongly with cognition and behaviour whereas intracranial EEG correlates only weakly and does not add anything new to the information from the EEG at skull. This obviously supports sensory canvas hypothesis.

In the same article also the notions of operational synchrony, rapid transition periods, and quasistationary segments are introduced. The motivation comes from the finding that EEG in various frequency bands and various areas of the cortex decomposes to quasistationary segments and rapid transition periods between them [15]. Quasistationary segments could represent subselves (mental images). Rapid transition periods might in turn have interpretation as control commands represented as simple reference waves or memetic codewords generating much more complex holograms.

4.5 Realization of motor commands

The remaining question is how motor activities are realized in this picture. The metaphor for consciousness as a computer sitting at its own terminal, which originally stimulated my personal attempts to understand consciousness, might help here. Computer screen corresponds to the magnetic canvas. The one who sits presumably corresponds to higher level in fractal magnetic hierarchy (flux tubes inside flux tubes). The central unit corresponds to the brain. Sensory projector MEs correspond to records organized as files formed by the radial bundles of MEs and coding the picture on the monitor. MEs as active quantum holograms acting as control commands seem to provide a realization of keyboard. The hypothesis that Z^0 MEs are responsible for the motor control from the personal magnetic body has survived hitherto the tests that I have been able to imagine. One of its nice features is that motor control and sensory representations separate neatly (see the chapters "Macroscopic quantum coherence and quantum metabolism as different sides of the same coin" and "Magnetospheric sensory representations" of [29]).

5 Anomalous visual percepts and sensory canvas hypothesis

Sensory canvas hypothesis means that at the perceptual level we see using ELF—rather than visible light. This suggests the possibility of the vision based solely on the ELF input from brain and body having no correlate with the visible light entering into retina nor with neural activity. Even genuinely three-dimensional vision in which own body is seen as it would be seen by the external world suggests itself.

There is some evidence for this kind of anomalous vision.

a) Yogis have reported altered states of consciousness in which they see their own body three-dimensionally, that is simultaneously from all directions.

b) Becker tells in his book "Cross currents" [4] about a young cancer patient who told that he can see the interior of his own body. The patient could locate the tumour correctly. This supports the view that ELF MEs could project from the entire body to the personal or magnetospheric sensory canvas.

c) 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 the 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.

The dropping of ions from the atomic spacetime sheets to the magnetic flux tubes so that they end up to high n cyclotron states decaying via the emission of photons at frequencies which are harmonics of the cyclotron frequency could generate the projector MEs needed for the sensory representation of the physical body or part of it as seen by the environment.

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.

6 Place coding of features inside brain

Place coding for various geometric parameters characterizing simple geometric 'features' inside brain could be realized using the variation of the cyclotron frequency along a magnetic flux tube of varying thickness. The hierarchy of the sensory canvases allows a modular structure in which a geometric feature such as triangle, line, or ellipse represented at a lower level sensory canvas is projected to a *single* point of 'our' sensory canvas. Also the magnetic flux tubes inside brain could provide similar coding of abstract geometric information, such as scales of a geometric figure.

Becker tells in his book "Cross Currents" [4] about a technique discovered by Dr. Elizabeth Rauscher, a physicist, and William Van Bise, an engineer. The technique uses magnetic fields generated by two coils of wire, each oscillating at a slightly different frequency and directed so as to intersect at the the head of the subject person. When two energy beams with different frequencies intersect at some point in space, a third frequency, so called beat frequency is formed as the difference of the frequencies. What Bise and Rauscher found that this ELF frequency (unfortunately, I do not know what the precise frequency range was) generates simple visual percepts like circles, ellipses and triangles and that the variation of the second frequency induces the variation of the shape of the percept.

The simplest interpretation is that the beat frequency is extracted by non-linear effects in brain and induces a magnetic quantum phase transition at magnetic tubes whose thickness varies and codes for a parameter (say scaling in some direction) characterizing the geometry of the primitive percept (or 'feature'). An analogous phenomenon occurs also for auditory inputs with slightly different frequencies fed into ears and makes it possible to 'hear' sounds below the audible range. The mechanism could be the same.

One can imagine two options concerning the ultimate representation of a simple geometric feature depending on whether the feature corresponds to a *collection* of points or *single* point at 'our' sensory canvas.

a) The visual percept corresponds to a *collection* of activated points at 'our' sensory canvas and activated geometric point corresponds to a standard mental image represented at brain level and assigned to a point of sensory canvas. The magnetic phase transition would initiate a process eventually activating particular projectors and the position of the quantum phase transition at the

magnetic flux tube would determine the shape of the feature. One can criticize this option. The brain applies modular hierarchy in the information processing and simple percepts like triangles and circles which are also fundamental in the elementary geometry, are ideal for basic features assignable with a *single* point of 'our' sensory canvas rather than being represented as composites of elementary features (points). The very fact that the place coding for the geometric shape of the feature is involved, suggests the same.

b) The visual percept is represented as a mental image inside brain or at some lower level sensory canvas so that the hierarchy of the sensory canvases would directly relate to the modularity of our sensory representations and sensory canvases would be in an intense interaction by quantum entanglement much like various subprograms of a computer program. This geometric mental image is assigned with a *single* point of 'our' sensory canvas by quantum entangling it with a projector ME projecting to a particular point of 'our' sensory canvas. The position of the feature at the sensory canvas might be determined by the position of the volume of intersection for the beams.

7 The relation of mental imagery to sensory experiences

Mental imagery is something which is difficult to understand in the framework of the standard neuro science. There are empirical results suggesting that visual mental images correspond to patterns of activity inside cortex, which are three-dimensional and continuous so that neural activation provides a concrete recognizable image about object. Also imaginative thought resembles very much visual imagery as is clear from the fact that language is full of visual metaphors. It is also known that imagery uses same regions of the cortex as real sensory experience and the problem is to understand why there is almost sensory experience involved with imagery.

In the framework of the standard neuroscience the obvious question is why the pattern of the imagery activity is not accompanied by a direct sensory experience. Also the boundary between direct sensory experience and imagination is sometimes problematic. For instance, in the state between sleep and awake sensory images often enter into mind. During dreams one can have sensory images and eidetic memory is essentially sensory memory. I have a personal experience about an extended state of consciousness, or rather whole-body consciousness (this experience actually made me consciousness theoretician!). During this state I could see my thoughts as vivid visual images and had also peculiar odour and taste experiences also reported to occur during mystic experiences.

If sensory representations are realized at the magnetic canvas, the difference between imagination and real sensory experience could result from the absence of the sensory representation. It is known that primary sensory areas, which in TGD framework are good candidates for the seats of the sensory projectors, are much less active during imagination than during real sensory experience. The projector MEs responsible for the sensory representation could be activated but be p-adic and thus represent only cognitive images. Similar argument would explain why motor activities are not accompanied by sensory experiences associated with motor pathways. This model would also explain why imagination can sometimes transform to real sensory experiences. The obvious reason for why sensory imagination should not create lively images is that this would lead to a dangerous mixing of the real and virtual.

8 Tests for the basic notions related to the magnetic sensory canvas

In the following some general tests for the notion of magnetic sensory canvas are proposed.

8.1 Quantum entanglement and fusion and sharing of mental images

Magnetic flux tubes, MEs and magnetic mirrors induce quantum entanglement between remote systems and this could be tested but this requires highly specialized experimenter. It has been recently found that quantum entanglement between macroscopic quantum systems consisting of about 10^{12} Cs atoms lasts a time of order millisecond at least [19]. This is not what one might have expected on basis of standard quantum theory. The prediction of shared and fused mental images is dramatic prediction and one should try to find a precise test for this prediction. Correlated features in EEG of a large number of subject persons and simultaneous subjective report about similar mental images might be regarded as a support for this.

Brains and organisms could form something analogous to a computer network. Brains would be in shared use and that also we would use several brains via the sharing of mental images and our own brains would be more like personal computer. The EEG bands which do not contribute directly to our consciousness would be involved with the communications to higher levels selves like magnetic Mother Gaia and her mental images. During sleep brains would be used most effectively by these selves.

Sharing of mental images with higher level selves could involve Schumann resonances and other cavity resonances in an essential manner. This might be actually the case quite generally since cavity resonances might make possible the horizontal communications between vertical magnetic flux tubes structure associated with brains. Thus the study of EEG correlations around Schumann frequencies and other resonance frequencies could be especially rewarding.

The liberation of binding energy as a usable energy accompanies the generation of quantum entanglement and could explain why synesthetes whose left brain contains large synchronous regions during synesthesia are able to survive although brain metabolism is 18 per cent lower than normally. Quantum metabolism could also explain why the oxidative metabolism is very low during intense synchronous neuronal firing. The notion of quantum metabolism could also be tested.

8.2 MEs

Maxwell's electrodynamics predicts that radiation cannot penetrate Faraday's cage. If MEs cannot penetrate Faraday cage, it would seem that the TGD based model for the sensory representations falls down since it would predict that person in and ideal Faraday cage could not have any sensory experiences! One can argue that in many-sheeted spacetime this argument is lost because MEs by definition are em bridges outside the atomic spacetime sheets where the Faraday cage acts.

This is of course just a guess and the conservative minded colleague would say that MEs penetrating Faraday cages should have been observed long ago. Something much more clever could indeed be involved. Z^0 MEs do not care about Faraday cages and biosystem could cheat the builder of Faraday cage by first generating Z^0 ME penetrating the Faraday cage without any difficulties, and then color rotating it to an em ME acting as a sensory projector. If sensory projector MEs indeed result from Z^0 MEs representing control commands by a color rotation, this mechanism is natural.

One can test the presence of MEs by studying whether system can emit radiation penetrating Faraday cage. In particular, if the system generates MEs with a nonvanishing em vacuum current, a system closed in Faraday cage could generate coherent photons outside the cage having correlations with the functioning of the system. One could try to detect Popp's biophotons for living matter inside Faraday cage. The effect of Faraday cage on 40 Hz EEG oscillations, which would naturally associated with sensory representations, would be also very interesting.

There are claims that alpha waves, in particular at Schumann resonance frequency can penetrate Faraday cage (for instance, the work of Dr. Andre Puharich). If Schumann resonance corresponds to oscillations of magnetic flux tubes, one can understand the penetration as occurring along magnetic flux tube structures.

8.3 Topological field quantization of magnetic fields and superconductivity

One could in principle test whether Earth's magnetic field in outer space allows tubular and/or shell like topological field quanta which would be ideal magnetospheric sensory canvases. The Russian experiments for overunity energy production in rotating magnetic systems demonstrate the presence of shell like magnetic field structures in these systems [32, 30]. The possible presence of vertical magnetic flux tube structures emanating from brain could be tested as well as the presence of magnetic circulation. For instance, cyclotron radiation from this kind of structures could serve as a signature. Also effects like cold fusion are made possible if atomic nuclei can approach target nucleus along magnetic flux tube and thus avoid Coulomb wall. 'Houdini effect' might be also crucial for the understanding of catalyst action.

Lian Sidoroff [37] mentions the experiment performed by M. Sue Benford et al. (unpublished), where exposing half of a hair sample to an ionizing radiation produced radiographic film exposure underneath the other half of the sample, located many miles away. A possible explanation is that part of the ionized atoms reside at the magnetic flux tubes connecting the two halves of the hair sample and are transferred from sample to another one via the mediary of supra currents. This experiment encourages to consider the possibility that supra currents can flow between healer and healed and that the supracurrent circuitry (magnetic circulation) is not restricted inside single organism but can connect different organisms to each other. Also adjuncts could become part of these circuits.

This kind of experiments could serve as ingenious tests for the hypothesis of superconductivity in macroscopic length scales. For instance, a variant of this test is based in the addition isotopes of selected ions to other half of the sample and finding whether the fraction of ion isotopes increases in the second half of the sample located, say, at the second side of the globe.

The treatment of water by magnetic fields is known to stimulate plant growth and to affect IR absorption spectra, surface tension and crystallization patterns. The effects resemble those achieved by the treatment of healer. The emission of biophotons in IR and UV range have been frequently measured in the proximity of healers. This is easy to understand if MEs and magnetic fields form magnetic mirrors so that presence of either makes the presence of another probable.

8.4 Sensory canvas and magnetospheric events

That supra currents could flow in magnetospheric length scales is in consistency with the magnetic sensory canvas model. Even more, the model for auroras as an astrophysical quantum phenomenon discussed in the chapter "Biosystems as superconductors" of [28] relies on the assumption that the magnetic flux tubes of both earth's and solar magnetic fields are superconductors (solar wind

would thus flow as supra currents). A topological model for the crucial reconnection phenomenon of the magnetic field lines of earth's and solar magnetic fields results. Reconnection is accompanied by the leakage of the supra currents to nonconducting spacetime sheets through join along boundaries bonds: this mechanism is a good candidate for a universal mechanism leading to a breakdown of superconductivity and is presumably involved with a wide class of atmospheric phenomena like lightnings, ball lightnings, tornadoes, etc.. The model allows to identify the mechanism generating the electric fields responsible for the acceleration of ions eventually giving rise to auroras via collisions with the ions of the ionosphere.

The model for the auroras suggests that a given magnetic flux tube contains only single charged ion species. This would mean that magnetic sensory canvas decomposes to subcanvases representing different types of sensory information, perhaps different selves in self hierarchy. This kind of decomposition might be of fundamental importance for conscious information processing and is indeed assumed in the proposed model of sensory qualia and sensory representations (see the chapter "Spectroscopy of Consciousness").

1. Sounds from auroras as ESPs?

The sounds claimed to be heard during auroras but not measured by microphones might represent genuine extrasensory percepts resulting from the perturbations of the magnetic auditory canvas caused by the auroras. The breakdown of the super conductivity might even correlate with the loss of consciousness reported to sometimes occur during perceiving auroras. This picture encourages to think that weather phenomena, in particular thunder storms, might relate to our consciousness also in extrasensory manner. There are also reports that seeing auroras can cause a loss of consciousness. This effect might not be only due to the depth of the aesthetic experience. The effects of magnetic storms on patients of mental hospitals are also well documented. If the transpersonal sensory representations responsible for third person aspect of consciousness are indeed realized at magnetic flux tubes structures associated with Earth's magnetic field, one is led to ask whether the dissipative processes associated with auroras destroying ionic supra currents might indeed affect directly our consciousness, inducing even a loss of consciousness. The effects of auroras as well as magnetic storms and substorms are indeed strong in the outer magnetosphere (in particular in plasma sheet), where the highest level representations should reside (see the chapter "Magnetospheric sensory representations" of [29]).

2. Meteor sounds and 40 Hz thalamocortical resonance frequency band

There is also some other evidence for the sensory canvas hypothesis. Since 16th century it is known that also meteors produce audible sounds. What is mysterious that there is no time lag due to the propagation through the atmosphere. The explanation is that it is very low frequency em waves which propagate to Earth and generate sounds by interacting with the objects at the surface of Earth.

Joined by the International Leonid Watch - Croatia (ILWC) project, a group of scientists presented the first instrumental detection of elusive electrophonic meteor sounds. In November 1998, the researchers from the Croatian Physical Society and the University of Kentucky organized an expedition to Mongolia to observe the anticipated Leonid meteor shower and shed some light on the phenomenon [40]. The complete data analysis revealed two electrophonic (electronically detected) sounds that provided several important clues about the nature of this longstanding astronomical mystery. It became clear that sounds were created when the meteors were crossing night-time ionosphere. The existing theories cannot however completely explain the phenomenon. The energy of meteor does not seem to be high enough to invoke the electric fields needed to explain the electronically recorded sounds, and strangely enough, the frequencies are much lower than expected, in the region 20-40 Hz.

Magnetic mirrors as carriers of the electromagnetic perturbations might allow a better understanding of the phenomenon. Perhaps the audible sounds, in contrast to the electronically recorded ones which seem to be of much lower frequency, are in fact generated by the direct perturbations of magnetic or Z^0 magnetic auditory canvas: this would explain why there is no lag due to the propagation through atmosphere. Electronically recorded sounds could be induced by the em perturbations propagating along magnetic mirrors and the mirrors might act as resonant wave guides amplifying the em fields (electro-phonetic sounds had frequency spectrum in the region of lowest Schumann frequencies). Notice that magnetic mirrors of length shorter than Earth's circumference would give rise to higher resonance frequencies than Schumann frequencies. Also cavity resonances and TGD counterparts of Alfvén waves might be involved.

3. Day-night and geographic variation of the sensory magnetic canvas and EEG

Magnetosphere should be responsible for the sensory (and other) representations related to memory and third person aspects of consciousness, whereas personal magnetic sensory canvas is responsible for the first person aspects. This implies definite predictions. For instance, space traveller (in particular moon traveller) consciousness should differ from the ordinary consciousness. Also night-day variation in consciousness are expected. This might correlate with the fact that we usually prefer to sleep during night time. Magnetic storms should have (and indeed are known to have) effects on consciousness, in particular so at delta and theta bands.

Also the possible dependence of EEG on the location of a given subject person could be studied. Personal sensory magnetic canvas presumably moves together with the subject whereas resonance condition for the length of ME ($f = c/L = f_m$) fixes the length of ME and also to high degree the point of magnetosphere where ME projects. The most natural option is the point at which ME projects changes so that magnetic transition frequency is not changed. This would predict minimal changes in EEG.

One could also test the third person aspects of consciousness in subjects in artificial satellites. What is known that an electric field oscillating at 10 Hz frequency is needed to keep the biological clocks of astronauts ticking: this might relate to the change of the endogenous cyclotron frequencies of Iron and Cobalt.

4. Plasmons as fundamental magnetic life forms and experiences about encounters of ETs

The explanation of Persinger for the experiences about encounters with ET:s generalizes: the magnetic perturbations of Earth caused by tectonic activity at tectonic lines generates spray of magnetic flux tubes from the site of the tectonic activity and these flux tubes can reconnect with the magnetic flux tubes of personal sensory canvas and this induces a leakage of supra currents and changes the structure of the personal sensory canvas. This can also lead to generation of plasmons, which are good candidates for the fundamental lifeforms. The entanglement of plasmonic mental images with ours might explain the experiences about encounters with angles, ETs,.. Even genuine UFOs might be plasmons and contain as a crew sensory representations of habitants of a planet of distance star!

The challenge is to develop precise experimental tests for this general picture. Artificial generation of conscious experiences would be one such test. For instance, if one could decouple brain regions giving the dominating sensory and motor input (for instance, by transcranial magnetic stimulation), the possible transpersonal contribution to the sensory canvas could begin to dominate and give rise to a plethora of altered states of consciousness: OBEs, encounters of deceased, life review,.. Also miraculous cognitive feats such as those performed by certain autists could become possible. One could also test whether the presence

of artificially generated plasmons induce altered states of consciousness.

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