

# Questions related to the notions of self and time

M. Pitkänen  
Email: [matpitka6@gmail.com](mailto:matpitka6@gmail.com).  
<http://tgdtheory.com/>.

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### Abstract

The notion of self and the relation between subjective and geometric time involves unclear aspects. In the following I try to articulate the problematic issues as clearly as possible. The precise nature of the hierarchy of causal diamonds (CDs) as correlate of self hierarchy should be characterized. The basic prediction that sub-selves have also time reversed variants should be interpreted and one can ask whether sensory-motor dichotomy is a sensible interpretation. One can of course wonder whether sub-selves are always experienced as mental images and whether after images really represent re-incarnations of sub-selves. One can ask whether the rather dramatic prediction of re-incarnations can be transformed to an experimentally testable prediction. If one takes seriously the notion of self hierarchy and identifies the EEG correlates of self in a manner proposed by Fingelkurts brothers, this kind of prediction is possible.

## 1 Questions related to the notion of self hierarchy

The TGD based model of self hierarchy [K1] involves the hierarchies of causal diamonds (CDs) and of space-time surfaces inside them as space-time correlates. The surprising prediction is that the death of self is followed by its re-incarnation at the opposite boundary of CD and that the arrow of geometric time for the re-incarnate is opposite than for self. This raises interpretational challenges, and in order to make predictions testable one must try formulate the notion self-hierarchy as clearly as possible.

### 1.1 Hierarchies of causal diamonds and space-time surfaces as geometric correlates for self hierarchy

Causal diamonds (CDs) identifiable as Cartesian products of intersections of future and past directed light-ones with  $CP_2$ , which plays no active role in the definition. I have not been able to nail down the precise definition for the hierarchy of causal diamonds. Self hierarchy demands that CDs serving as imbedding space correlates for selves have sub-CDs identifiable as mental images

of self. The basic question is whether CDs can also overlap. If so then finite unions of CDs could be allowed.

Selves as conscious entities are assumed to have space-time surfaces within CDs as space-time correlates. These CDs are dynamical: the other boundary remains unaffected during sequence of repeated state function reductions as also the states at it. Second boundary shifts so that the distance between the tips of CD increases and defines the experienced flow of time. These space-time surfaces form also a hierarchy.

Given space-time sheet has both Minkowskian and Euclidian regions - wormhole contacts - separated by wormhole throats at which the signature of the induced metric changes. Minkowskian space-time sheets are connected by Euclidian wormhole contacts. If the magnetic flux through wormhole contact is monopole flux, wormhole contact connecting two Minkowskian space-time sheets has interpretation as a building brick of elementary particles. Minkowskian space-time sheets at different levels of hierarchy are disjoint and separated by Euclidian wormhole contacts. This forces to modify the notion of quantum mechanical subsystem as a tensor factor of the state space.

What is new that two Minkowskian space-time sheets glued to larger disjoint Minkowskian space-time sheets can be connected by magnetic flux tube serving as a correlate for (negentropic) entanglement just as wormholes in GRT picture serve as correlates for entanglement. Two unentangled systems can therefore have subsystems, which are entangled and correspond to two space-time sheets connected by magnetic flux tubes! This is possible only in many-sheeted space-time and the hypothesis has been that two selves, which have no entanglement at their own level of self-hierarchy, can have entangled subselves and that this negentropic entanglement means sharing of mental images giving rise to a kind of stereo consciousness. The fusion of right and left visual fields would be example of stereo consciousness.

What does this situation mean at the level of CDs? It would seem that the CDs associated with selves sharing mental images overlap and that the space-time surfaces assignable to fused mental images/subselves belong to the intersection of CDs. Thus it seems that one must allow unions of also overlapping CDs.

## 1.2 Are time reversed sub-selves always experienced as mental images?

In the proposed vision about self as generalized Zeno effect self dies as the first state function reduction to the opposite boundary of CD takes place. This implies the re-incarnation of self with the property that the geometric time flows in opposite direction since the opposite boundary of CD shifts such that the temporal distance between it and the opposite static boundary increases in repeated state function reductions leaving the states at static boundary un-affected.

Subselves correspond to mental images. The question is whether self really experiences the time reversed sub-selves as a mental image and if this is the case, what can one conclude about this. For sub-sub...-selves this problem is not acute if sub-sub-selves are experienced as kind of statistical averages. One possible interpretation for self and its time reversal is in terms of sensory input and motor action. I have indeed proposed that motor action is essentially sensory experience in reversed time direction and Libet's discovery that conscious decision is preceded by neural activity (with respect to geometric time) provides a support for this interpretation. The time reversal of sensory mental image would represent motor action and at the level next below our level of hierarchy would be directly experienced as volitional act.

I have considered also other interpretations. One is suggested by visual illusion in which the picture of dancer is experienced to make either right or left pirouette. The direction of rotation would distinguish between mental images and its time reversal. It however seems that the sensory-motor dichotomy provides the most plausible and economical interpretation.

One can also wonder what happens, when mental the image is associated with a boundary of  $CD_1$ , which overlaps with CD in such a manner that the opposite boundary is outside of CD. Does self experience the mental image associated with  $CD$  but not its time reversal?

## 1.3 Are after images reincarnations of mental images?

After images appear periodically as one can easily find by looking and lamp and closing eyes. They also change colors. Could these after images be interpreted as re-incarnations? This sounds

attractive but one must be very careful. A sub-self, which dies and transforms to its time reversal reincarnates eventually as sub-self with original arrow of time. It should re-incarnate at time which is very near to the time when it died since the boundary of the static CD has not shifted and only single shift occurs at the re-incarnation. With respect to geometric time the new mental image should thus begin at the moment when previous subself died. After images are not experience to begin immediately which suggests that they are not re-incarnations but belong to a 4-D population of sub-selves. Our geometric past is alive and changes all the subjective time. This is not so confusing when one realize that ZEO means that conscious existence is essentially 4-dimensional. Also our memories are dynamical and change all the subjective time. Negative energy signals to geometric past which correspond to time reversed sub-selves indeed affect the geometric past and memory representations. In principle this kind of signalling could be carried out artificially to manipulate geometric past.

What does this picture mean for an observer measuring EEG of subject person? The operational architecture model of brain developed by Fingelkurts brothers (see <http://tinyurl.com/hpdqsmq>) [J1] has strong resemblances with self hierarchy of TGD. The model suggests that sub-selves/mental images should have as correlates quasi-stationary segments of EEG having average duration of about .3 seconds in alpha band. The subjective time of the observer should correspond to the geometric time appearing as parameter in EEG and increases as the boundary of CD assignable to observer shifts in repeated reductions. During the time interval that time-reversed mental image lives, this geometric time increases. Does this mean that the re-incarnated sub-self is born in geometric past of observed and the re-incarnation should not be visible in the EEG recording? Or is the entire 3-D EEG recording updated in each repeated reduction so that it is consistent with the geometric past? This would be somewhat analogous for cosmic censorship postulated in General Theory of Relativity? If so, then the finite interval of subjective time for time reversed self would correspond to very short time interval between subsequent quasi-stationary EEG segments! Very strange indeed but possible if one accepts that subjective time and experienced time are not one and same thing and that there is self hierarchy each with its own subjective time and natural geometric time as temporal distance between the tips of corresponding CD.

#### 1.4 Inverse research on decisions shows instinct makes us behave like cyborgs, not robots: really?

I learned recently (May 2016, much later than the above text was written) about an interesting work, which relates to the relationship of experienced time and geometric time but ortodoxically assumes that these two and one and the same thing. The title of the popular article was *Inverse Research on Decisions Shows Instinct Makes Us Behave Like Cyborgs, not Robots* (see <http://tinyurl.com/zhngc43>). It tells about the work of Adam Bear and Paul Bloom. The article claims that our mind for some mysterious-to-me reason tricks us to believe that were are responsible for totally automatic or reflexive behaviours. In fact, these behaviors by definition are such that we do not feel of being responsible for them. Bear how allows us some subconscious free will so that we are not programmed robots but cyborgs whatever that might mean.

This work is an excellent example about how a dominating paradigm, which is wrong, leads to wrong interpretation of experimental findings, which as such are correct. The standard belief in neuroscience and standard physics is that causal effects propagate always in the same direction of the geometric time. This interpretation follows from the identification of geometric time (time of physicist) with subjective time. This despite the fact that these times have very different properties: consider only reversibility *viz.* irreversibility, existence of both future and past *viz.* only past exists.

The classical experiments of Libet challenge this dogma. Person decides to raise finger but neuro-activity begins fraction of second earlier. Mainstream neuroscientist of interprets this by saying that there is no free will. Second proposed interpretation is that the decision is made earlier at subconscious level and at our level the experience of free will is an illusion. One can of course wonder why this illusion.

The third manner to interpret the situation respects our immediate experience that we indeed have free will but in order to avoid mathematical contradictions must be accompanied by a new more general view about quantum physics accepting as a fact that there are two causalities: that of free will and that of deterministic laws of field equations. In TGD framework Zero Energy Ontology realizes this view. The outcome is prediction of signals which can propagate in both directions of

geometric time. If the conscious decision generates a signal to geometric past it initiates a neural activity in geometric past. An excellent tool for survival in jungle or in modern market economy full of merciless predators.

In the experiment considered subject persons saw five dots and selected one. One of the dots became red with a varying time lag but subject person did not know when. Subject person had to tell whether her choice had been correct, wrong, or whether she had failed to make any choice at all before the change took place.

The surprising observation was that the shorter the time interval from the guess to change of color to red was, the better the reported ability to guess correctly was and in conflict with statistical model based on fixed arrow of time. If information can travel backwards in geometric time, the natural interpretation would be the same as in Libet's experiments and in the experiments of say Radin and Bierman claimed to demonstrate precognition. This is possible in zero energy ontology (ZEO). ZEO allows also a slightly different interpretation relies. In ZEO in which mental images correspond to causal diamonds (CDs). For sensory mental images their time scale would be of order .1 seconds so that below this scale one cannot anymore put events in precise time order and one indeed has precognition. What this means that one does not know whether the sensory input corresponds to the "upper" or "lower" boundary of CD so that these interpretations are equivalent.

Neuroscientist cannot of course publicly utter the word "precognition" associating immediately with really dirty word "paranormal". The orthodox conclusion is that subject persons are "cheating" themselves without knowing it. Very bizarre interpretation - if taken completely seriously it forces to question all our knowledge! One can also ask, why the subjects would tend to cheat themselves when the change occurred immediately after their choice: why not always? Certainly the interpretation is a heroic attempt to save the standard world view.

A simple modification of the experiment would be an addition of a keystroke telling the choice when it was done. This would immediately tell whether something like precognition was involved. In fact, the above key stroke could be un-necessary,

## **2 Re-incarnation and time reversed selves as basic predictions of TGD inspired theory of consciousness**

Life has been hard for skeptics during last two decades. A typical skeptic has as building bricks of his ego the items in the list of notions that they regard as pseudoscientific. This allows to attack the people who have the gift of imagination and passion for genuine understanding, which skeptics unfortunately do not possess. What makes attacks easy that no arguments based on contents are needed and the skeptic need not waste his time by trying to understand the arguments of the person to be labelled as pseudoscientist or crackpot.

The typical rhetoric tricks used begin from replacement of Dr X with Mr X and end up with the "conclusion" that the work of Mr X is totally incomprehensible. I have learned that rather often skeptic of this kind is an academic dropout who never managed to do his MsC. Obviously, the role of skeptic became a manner to survive socially and retain the illusion "I am a scientist". During last decades the list of pseudoscientific notions has shortened item by item as quantum biology and quantum consciousness have emerged as respected branches of science. The notion of re-incarnation (see <http://tinyurl.com/jfpowqg>) has been certainly regarded as one of safest pillars supporting the ego of skeptic but even this pillar is in danger to fall down. Poor skeptics.

It is indeed amusing how fast the attitudes change as ideas evolve and experimental data emerge. Only few years ago I could not say anything definite about reincarnation in the framework of TGD inspired theory of consciousness. Now it has become an unavoidable prediction of zero energy ontology (ZEO), which itself is a "must" in TGD framework.

### **2.1 Reincarnation: a testable prediction?**

The prediction related to re-incarnation is however not quite what one might have expected. In death of self a reincarnation as time reversed conscious entity takes place. For time reversed self subjective time evolution corresponds to evolution in a reverse direction of geometric time. The next death/reincarnation after this re-incarnation gives rise a mental image for which the arrow of geometric time is the original one.

Can one test this prediction? If one accepts the predicted fractal self hierarchy in which sub-selves correspond to mental images of self, this is possible. I am too lazy to retype basics about ZEO, CDs, and about how self as generalized Zeno effect emerges and just assume that reader knows the basic concepts or sees to trouble to refresh her knowledge about them.

1. Self hierarchy predicts that also our mental images are conscious entities. Motor-sensory dichotomy naturally corresponds to sub-self and time reversed sub-self. That is sensory mental image and that associated with motor action induced by sensory input. Motor action initiated in the geometric past at the opposite boundary of causal diamond (CD) (this explains Libet's finding that conscious decision is preceded by neural activity in geometric time). Note that motor action does not proceed from brain to muscles but in reversed time direction from muscles to brain! This conforms with the vision in which magnetic body is intentional agent.
2. To proceed one must identify EEG correlates for the sub-selves (mental images) and their time reversed re-incarnates. Here the work of Fingelkurts brothers (see <http://tinyurl.com/hpdqsmq>) working in Finland helps [J1]. They postulate what they call operational architecture of brain (OA) having operations (O) and operational modules (OM) as building bricks. Quasi-stationary EEG segments are assumed to serve as correlates for operations and synchrony of these segments associated with various locations in brain tells that they belong to the same OM.

Synchrony means spatio-temporal coherence - not only spatial - and is very natural concept in ZEO, where 4-D CDs and space-time surfaces inside them serve as geometric correlates of selves. Synchrony implies that these EEG segments at different spatial locations begin and end at the same time. Between EEG segments there is rapid transition period (RTP) allowing to distinguish segments from each other. Quasi-stationary segments of EEG have average duration is about .3 seconds.

The translation of this picture to TGD framework is rather straightforward. Operations correspond to sub-selves and OMs to collections of them forming sub-selves of self. CDs (sub-CDs) in turn serve as geometric correlates for selves (sub-selves). The quasi-stationary segments of EEG become correlates for sub-selves/mental images. Operational module corresponds to a self/CD having sub-selves/sub-CDs with synchronous EEG segments. The average duration of mental image would be about .3 seconds.

Two sub-sequent quasi-stationary segments separated by RTP would correspond to sub-self and its re-incarnation in the original time direction. Note that a very brief period of geometric time defined by the duration of RTP identifiable as the duration of a unitary time evolution between two sub-sequent state function reductions at the same boundary of CD corresponds to a finite duration of experienced time - the lifetime of the time reversed mental image!

The testable prediction is that the segment corresponding to time-reversed sub-self is located in geometric past and runs in opposite direction of geometric time. This EEG segment should be assignable to motor response accompanying sensory mental image. This is a highly non-trivial prediction testing the new view about time.

3. One can check whether these EEG segments appear as pairs with first member assignable to sensory mental image and second one to motor mental image. Time reversal implies that second law is obeyed in "wrong" time direction for EEG segment assignable to the motor output and this can be tested. Already Fantappie [J2] discovered that both directions of (geometric) time appear in living matter and introduced the notion of syntropy as time reversal of entropy. Spontaneous molecular self-assembly is a basic example of a syntropic process and identifiable as a decay process in reverse direction of geometric time. Phase conjugation is known to occur for phase conjugate laser light and sound. Does a process analogous to self-assembly occur for segments of EEG associated with motor actions: is the motor part of EEG time reversed? To answer this question one needs phase information about EEG besides power spectrum. In principle this information is contained in EEG.

## 2.2 Do conscious entities with different time arrows interact?

Zero Energy Ontology (ZEO) predicts conscious entities with both arrows of geometric time. I find that forcing myself to think and write about this is difficult. The fear is that the whole nice scenario falls down by predicting something totally absurd. The questions that I try to avoid are following. What could these ghostly time-reversed entities be? Do they interact with those with standard time orientation? How could they do so?

Let us first briefly recall what ZEO based theory of consciousness says.

1. In ZEO self corresponds to a generalized Zeno effect that is sequence of state function reductions leaving the passive boundary of CD unaffected as also the members of state pairs associated with 3-surfaces at it. At active boundary the members of state pairs change and the active boundary drifts reduction by reduction farther away from passive boundary. The temporal distance between the tips of CD increases gradually and corresponds to the experience about flow of time.
2. Negentropy Maximization Principle (NMP) [K2] forces eventually self to die by making the first reduction to the passive boundary of its causal diamond (CD), which now becomes the active boundary: a new time reversed self is born. This option is forced because it produces more negentropy. For this self the arrow of geometric time would be opposite since now the formerly passive boundary would be active and shift in opposite direction of time: in this manner CD would steadily increase in size.

Also the time-reversed self would eventually die and make the first reduction to the opposite - the original - boundary of CD. The position of the boundary of active boundary in first reduction would be shifted to the geometric future from the original position. The first and - as will be found - probably wrong guess for the size of shift towards geometric future from the position at the moment of previous death would be as the average increase of the temporal distance between tips of CD during Zeno period. This increment could be rather small as compared to the size of CD itself.

This picture raises questions.

1. Do we make this kind jump to time-reverse life at some level of our personal self hierarchy as we fall sleep? If wake-up period corresponds to re-incarnation in the original time direction, time increment of CD from its previous value would be the duration of sleeping period as seen by a larger conscious system. This is much longer than the subjective chronon for sensory mental images about .1 seconds.

**Remark:** Note that EEG splits to pieces of duration about 300 ms and it might be possible to identify in EEG periods, which correspond to mental images and their time reversals. These periods could differ by a phase conjugation although the power spectrum would have the same typical behavior (sound wave and its phase conjugate have same power spectrum but we can distinguish sound and its time-reversal from each other).

Could the first big reduction correspond to a time increment, which is of the same order of magnitude as the total time duration of life-cycle of the time-reversed self? The size of 3-surfaces at the boundary of time-reversed CD has increased by about life-time. Could the first reduction to the opposite boundary increase the size of the 3-surface at this boundary by the same amount? If so, the re-incarnations for human life cycles would take roughly life-time after the death.

Could one identify negative energy time reversed signal as time-reversed self at some level of hierarchy? If so then the selves associated with CDs could gradually increase their energy by dying and re-incarnating repeatedly since the opposite boundary would increase also the magnitude of the negative energy at the opposite boundary. This is in principle possible since conservation laws hold true by the very definition of zero energy states as well as for classical time evolutions appearing in their quantum superposition. The average energy for a given member of pair defining zero energy state would increase gradually. The size of the CD associated with re-incarnating self could become arbitrary large and gain an arbitrary high total energy: the wildest speculation is that cosmologies correspond to very large selves [?].

2. Could selves/systems living in opposite directions of time have direct interactions? If the vision that motor actions are realized as negative energy signals travelling to brain of the geometric past and induce neural activity fraction of second earlier than the conscious decision was made (Libet's finding), this could be the case. Motor action could correspond to a death of sensory self, reincarnation as time-reversed motor-self, and a re-incarnation as sensory self in time scale of .1 seconds. Sensory-motor cycle would correspond to a sequence of re-incarnations as time reversed sub-self.
3. How the time reversed selves could reveal themselves? If their presence can be indeed detected, a key signature would be the opposite direction of the thermodynamical arrow of time for them. Heat would be apparently transferred in wrong direction: from cold to hot. This kind of apparent breakings of second law have been observed: phase conjugate laser waves and acoustic signals represent examples of this. Fantappie suggested that they occur routinely in living matter and introduce the notion of syntropy as time reverse counterpart of entropy [J2]. The strange cooling of the air at magnetic walls associated with the rotating magnetic systems [?] provides second example.
4. Good music is claimed to send cold shivers in spine and sensations of cold are assigned also with the perception of ghosts. Could the claims about encounters of ghosts be due to a perception of time reversed selves? I remember that in my personal great experience for three decades ago the entire body went into a state analogous to that created by a good music. Did I interact with a time reversed conscious entity? My experience indeed was that I was in contact with what I called Great Mind. This is of course just a subjective experience and the skeptic scientist knows that I was in a psychotic state since it is completely obvious from my scientific work even without reading it that I am a madman.

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