Essay

How Imagination Could Be Realized p-Adically?

Matti Pitkänen [1]

Abstract

One of the original motivations for identifying p-adic physics as a possible correlate for cognition, imagination and intentionality was that p-adic differential equations allow pseudo constants as integration constants - piecewise constant functions depending on finite number of pinary digits have vanishing p-adic derivatives. The naive idea about the realization of intentional action is that a quantum phase transition changes p-adic space-time sheet representing intention to a real one representing action. This idea was too simplistic and in the following a more refined mathematical realization based on strong form of holography is proposed. Imaginations are identified as being represented by string world sheets and partonic 2 -surfaces which can be continued to p-adic preferred extremal for various p-adic primes but not necessarily real ones. Only realizable intentions can be continued also to the real preferred extremals.

1 p-Adic pseudo constants and imagination

The vision about p-adic physics as physics of cognition has gradually established itself as one of the key idea of TGD inspired theory of consciousness. There are several motivations for this idea.

The strongest motivation is the vision about living matter as something residing in the intersection of real and p-adic worlds [**?**]cognic,numbervision. One of the earliest motivations was p-adic non-determinism identified tentatively as a space-time correlate for the non-determinism of imagination. p-Adic non-determinism follows from the fact that functions with vanishing derivatives are piecewise constant functions in the p-adic context.

More precisely, p-adic pseudo constants depend on the pinary cutoff of their arguments and replace integration constants in p-adic differential equations. In the case of field equations this means roughly that the initial data are replaced with initial data given for a discrete set of time values chosen in such a manner that unique solution of field equations results. Solution can be fixed also in a discrete subset of rational points of the imbedding space. Presumably the uniqueness requirement implies some unique pinary cutoff. Thus the space-time surfaces representing solutions of p-adic field equations are analogous to space-time surfaces consisting of pieces of solutions of the real field equations. p-Adic reality is much like the dream reality consisting of rational fragments glued together in illogical manner or pieces of child's drawing of body containing body parts in more or less chaotic order.

The obvious interpretation for the solutions of the p-adic field equations is as a geometric correlate of imagination. Plans, intentions, expectations, dreams, and cognition in general are expected to have p-adic cognitive space-time sheets as their geometric correlates. A deep principle seems to be involved: incompleteness is characteristic feature of p-adic physics but the flexibility made possible by this incompleteness is absolutely essential for imagination and cognitive consciousness in general.

If one accepts the idea that real and p-adic space-time regions are correlates for matter and cognitive mind, one encounters the question how matter and mind interact. The original candidate for this interaction was as a phase transition leading to a transformation of the real space-time regions to p-adic ones and vice versa. These transformations would take place in quantum jumps. p-Adic-to-real phase transition would have interpretation as a transformation of thought into a sensory experience (dream or hallucination) or to an action. The reverse phase transition might relate to the transformation of the sensory experience to cognition. Sensory experiences could be also transformed to cognition by initial

[1]Correspondence: Matti Pitkänen `http://tgdtheory.com/`. Address: Karkinkatu 3 I 3, 03600, Karkkila, Finland. Email: matpitka6@gmail.com.

values realized as common rational points of a real space-time sheet representing sensory input and a p-adic space-time sheet representing the cognitive output. In this case the cognitive mental image is unique only in case that p-adic pseudo constants are ordinary constants.

It turned out that this interpretation leads to grave mathematical difficulties: one should construct U-matrix and M-matrix for transitions between different number fields, and this makes sense only if all the parameters involved are rational or algebraic. A more realistic view is that the interaction between real and p-adic number fields is that p-adic space-time surfaces define cognitive representations of real space-time surfaces (preferred extremals). One could also say that real space-time surface represents sensory aspects of conscious experience and p-adic space-time surfaces its cognitive aspects. Both real and p-adics rather than real or p-adics. The notion of p-adic manifold [4] tries to catch this idea mathematically.

2 Strong for of holography

Strong form of holography [5] implied by strong form of General Coordinate Invariance leads to the suggestion [2, 1] that partonic 2-surfaces and string world sheets at which the induced spinor fields are localized in order to have a well-defined em charge [3] (this is only one of the reasons) and having discrete set as intersection points with partonic 2-surfaces define what might called space-time genes. Space-time surfaces would be obtained as preferred extremals satisfying certain boundary conditions at string world sheets and carrying vanishing classical Noether charges for a sub-algebra of super-symplectic algebra isomorphic to the entire algebra. Space-time surfaces are defined only modulo transformations of super-symplectic algebra defining its sub-algebra and acting as conformal gauge transformations so that one can talk about conformal gauge equivalences classes of space-time surfaces.

The map assigning to real space-time surface cognitive representation would be replaced by a correspondence assigning to the string world sheets preferred extremals of Kähler action in various number fields: string world sheets would be indeed like genes. Mathematically this formulation is much more elegant that that based on p-adic manifold since discretization seems to be un-necessary at space-time level and applies only to the parameters characterizing string world sheet.

String world sheets and partonic 2-surfaces would be in the intersection of realities and p-adicities in the sense that the parameters characterizing them would be algebraic numbers associated with the algebraic extension of p-adic numbers in question. It is not clear whether the preferred extremal is possible for all p-adic primes but this would fit nicely with the vision that elementary particles are characterized by p-adic primes. It could be also that the classical non-determinism of Kähler action responsible for the conformal gauge symmetry corresponds to p-adic non-determinism for some particular prime so that the cognitive map is especially good for this prime.

3 Figments of imagination as 2-surfaces which allow continuation to p-adic space-time surfaces only?

The idea about p-adic pseudo constants as correlates of imagination is too nice to be thrown away without trying to find an alternative interpretation consistent with strong form of holography. Could the following argument allow to save p-adic view about imagination in a mathematically respectable manner?

1. The construction of preferred extremals from data at 2-surfaces is like boundary value problem. Integration constants are replaced with pseudo-constants depending on finite number pinary digits of variables depending on coordinates normal to string world sheets and partonic 2-surfaces.

2. Preferred extremal property in real context implies strong correlations between string world sheets and partonic 2-surfaces by boundary conditions a them. One cannot choose these 2- surfaces completely independently. Pseudo-constant could allow a large number of p-adic configurations involving string world sheets and partonic 2-surfaces not allowed in real context and realizing imagination.

3. Could imagination be realized as a larger size of the p-adic sectors of WCW? Could the realizable intentional actions belong to the intersection of real and p-adic WCWs? Could the modes of WCW spinor fields for which 2-surfaces are extendable to space-time surfaces only in some p-adic sectors make sense? The real space-time surface for them be somehow degenerate, for instance, consisting of string world sheets only.

   Could imagination be search for those collections of string world sheets and partonic 2-surfaces, which allow extension to (realization as) real preferred extremals? p-Adic physics would be there as an independent aspect of existence and this is just the original idea. Imagination could be realized in state function reduction, which always selects only those 2-surfaces which allow continuation to real space-time surfaces. The distinction between only imaginable and also realizable would be the extendability by using strong form of holography.

I have the feeling that this view allows respectable mathematical realization of imagination in terms of adelic quantum physics. It is remarkable that strong form of holography derivable from - you can guess, strong form of General Coordinate Invariance (the Big E again!), plays an absolutely central role in it.

References

[1] M. Pitkänen. Construction of WCW Kähler Geometry from Symmetry Principles. In *Quantum Physics as Infinite-Dimensional Geometry*. Onlinebook. `http://tgdtheory.fi/public_html/tgdgeom/tgdgeom.html#compl1`, 2006.

[2] M. Pitkänen. Identification of the WCW Kähler Function. In *Quantum Physics as Infinite-Dimensional Geometry*. Onlinebook. `http://tgdtheory.fi/public_html/tgdgeom/tgdgeom.html#kahler`, 2006.

[3] M. Pitkänen. WCW Spinor Structure. In *Quantum Physics as Infinite-Dimensional Geometry*. Onlinebook. `http://tgdtheory.fi/public_html/tgdgeom/tgdgeom.html#cspin`, 2006.

[4] M. Pitkänen. What p-Adic Icosahedron Could Mean? And What about p-Adic Manifold? In *TGD as a Generalized Number Theory*. Onlinebook. `http://tgdtheory.fi/public_html/tgdnumber/tgdnumber.html#picosahedron`, 2013.

[5] M. Pitkänen. Unified Number Theoretical Vision. In *TGD as a Generalized Number Theory*. Onlinebook. `http://tgdtheory.fi/public_html/tgdnumber/tgdnumber.html#numbervision`, 2014.