This chapter as also other chapters about the notion of time appearing in
books about TGD inspired theory of consciousness should be taken as stories
about how ideas developed through many tortuous twists and turns. In this
abstract I only summarize the outcome and leave the description of the
tortuous path to the chapter.

If one accepts the identification of moment of consciousness as quantum
jump between quantum histories, the basic challenge is to explain how
psychological time arises: why the contents of at least sensory experiences
are concentrated around definite value of geometric time and what is the
origin of the arrow of psychological time. It has become gradually clear
that TGD cannot reproduce the common sense conception of time as such and
that one can only require that the generalized view is consistent with our
restricted conscious experiences and shows our position in the hierarchy of
consciousness.

The understanding of the notion of psychological time and its arrow — or
equivalently, the relationship between subjective and geometric time —
turned out to be quite difficult challenge and led to a handful of
proposals based on the identification of space—time sheet as a correlate of
self and the idea that the experienced flow of geometric correspond to
some kind of motion in space—time or in imbedding space. These
identifications did not lead to anything practical and generated paradoxes.
Also the notion of self turned to be problematic.

The most recent proposal involves no ad hoc assumptions and relies on the
recent formulation of quantum TGD using zero energy ontology (ZEO) and the
understanding of both nature of time and self reduces to a more precise
view about what happens in state function reduction in ZEO.

\begin{enumerate}

\item The imbedding space correlate of self is so called causal
diamond
(pair of future and past directed light-cones) which is 8-D sub-
manifold of
the imbedding space rather than space-time sheet.

\item In ZEO state function reduction can occur at both boundaries
of CD
but can occur repeatedly at given CD boundary. In the repeated
reduction
the already reduced positive/negative energy state remains the same
just
as the state function remains invariant in ordinary repeated state
function
reduction. Second boundary of CD corresponds to a wave function in
the
moduli space of CDs and changes: since the distance between the tips
of CD
is one particular modular degree of freedom, the average value of
this
distance tends to increase just as the distance of particle
diffusing
inside cone increases during diffusion. This gives rise to the
experience
flow of geometric time identified this temporal distance.

\item Self can be understood as a sequence of repeated state
functions at
the same boundary - the original identification was as sequence of
all
quantum jumps. The arrow of geometric time changes at some level of
self
hierarchy when quantum jump takes at the second boundary of CD and
could
correspond to volition, act of free will.

\item The notion of negentropic entanglement also leads to a model
for self
model to be carefully distinguished from self.

\end{enumerate}

The concept of self led to the understanding of the subjective
memory as an
average over experiences of self experienced after its
\blockquote{wake-up}.
Subjective memories are always about past. Geometric memories are
predictions for the future/past assuming that no quantum jumps would
occur

after/had occurred before the one giving rise to the geometric
memory.
Pre-cognitions can be seen as geometric memories about future. Intentions
are p-adic variants of precognitions. It seems that long term memories
must correspond to geometric memories: this hypothesis, when combined with
the spin glass model of brain, the notion of quantum self-organization, and
some key aspects of many-sheeted physics, allows to understand the basic
aspects of the long term memory and avoids the basic difficulties of the
neural net models.