TGD as a generalized number theory vision supports the interpretation of
the p-adic physics in terms of physical correlates of cognition and
intentionality so that matter-mind dichotomy would correspond to
real--p-adic dichotomy at the level of the geometric correlates of
mind.
This interpretation has far reaching implications for both TGD
inspired
theory of consciousness and for the general world view provided by
TGD.
Cognition is predicted to be present in all length scales and the
success
of the p-adic physics in elementary particle length scales forces to
conclude that cognition and intention are present even at this
level.

The vision about life and conscious information and intelligence as
something in the intersection of real and p-adic worlds is the key
guiding
principle also in TGD inspired quantum biology. The very fact that
the
notion of conscious information makes sense only in this
intersection
supports the proposed interpretation of p-adic physics. Zero energy
ontology (ZEO) and the notion of causal diamond (CD) with zero
energy
states having interpretation as memes in very general sense is also
of
central importance, and allows a quantitative formulation reducing
the
fundamental bio-rhythms to fundamental elementary particle time
scales.
The hierarchy of Planck constants as an explanation of dark matter
and
energy as macroscopic quantum phases even in astrophysical scales
and
implying that dark matter is a key actor in the drama of life is
the third
key element.

In this chapter the implications of this vision are studied from the
point
of view of cognitive consciousness. The basic ideas behind the
proposed
vision about intentionality and cognition are following.

\begin{enumerate}

\item p-Adic space-time sheets are identified as the correlates of
cognition and intention. The possibility to identify the inherent
non-determinism of the p-adic field equations as the non-
determinism of

imagination makes this identification attractive. Only the p-adic
space-time sheets in the intersection of real and p-adic worlds
allow the
transformation of intentions to actions and sensory input to
cognitions.
Cognitions and intentions are related by time reversal in zero
energy
ontology. The common algebraic points of real and p-adic partonic
2-surfaces in the algebraic extension or rationals guaranteing that
the
representation of 2-surface makes sense both in real and p-adic
senses
define fundamental cognitive representations as finite point sets.

\item The \blockquote{phase transition} of a p-adic space-time
sheet to a real
space-time sheet taking place in quantum jump between quantum
histories
corresponds to the transformation of a thought into action or
sensory
experience (during dreams and hallucinations) whereas the reverse
transformation corresponds to the transformation of the sensory
input into
cognition. This transition can be thought to occur in the
intersection of
real and p-adic worlds where the mathematical representations of
partonic
2-surface make sense both in real and p-adic sense. Motor action
would
correspond to the transformation of p-adic space-time sheets to
their real
counterparts and during sensory experience the reversal of this
transformation would take place. In zero energy ontology these
transformations could reduce to quark and lepton level as is
suggested by
the fact that the time scales assignable to quarks and leptons
correspond
to 1 ms and .1 s defining fundamental time scales of nerve pulse
activity
and EEG.

\item The obvious question is how to test p-adic physics
empirically. First
of all, thinking could be interpreted as p-adic sensory
experiencing.
Hence the reduction of theories--experimental science dichotomy to
p-adic--real dichotomy seems natural: just like experimental science
is an
extension of everyday real sensory experience, theories represent an
extension of everyday p-adic sensory experience (common sense
thinking).
Thus the basic test is how well p-adic physics based theories
describe

cognition. Secondly, the p-adic models for physical systems are strictly
speaking models for cognitive models for real physics. The successes of
these highly predictive models (consider only p-adic elementary particle
mass calculations involving only very few integer valued parameters)
supports the vision about p-adic physics as physics of cognition.
p-Adic--real phase transitions as models for how thought is transformed to
action and sensory input to thought provide a further testing ground for
the new paradigm.

\end{enumerate}

The following topics are discussed in the chapter.

\begin{enumerate}

\item The relationship between p-adic physics, intentionality, and
cognition are discussed on general level. Basic cognitive functions such as
imagination, hallucinations, formation of cognitive representations,
Boolean mind, and learning are discussed in this conceptual framework.

\item Possible - necessarily indirect - evidence for p-adic cognition is
considered.

\item In the mathematical sections   the relationship between
intentionality, cognition and number theory is discussed. Also the
relation between p-adic and real physics is discussed at general level with
basic vision being that the intersection of real and p-adic space-time
sheets in the intersection of real and p-adic worlds consists of points
belonging to the algebraic extension of rational needed to guarantee that
the mathematical representation of the partonic 2-surface makes sense both
in real and p-adic sense.

\item Frontal lobes are known to be the seat of the higher level
intentional action and are discussed from p-adic point of view.

\item   A generalization of the memetic code to cognitive codes is
discussed and some proposals about codes are made. This generalization is

based on p-adic length scale hypothesis. If the time scales involved
correspond to time scales assignable to the CDs of the known elementary
particles, the generalization is not favored. On the other hand, dark
matter sector could allow entire fractal hierarchy of elementary particle
physics whose existence is reflected as fundamental bio-rhytms and
cognitive codes.

\item   The intersection of real and p-adic partonic 2-surfaces defining
space-like cognitive representations consist of algebraic points. The
hypothesis that these intersections obey various kind of symmetries
identifiable as molecular symmetries is discussed.

\end{enumerate}