THE MODELING OF MEMORY

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The brain memory is a complex phenomenon which can be divided in two steps:
i) memory formation through learning and consolidation
ii) memory reactivation

The first step (i) is called a formation of an engram. Its molecular mechanisms are poorly understood. Nevertheless, the current belief of contemporary neuroscientists is that the synapse is the fundamental unit of memory storage. A hypothesis of cluster formation of rafts due to electrochemical (electrophoretical) movement of proteins and lipids in the membrane(s) seems to be attractive for modeling from the mathematical point of view. Probably the nonlinear partial differential equations for heat diffusion
seems to be the best suitable for the process.

The modeling of the second step (ii) seems to be a rather tough issue. Even to image how to bring the information from the membrane (where we believe it is stored) to usable daily use remains a dream. The current scientific view of living things is that they are machines whose components are biomolecules. Looking at the physical nature of living systems there seem to be certain mathematical (and phenomenological) properties that are not handled at all by any techniques used so far or by any current model. Another way that the unimaginable discovery might come about is through „new mathematics". This would not require any new physics to be present in living systems. We may simply not be seeing some fundamental mathematical description of what is going on in living (neurological) systems.