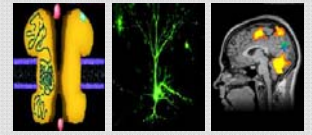


SFB 874 / IGSN

CONFERENCE



Cortical and subcortical representation of sensory and cognitive memory

April 28 - 29, 2015 Ruhr University Bochum

Tuesday,

Session 2:

April 28, afternoon (13:15 – 16:15)

**Categorization learning at the interface between
perception and cognition**

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Integrating rapid neocortical consolidation into complementary learning systems theory

Since the 1950's, it has been known that the medial temporal lobes in the brain play a special role in learning an memory. These findings have led, through the work and thinking of David Marr and many others, to a theory of the roles of hippocampus and neocortex in memory called the complementary learning systems theory (*McClelland, McNaughton, & O'Reilly, 1995*).

Our theory postulated two distinct learning systems, one in the medial temporal lobes that supports the rapid learning of arbitrary new information, and one in the neocortex and other structures that supports the gradual discovery of structured representations that encode knowledge of the natural and man-made world, as well as the knowledge underlying cognitive skills and the knowledge underlying language and communication.

In this talk, I examine evidence from recent studies showing that new information can sometimes be integrated rapidly into the neocortex, challenging our theory as previously presented. I present new simulations based on our theory, showing that new information that is consistent with knowledge previously acquired by a cortex-like artificial neural network can be learned rapidly without interfering with existing knowledge. These results match the pattern observed in the recent studies, and provide a mechanism for understanding when and how rapid integration of new information can occur.

