PHILOSOPHY MEETS COGNITIVE SCIENCE

RUB

Stiftung Mercator

Mercator Research Group

Organization and contact: Prof. Dr. Markus Werning.
Website: www.rub.de/phil-lang.
Venue: Do., 10 June 2010, 16-18h, in room GAFO 04/615.
All interested students, scientists, and scholars are cordially invited to the following talk of the research colloquium:

Prof. Dr. Sen Cheng

(Ruhr U Bochum)

Replaying past experiences in the brain

To form Memories about events, such as our last birthday party, we need a brain region called the hippocampus. However, after a process known as consolidation is completed, the hippocampus can be removed without affecting the stored memory. In my talk, I will review experimental evidence for a neural mechanism of consolidation: sequential replay. Neurons that are active in a particular sequence during behavior are reactivated in the same or reversed order during subsequent periods of rest or sleep. There replay events appear to be organized by special network events, called ripples. I will then show that a similar mechanism might underlie the initial transformation of new memories. By studying hoe neural activity changes as rats form memories for novel locations, I could show that neurons with place fields in novel locations exhibit more strongly correlated activity. These correlation decrease as novel locations become familiar. In contrast, spatial activity is initially less accurate in novel locations but improves with increased familiarity. Thus, ripples during learning might drive the formation of memories and accurate spatial representations.

I completed my graduate work in theoretical nuclear physics at Michigan State University in 2002. My research focused on modeling the dynamics of relativistic heavy ion collisions. I then received a Sloan-Swartz Postdoctoral Fellowship in theoretical Neurobiology at the University of California, San Francisco. There, I worked with Prof. Philip Sabes on modeling and experimental studies of the dynamics of sensorimotor adaptation and with Prof. Loren Frank on modeling hippocampal function. Since January 2010, I am leading my own group at the Ruhr-University Bochum to study learning and memory with computational methods