NYU-ECNU
Institute of Brain and Cognitive Science
at NYU Shanghai

BI-WEEKLY SEMINAR SERIES

TOPIC: Large-scale Brain Structure and Dynamics

SPEAKER: Dr. Xiao-Jing Wang
TIME: 12:00-13:00, 13 October 2014

VENUE: Room 152 Geography Building, 3663 Zhongshan Road North, Shanghai (华东师范大学中山北路校区，地理楼 152 室)

ABSTRACT OF THE TALK

A major challenge today is to elucidate the dynamical operation and function of large-scale brain systems, beyond local networks. In this talk I will present our recent data analysis and modeling that is based on recently published directed and weighted connectivity data of primates. We found a systematical relationship between the connection of any pair of cortical areas and their functional similarity. This relationship holds for monkey, human as well as rodent. I will introduce a class of spatially embedded random network models that robustly give rise to this structure, as well as many other observed spatial and topological cortical connection properties. I will then talk about how to incorporate dynamics into this model, by taking into account quantitative heterogeneity across cortical areas. This large network naturally displays a hierarchy of timescales: early sensory areas respond rapidly to an external input and the response decays away immediately after stimulus offset (appropriate for sensory processing), whereas association areas higher in the brain hierarchy are capable of integrating inputs over a long time and exhibit persistent activity (suitable for decision-making and working memory). Taken together, this model offers a promising new platform for investigating dynamics and functions of the large-scale primate brain.

BIOGRAPHY

Xiao-Jing Wang is Professor of Neural Science at New York University and Associate Vice Chancellor for Research at NYU Shanghai. Before joining NYU in the fall of 2012, Wang was Professor of Neurobiology at Yale University, where he also served as the Director of the Swartz Center for Theoretical Neuroscience in addition to holding secondary faculty appointments in Physics, Applied Mathematics, and Psychology.
Wang is an expert on the neurobiology of executive and cognitive functions. His group has pioneered neural circuit models of the prefrontal cortex, which is often called the “CEO of the brain.” In particular, Wang is known for his work on the cellular basis of short-term memory, neural mechanisms for decision-making, communication and synchronization through inhibitory neurons in the brain. His research group is now embarking on a new initiative of developing neurobiologically realistic large-scale brain circuit models of cognitively controlled flexible behavior.