

## WORKING AND LITERATURE SEMINAR

**Topic:** Timescales and Hierarchy in the Large-scale Organization of the Brain

**Speaker:** John D. Murray and Rishidev Chaudhuri, New York University

**Time:** 15:00 - 16:00, 17 March 2014

**Venue:** Room 379, Geography Building, 3663 Zhongshan Road North, Shanghai  
(华东师范大学中山北路校区, 地理楼 379 室)

### ABSTRACT OF THE TALK

The brain can respond to stimuli with a broad range of speeds: recognizing a familiar face can occur within one hundred milliseconds; making a hard decision may take seconds or longer. It is known that sensory brain regions respond to stimuli very quickly, while higher cognitive areas can integrate stimuli much more slowly. How do brain areas differ in the time it naturally takes them to process inputs? We will present our recent efforts to study hierarchical specialization in the temporal domain. First we will discuss a large-scale model of primate cortex which we built by combining quantitative data on long-range projections between cortical areas with an estimate of the strength of excitatory connections within an area. We found that these specific inter-areal differences allow cortical areas to show dynamics with a hierarchy of timescales and that this hierarchy can be flexibly reconfigured in response to input. We will also discuss an analysis of the timescales of neural activity, applying a stochastic point process framework to spike trains recorded in multiple cortical areas. We found a hierarchy of intrinsic timescales across cortical areas, with sensory areas showing shorter timescales and prefrontal areas showing longer timescales. Together, these findings suggest a fundamental organizing principle for the brain, in which anatomical specialization supports functional specialization across the cortical hierarchy.

### BIOGRAPHY

Rishidev Chaudhuri and John D. Murray are Postdoctoral Associates in the Center for Neural Science at New York University, working with Prof. Xiao-Jing Wang.