

The University of Hong Kong
Department of Psychology

Departmental Seminar

***Visuomotor behavior in naturalistic task:
from receptive fields to value functions***

Date: October 11, 2012 (Thursday)
Time: 12:30 – 1:30 p.m.
Venue: Rm 813, 8/F, The Jockey Club Tower, Centennial Campus, HKU
Speaker: Dr. Constantin A. Rothkopf
Institute of Cognitive Science, University Osnabrück, Osnabrück,
Germany, and
Frankfurt Institute for Advanced Studies, Goethe-University,
Frankfurt, Germany

Although there is a long tradition of separating perception, action, and learning, these can be treated separately only under very special circumstances. There are both theoretical reasons evident from a treatment of such control tasks in the framework of Markov decision processes, as well as empirical studies having revealed this fact, especially when considering naturalistic sequential visuomotor tasks. We will present results from several studies investigating these interdependencies. First, we show that learning of representations of natural visual stimuli through generative models can explain a variety of psychophysical biases only when the statistics of the natural environment and the active usage of the visual system are taken into account. Secondly, we will show how human visuomotor behavior can be quantified using Bayesian inverse reinforcement learning algorithms to extract the reward functions underlying human actions. This analysis demonstrates, that the guidance behavior in a navigation task does not necessarily follow the given task instructions and reveals systematic individual differences within subject's task priorities. Finally, we will present results from a study in which human subjects intercepted moving objects in a virtual environment. The probabilistic relationships governing the behavior of the environment were manipulated systematically so as to reveal that subjects can indeed quickly learn new sequential control policies. A theoretical analysis shows, that the learned behavior can only be understood by considering the observation and control uncertainties in order to successfully carry out the interception task.