

--Friday, September 26, 2014--

The Kavli Foundation Neuroscience Workshop

Conrad Ballroom, 3rd floor

Session I: 9:00-10:30 am

Using neuroimaging to infer mental states: A guided tour through the minefield

Russell Poldrack, PhD

Stanford University

One of the most common uses of neuroimaging is to infer what kind of psychological state a person is in during a particular decision making task, known as "reverse inference". This enterprise is crucial to neuroeconomics, but the journey to effective inferences is littered with land mines that must be avoided. I will outline the problems with informal reverse inference, and will show how these problems can be overcome through the use of decoding techniques from machine learning along with large-scale databases that can support formal reverse inference. I will also discuss how pattern similarity analyses can be used to understand neural representational spaces, and how differences between univariate and multivariate analyses can be interpreted.

Session II: 10:50-12:20 pm

Hierarchical reinforcement learning and the neural basis of choice

Matthew M. Botvinick, PhD

Princeton University

This workshop will provide an overview of recent research investigating the role of hierarchical structure in reward based decision-making. We will begin with a tutorial introduction to hierarchical reinforcement learning (HRL), a computational framework that expands the scope of standard reinforcement learning to include temporally extended behaviors. From there, we will look at fMRI studies that have tested an initial set of predictions from HRL. On a formal level, we probe the question of why (and when) hierarchy is beneficial to adaptive behavior, and on the neuroscientific level we will relate HRL to the broader notion of efficient coding.

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