

**2022****Kavli Summer Institute in Cognitive Neuroscience****Week 2: Behavioral, neural and computational foundations of attention function: New perspectives on an old theme****Course Directors**Sabine Kastner
Princeton UniversityChethan Pandarinath
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Attention refers to the brain's ability to prioritize information processing for guidance of behavior. This cognitive function can be directed to sensory input from the environment or to internally-generated abstract constructs such as thoughts, emotions, or intentions. Attention function is fundamental for any cognitive operation (e.g. language, memory) and its dysfunction is detrimental to individual quality of life. The neural bases of attention have been probed by decades of empirical research, making attention perhaps the currently best understood cognitive function. The attention field has been recently rejuvenated by impactful discoveries that can lead this field into new directions. In this week, we will provide a state-of-the-art overview of current attention research, as well as current hot topics in the field. We will discuss the neural bases of attention function, considering several different brain models (i.e. rodents, non-human primates, humans), and spanning a large variety of different methods and analytical approaches (from optogenetics to fMRI, and from single- and multi-neuron physiology to MEG). We will explore how results from these different approaches begin to inform detailed computational models and theories.

Monday (6/27): Introduction

- 8:00-8:30 Breakfast
8:30-8:35 Welcome – Barry Giesbrecht and Mike Miller
8:30-8:45 Introductory Remarks – Sabine Kastner and Chethan Pandarinath
8:45-10:10 **Speaker 1: Sabine Kastner**, Princeton
"Everybody knows what attention is ..."
10:00-10:30 Break
10:30-11:45 **Speaker 2: Chethan Pandarinath**, Emory University
"Quantitative approaches to studying attention"
11:45-1:45 Lunch
1:45-3:00 **Speaker 3: Adriana Galvan**, UCLA
"Neuroethics: Ethical and Societal Implications of Cognitive Neuroscience"
3:00-3:15 Break
3:15-4:15 **Lab Session:** Responsible Conduct of Research, Mike Miller, UCSB
4:15 Adjourn

Tuesday (6/28): State of the Art in Human fMRI & MEG Research

- 8:00-8:45 Breakfast
8:45-10:00 **Speaker 4: Sarah Shomstein**, George Washington University
"Solving Attention with fMRI: Sources and effects"
10:00-10:30 Break
10:30-11:45 **Speaker 5: Ole Jensen**, University of Birmingham, U.K.
Top-down control of sensory brain oscillations during visuo-spatial attention

11:45-1:45 Lunch
1:45-5:00 **Lab Session:** Encoding/Decoding, Tommy Sprague, UCSB, Sreenivasan
Meyyappan, UC Davis
5:00 Adjourn

Wednesday (6/29): New Concepts I: Shifting Models of Cognitive Control

8:00-8:45 Breakfast
8:45-10:00 **Speaker 6: Mike Halassa**, MIT
"Thalamocortical interactions in cognitive control and flexibility in rodents"
10:00-10:30 Break
10:30-11:45 **Speaker 7: Marty Usrey**, UC Davis
"Behavioral modulation of sensory processing in vision"
11:45-1:45 Lunch
1:45-5:00 **Lab Session:** MEG, Ole Jensen, University of Birmingham, UK
5:00 Adjourn

Thursday (6/30): Computation and Theory

8:00-8:45 Breakfast
8:45-10:00 **Speaker 8: Nancy Kopell**, Boston University
"Brain Rhythms and Cognitive Flexibility"
10:00-10:30 Break
10:30-11:45 **Speaker 9: Brent Doiron**, University of Pittsburgh
"The circuit mechanics of neuronal variability"
11:45-1:45 Lunch
1:45-5:00 **Lab Session:** Neurostimulation, Regina Lapate, UCSB
6:30-8:00 **DEBATES: Teams 3 and 4** (fellows will be organized into teams during week 1)

Friday (7/1): New Concepts II: Attentional Rhythms

8:00-8:45 Breakfast
8:45-10:00 **Speaker 10: Ian Fiebelkorn**, Princeton University
"A neural basis of rhythmic selective attention"
10:00-10:30 Break
10:30-11:45 **Speaker 11: Ayelet Landau**, Hebrew University
"Rhythmic motifs in perception and attention"
11:45 Adjourn
5:00-6:00 **Reception Faculty Club**
6:00-8:00 **Banquet Faculty Club**

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