

Program
Winter Conference on Learning and Memory
Saturday January 3- Tuesday January 6, 2015
Park City, Utah

SATURDAY JANUARY 3, 2015

Registration 3:00 -4:00 p.m. (*Just outside Prospector 1-2*)

Session 1: Dave Olton Data Blitz

Time: 4:00 to 6:00 p.m.

Location: Prospector 1-2

Organizers: Pam Kennedy (UCLA) and Brock Kirwan (BYU)

Description: If you would like to present at this session, please e-mail Pam Kennedy at pkennedy@psych.ucla.edu with the title of your presentation. Presentations are limited to 5 minutes, including discussion. Limit of 1 slide with a single panel will be strictly enforced.

PIZZA PARTY:

Time: 6:30 -8:00 p.m.

Location: Atrium

Session 2: Longitudinal Axis Specialization of the Hippocampus and Relationship to Pathological States

Time: 8:00-10:00 p.m.

Location: Prospector 1-2

Organizer: Michael Yassa (University of California, Irvine)

Description: There is growing interest in both animal and human studies in understanding the roles that different subdivisions along the longitudinal axis of the hippocampus play in service of episodic memory. This dorsal/ventral distinction (posterior/anterior respectively in humans) is likely a product of (1) dissociated inputs to these subregions, (2) differential distribution of hippocampal subfields, (3) differences in connectivity, molecular expression, and network dynamics. Most studies of the hippocampus in animals have focused on dorsal hippocampus due to the technical challenges with targeting the ventral portion. Most human fMRI studies have also found evidence for memory-related activity most reliably in the posterior hippocampus. Interest in the ventral/anterior hippocampus has grown in recent years as more studies have suggested that it can be functionally dissociated from dorsal hippocampus and its relevance to pathological states such as stress, anxiety and depression has been investigated in more detail. Speakers in this session will highlight the current state of research on longitudinal axis specialization in the hippocampus and relevance to disease states. Discussion will focus on charting a plan forward and highlighting the most useful future experiments to be conducted to

further elucidate the roles of dorsal and ventral hippocampus and identify selective vulnerabilities in these regions.

Speakers:

- Hongwei Dong (University of Southern California) - Connectome of the hippocampus
- Mazen Kheirbek (Columbia University) - Differential control of learning anxiety along the dorsoventral axis of the hippocampus
- Tallie Z. Baram (University of California, Irvine) - Essential role of dorsal hippocampus ca1 in spatial memory: lessons from stress
- Michael Yassa (University of California, Irvine) - Longitudinal axis specialization in the hippocampus: A continuum of construction

SUNDAY JANUARY 4, 2015

Session 3: Progress towards a systems analysis of the cognitive control of memory

Time: 4:00-6:00 p.m.

Location: Prospector 1-2

Organizer: Howard Eichenbaum (Boston University)

Description: It has become clear that the prefrontal cortex and hippocampus interact to guide the organization and selection of memories appropriate to one's current experience. Here we will present new evidence from studies on both humans and animals that is beginning to reveal the distinct roles of specific prefrontal and hippocampal areas and the pathways through which these interactions occur. Studies on humans using brain imaging are identifying functionally distinct contributions and pathways by which the prefrontal cortex guides memory retrieval. Charan Ranganath will present new findings that reveal how prefrontal areas differentially contribute to conscious attributions and overt decision behavior associated with hippocampal retrieval of events in context. David Badre will discuss recent studies that dissociate ventral versus dorsal pathways related to control over access to memory versus control over responding. Studies on rodents are revealing how prefrontal areas control the firing patterns of hippocampal neurons during memory retrieval. Matt Shapiro will describe recent evidence differentiating orbital and medial prefrontal areas that support the formation and utility of expected value and rule-based representations in hippocampal neural ensembles. Howard Eichenbaum will present new evidence on bidirectional interactions between the prefrontal cortex and dorsal-ventral hippocampal areas that support the context dependent memory representations in hippocampal neuron populations. The findings in these studies suggest remarkable parallels in the functional organization of the prefrontal-hippocampal system in humans and animals, driving new insights into the information processing that supports memory representations and access to them in adaptive behavior.

Speakers:

- Charan Ranganath (UC Davis) "Differential roles for hippocampus and prefrontal cortex in context representation and memory attributions"

- David Badre (Brown Univ) “Separable ventral and dorsal frontal pathways supporting cognitive control of retrieval”
- Matt Shapiro (Mt Sinai Medical School) “Keeping memories on track: prefrontal cortex supports learning that resists interference among episodes.”
- Howard Eichenbaum (Boston Univ) “Memory control via bidirectional interactions between prefrontal cortex and the hippocampus”

Dinner: Check out the new eateries in town.
6:00-8:00 p.m.

Session 4: Beyond synaptic plasticity, what is mnemonic encoding?

Time: 8:00-10:00 p.m.

Location: Prospector 1-2

Organizer: Ehren Newman (Boston University)

Description: "What is encoding?" The term 'encoding' is a psychological construct. Neuroscience has, classically, given the cellular-level explanation that encoding is enacted by synaptic plasticity. However, as data acquisition methods have improved, allowing us to collect higher-dimensional representations of what is happening at the time of encoding, it is time to develop a systems-level definition of encoding. Thus, in this session, we will seek to move beyond the cellular-level definition and lay the ground work for constructing a systems-level definition drawing upon a broad range of data types and empirical approaches. These data types include single-unit in-vivo rodent data supporting the role of Hebbian plasticity in updating neural representations, population-vector in-vivo rodent data elucidating the relationship between the time-varying content of neural representations at the time of encoding to the nature of the subsequent representations, human EEG / MEG data identifying the broad temporal / spatial patterns of activity that are predictive of successful encoding, and multi-variate analyses of human fMRI data characterizing how information is generalized from individual experiences into schemas.

Speakers:

- Sam McKenzie (New York University)
- Dharshan Kumaran (UCL Institute of Cognitive Neuroscience)
- Per Sederberg (Ohio State University)
- Ehren Newman (Boston University)

MONDAY JANUARY 5, 2015

Session 5: The impact of diet on motivation, reward and cognition

Time: 4:00-6:00 p.m.

Location: Prospector 1-2

Organizer: Amy Reichelt (University of New South Wales)

Description: Many people claim that they feel compelled to eat energy rich, high sugar and fat foods in the absence of metabolic requirements. Animal models have been developed that capture addiction-like aspects of sugar and palatable high fat / high sugar food consumption that can lead to obesity. This hedonic eating involves eating foods based largely on palatability rather than nutrient requirements, leading to over-eating and weight gain. As high fat / high sugar foods are inherently rewarding, eating for pleasure can cause modulation of reward neurocircuitry, causing changes in responsiveness to reward-predicting stimuli and incentive motivation. This session will explore recent research focusing on how consumption of palatable foods can change reward signaling and learning about stimuli and responses associated with foods.

Speakers:

- Nicole Avena (Columbia University) - Empirical Evidence of Addiction-Like Responses to Food: Brain and Behavior in Rats and Humans
- Alex Johnson (Michigan State) - The effects of an obesogenic diet on incentive learning and hedonic evaluation in mice
- Aaron Blaisdell (UCLA) - Diet Quality and Cognition: The Effects of a Refined, Low-Fat Obesogenic Diet on Motivation and Attention in the Rat
- Amy Reichelt (UNSW) - Impact of sugar and sugar/fat bingeing on appetitive conditioning

Dinner: Check out the new eateries in town!
6:00-8:00 p.m.

Session 6: Reciprocal interactions between memory and energy intake: a vicious cycle.

Time: 8:00-10:00 p.m.

Location: Prospector 1-2

Organizer: Marise Parent (Georgia State University)

Description: Extensive attention has been devoted to understanding the homeostatic and hedonic mechanisms that regulate energy intake. In contrast, a critical question in neuroscience that has been very poorly addressed is, "How do top-down cognitive processes such as memory modulate energy intake?" Equally understudied is the possibility that impaired memory contributes to pathological eating behavior, such as hyperphagia. In this session, the speakers will 1) discuss some of the latest evidence showing that hippocampal neurons modulate the amount and timing of food intake, 2) provide research indicating that excess intake of fat and sugar negatively

impacts hippocampal neurons and the mechanisms through which excess energy intake mediates these effects, and 3) explore how these reciprocal interactions implicate impaired hippocampal function and memory deficits in overeating, the development of diet-induced obesity, and/or the maintenance of the obese state.

- Marise Parent (Georgia State University) *Reciprocal interactions between memory and energy intake*
- Scott Kanoski (University of Southern California) *Hormones and the hippocampus: effects on feeding behavior*
- Terry Davidson (American University) *Western diet-induced obesity and hippocampal dysfunction*
- Alexis Stranahan (Medical College of Georgia) *Adipose inflammation impairs hippocampal function in genetic and dietary obesity models*

TUESDAY JANUARY 6, 2015

Session 7: Adult Hippocampal Neurogenesis: Behavioral Functions at the Intersection of Cognition and Emotion

Time: 4:00-6:00 p.m.

Location: Prospector 1-2

Organizer: Jason Snyder (University of British Columbia)

Description: Over a decade has passed since the first reports linking adult hippocampal neurogenesis to cognition. Despite the hundreds of papers published in the ensuing years, the role of neurogenesis in learning and memory continues to be poorly understood. In parallel, a literature has emerged implicating adult neurogenesis in emotional regulation and the response to stress. The putative emotional and cognitive functions of adult neurogenesis have largely been studied in isolation. Recent work, however, suggests that the key to understanding the role of adult neurogenesis in behavior may lie at their intersection. For example, adult neurogenesis may indirectly affect emotional state by influencing how experiences are represented in the hippocampus; encoding deficits can potentially explain the generalized fear/anxiety observed in neurogenesis-deficient animals. However, evidence that neurogenesis dampens the response to novel stressors suggests that cognitive and mnemonic functions of new neurons may be secondary to changes in emotional state. This raises a number of new questions, namely: (1) How does adult neurogenesis influence memory of stressful vs. non-stressful events? (2) Can we dissociate memory deficits from altered stress responding? (3) Does adult neurogenesis have direct effects on behavior or indirect effects via the HPA axis? Each of the speakers in this symposium will present novel, unpublished work that addresses these questions and begins to bridge the cognitive and emotional functions of adult neurogenesis.

- Heather Cameron (National Institute of Mental Health) A role for adult neurogenesis in the adaptation to an unpredictable, threatening environment
- Michael Drew (University of Texas) Hyperreactivity to stressors can mask learning deficits after the arrest of adult hippocampal neurogenesis

- Amelia Eisch (University of Texas Southwestern Medical Center) Space radiation-induced improvement in pattern separation is neurogenesis-independent
- Jason Snyder (University of British Columbia) Adult neurogenesis buffers the effects of stress on spatial learning and memory

Business Meeting:

Time: 6:00-6:30 pm
Location: Prospector 1-2

Banquet

Time: 7:30-11:00 pm
Location: Prospector 1-2

SOCIAL ACTIVITIES:

DINNER

January 3rd - Pizza Party - *For registrants or guests, no extra cost.*

January 4th - Dinner (on your own)

January 5th - Dinner (on your own)

January 6th - Banquet – *\$40 for registrants and guests*

Cash Bar: *Friday, Saturday, Sunday evenings*

Time: 10:00 pm-12:00 am
Location: Timbers