THIRTY-SEVENTH ANNUAL

WINTER CONFERENCE

ON

THE NEUROBIOLOGY OF LEARNING & MEMORY

AT PARK CITY

January 3-6, 2013
Park City Marriott Hotel
Park City, Utah

REGISTRATION FEE: $200.00 for regular participants - Payable at registration on Thursday, January 3rd, from 3:00-4:00 pm in the hall outside of Ballroom 1 at the Park City Marriott Hotel. There is a reduced fee of $100.00 for graduate students and postdoctoral fellows. Banquet on Sunday, January 6th. The banquet will cost $40.00 per person. The Pizza Party will be free for participants and guests. Rooms for the Marriott Hotel are based on a single rate for $204 or double rate for $204. **If you plan to stay at the Marriott Hotel, they can be contacted directly at (800) 234-9003 if you have any problems making the reservation. Please make your reservation by Nov 15 and request a room booked by the neurobiology of learning and memory conference for the rate of $204.00 per night. In order to avoid paying higher prices for the hotel room, please make the reservation before November 15. Furthermore, we have booked a certain set of rooms and if they are not reserved by November 15, the conference will have to pay for the rooms, resulting in higher conference registration costs in the future.**

BACKGROUND INFORMATION: The Thirty-Seventh Annual Neurobiology of Learning and Memory Conference is organized by Michael Yassa and David Smith in conjunction with Paul Gold, Raymond Kesner, Sheri Mizumori, Aryeh Routtenberg, Os Steward, and Wendy Suzuki, and is supported in part by the Department of Psychology, University of Utah. The sessions are organized so that one-half of the time will be available for discussion. There will be time-keepers who will make certain that the formal presentations do not extend beyond the allotted time. Furthermore, we will strongly encourage a limit of 5-7 slides and suggest that the first slide summarizes the "take home message".

Material presented at this meeting should not be cited in bibliographies. It should be treated as personal communication and should be cited as such only with consent of the author. For the Data Blitz session (only), please give the title, presenter, and ppt slide (no more than one slide) to Michael Yassa. If you would like to present at this session please send an email Michael Yassa (yassa.michael@gmail.com) with the title of your presentation by December 1, 2012. A projector for power point slides presentations will be available. Data blitz slides should depict no more than

FOUR pieces of data. This means 4 figures, plots, tables, images, diagrams, etc… While the best slide format should only have a ONE data point to convey, additional background data or control experiments sometimes necessitate additional figures or plots and thus the "4-to-a-slide" rule. Animations are only allowed in so far as the slide content appears in order and to help convey the slide's data. Under no circumstances should animations be use to "scale" figures up and down such that more pieces of data can be accommodated on the slide. Data blitz slides that do not fit with these criteria will be returned to the presenter for editing.

TRANSPORTATION:
Transportation from Salt Lake City International Airport to Park City (approximately 40 miles) is available in all forms: bus, limousine, cab, rental car, etc. Park City Marriott Hotel provides a courtesy shuttle bus during peak periods to the ski area and downtown Park City. The fare is free and times vary with demand. Inquire at the hotel desk for further information. Park City offers a ski shuttle service from the ski area to area hotels. The fare is free and the shuttle departs the ski area on the hour and every 20 minutes with the exception of no run at 2:00 pm. Park City Marriott Hotel also provides for discount tickets for the three ski resorts in Park City.

If desired, ski rental and ski repair (e.g. waxing, tuning, and sharpening) are available at the hotel.

THURSDAY, JANUARY 3

Session 1: Dave Olton Data Blitz

Registration: 3:00 – 4:00 pm
Time: 4:00 - 6:30 pm
Location: Prospector 1-2

Moderators: The session will be organized by Michael Yassa. If you would like to present at this session please send an email to Michael Yassa (yassa.michael@gmail.com) with the title of your presentation.

Overview: Presentation limited to 5 minutes, including any discussion. Limit of one slide.

PIZZA PARTY:

Time: 6:30-8:00 pm
Location: Atrium

Session 2: **New insights into the role of adult neurogenesis in memory**

Time: 8:00-10:00 pm
Location: Prospector 1-2

Organizer: Jason Snyder (University of British Columbia) **Abstract:** Plasticity is an essential component of nearly all theories of memory and, indeed, there is strong evidence that adult neurogenesis contributes to learning and memory processes in mammals. But do new neurons make specific and special contributions to learning and memory? While we do not yet have a definitive answer to this question, certain patterns are beginning to emerge. This session will explore some of the latest insights into the function of adult neurogenesis in memory and behavior. A major challenge in the field of adult neurogenesis has been to identify specific behavioral functions. These talks incorporate new ideas about neurogenesis and memory in multiple brain regions, as related to both normal memory and psychiatric disorders, and in the context of brain development throughout the lifespan. While there is plenty of work remaining, these new insights begin to paint a coherent picture of the functions of new neurons in memory.

Speakers:

Paul Frankland
Hospital for Sick Children
Adult neurogenesis, forgetting and infantile amnesia

Anne Didier
Université de Lyon
The relationship between adult olfactory neurogenesis and memory

René Hen
Columbia University
A pattern separation role for new neurons in memory and anxiety

Jason Snyder
University of British Columbia
Adult neurogenesis regulates the response to stress

FRIDAY, JANUARY 4

Session 3: The cognitive timeline: Temporal coding in the hippocampus

Time: 4:00-6:00 pm
Location: Prospector 1-2

Organizer: Timothy A. Allen (University of California-Irvine)

Abstract:
It is well known that the hippocampus is thought provide a "spatial framework" in which the "items and events of an organism's experience are located", as described in the immensely influential book *The Hippocampus as a Cognitive Map* (O'Keefe & Nadel, 1978). However, it is less commonly known that time is thought to be as important to memory as space, and that it provides a critical context and mechanism for segregating unique experiences in the brain. Recent evidence from several labs supports the notion that

temporal information is critical to memory, and that it also depends on the hippocampus. In this session the speakers will (1) discuss the theoretical framework of temporal contexts in memory, (2) provide current behavioral evidence for temporal contexts in memory, (3) provide current neurobiological evidence for the role of the medial temporal lobe in temporal context memory, and (4) relate these findings in a larger framework of spatial-temporal processing in declarative memory processes. The objectives of the session are to discuss the role of temporal contexts in memory systems at the cognitive, behavioral and neurobiological levels and to emphasize and encourage discussion on the similarities and differences in temporal and spatial processing in memory.

Speakers:

Timothy A. Allen
University of California-Irvine
Introduction

Howard Eichenbaum
Boston University
Time cells and place cells in the representation of context

Norbert J. Fortin
University of California-Irvine
Keeping track of the timeline: The hippocampus and memory for elapsed time

Raymond Kesner
University of Utah
The role of the CA1 subregion of the hippocampus in processing of temporal information

Charan Ranganath
University of California-Davis
Mechanisms of temporal memory in the brain

Dinner: Check out the new eateries in town.

6:00-8:00 pm

Session 4: The cognitive map: Spatial coding in the hippocampus

Time: 8:00-10:00 pm
Location: Prospector 1-2
Organizer: Mark Brandon (University of California-San Diego)

Abstract:
All aspects of episodic memory, including what, where, and when appear to rely on neural mechanisms within the hippocampus. For the past 40 years, the role of the hippocampus in coding space (the 'where' aspect of memory) has been a focus, as countless reports have documented the activity of hippocampal 'place cells'. The recent discovery of entorhinal 'grid cells' has reinvigorated this line of research and has inspired a new set of models that describe how the representation of space is computed. Moreover, in addition to recent evidence of, recent evidence has suggested that the hippocampus contains a robust code for time. Is this time code related to the spatial signal? In this session, we will review hippocampal models of spatial coding with a focused discussion asking (1) Are the neural mechanisms that code for space the same as those that code time? (2) Can the current models of spatial coding explain temporal coding in the hippocampus? The objectives of the session are to review and discuss theoretical mechanisms that underlie hippocampal spatial coding as well as to discuss whether the neural mechanisms that have been proposed for spatial processing can or cannot be applied to temporal processing.

Speakers:

Mark Brandon
University of California-San Diego
Introduction

Tad Blair

University of California-Los Angeles
Oscillatory neurocomputing in hippocampal memory networks

Jill Leutgetb
University of California-San Diego
An extended code for time within hippocampal spatial maps

Bruce McNaughton
University of Lethbridge
TBD

SATURDAY, JANUARY 5

Session 5: Associative learning and representational plasticity in primary sensory cortices

Time: 4:00-6:00 pm
Location: Prospector 1-2

Organizers: Kasia M. Bieszczad (University of California-Irvine)
Thomas A. Cleland (Cornell University)

Abstract:
Plasticity in primary sensory cortices in the adult brain is well established, but only recently has its importance to general issues in learning and memory been recognized. For example, it is becoming clear that the neural substrates of natural memories are broadly distributed throughout the brain and dynamic in locus and form. Within sensory cortices, complex statistical properties of sensory stimuli – including context, timing, intensity, reliability, and behaviorally-learned associations – determine outcomes that delineate the conditions under which a memory subsequently can be recalled and utilized. Understanding the basis of how these complex conditions are acquired and integrated into neural substrates is critical if the richness of natural memory is to be understood. Thus, a complete account of learning and memory ultimately will require study of neural systems that process and store specific and identifiable content, i.e., representations. Primary sensory cortices –

within which tractable representations of external information are integrated with top-down influences and intrinsic learning – are ideal structures in which to study these representational mechanisms. This session brings together investigators studying associative learning-dependent representational plasticity in various primary sensory cortices to begin to elucidate common principles regarding the role of primary cortices in learning and memory.

Speakers:

Thomas A. Cleland
Cornell University
Intrinsic learning and memory mechanisms in olfactory bulb

Ingrid Bureau
Universite de la Mediterranee, INSERM
Mapping the loci of plasticity after conditioning within the neuronal circuits of barrel cortex

Alfredo Fontanini
Stony Brook University
The sweet taste of anticipation: Expectation and cortical processing of gustatory information

Hans C. Dringenberg
Queen's University
Trained-induced plasticity and metaplasticity in the primary visual cortex

Kasia M. Bieszczad
University of California-Irvine
Representational plasticity encoding specific memory strength in the primary auditory cortex

Dinner: Check out the new eateries in town!
6:00-8:00 pm

Session 6: The role of inhibitory processes in memory

Time: 8:00-10:00 pm
Location: Prospector 1-2

Organizers: Benjamin J. Levy ()
Brendon Depue ()

Abstract:
Internal or external memory cues often cause us to retrieve prior episodes, allowing the past to inform current behavior. While this relatively automatic retrieval is usually advantageous, in some situations these memories conflict with our current goals and can interfere with effective goal-directed behavior. By one theoretical account, when such circumstances arise control over memory is achieved, at least in part, by the recruitment of inhibitory processes that target and weaken irrelevant memories or memory processes. Consistent with this view, a considerable body of research suggests that this form of control over memory is associated with impaired subsequent memory for the avoided memory. There is also growing evidence about how such inhibitory control is enacted in the brain. It appears that control processes mediated by the prefrontal and parietal cortices interact with structures known to support long-term memory, particularly the medial temporal lobes. While this work is promising, uncovering the dynamics of inhibitory processes in memory is a complex task and many questions still remain. Here we will present work from a broad spectrum of approaches highlighting recent work using comparative anatomy modeling, human neuroimaging (i.e., ERP/EEG, fMRI) and animal models. These research approaches focus on PFC – hippocampal interaction, neural oscillatory behavior, the role of conscious intrusions during memory retrieval and the effects of mPFC lesions on memory performance in rats. Critically, understanding the fundamental role that inhibition plays in memory also clearly relates to dysfunction in psychiatric disease (e.g., P.T.S.D.).

Speakers:

Benjamin J. Levy

Behavioral and neuroimaging evidence for the involvement of inhibitory control over memory

Simon Hanslmayr
The role of brain oscillations during intentional and unintentional forgetting

David M. Smith
The prefrontal cortical role in modulating memory retrieval: Evidence from a rodent model

Brendan E. Depue
Modeling the anatomy and function of PFC: Hippocampal interaction underlying the modulation of retrieval

SUNDAY, JANUARY 6

Session 7: Translating memory attributes to neural substrates: Contributions of Ray Kesner

Time: 4:00-6:30 pm
Location: Prospector 1-2

Organizer: Rob Berman, University of California-Davis

Abstract:
Research on the neurobiology of learning and memory has come a long way over the past 40 years, and the free exchange of ideas and the collaborations fostered through the Winter Conference on the Neurobiology of Learning and Memory over its 36 year history have advanced the field and made it one of the most exciting areas of research in neuroscience. A major contributor to our current ideas about memory systems is Ray Kesner, one of the original founders of the Winter Memory and Learning Conference, along with Aryeh Routtenberg, James McGaugh and Larry Squire. In recognition of Ray's contributions to the conference and the field, this session will focus on the evolution of his ideas and approaches to the study of memory, and attempt to

place his research within the context of current thinking in the field. The speakers are all past students and collaborators with Ray over the past 4 decades, and each will present their perspective of Ray's thinking during their time in his laboratory, along with their contributions and current thinking about memory systems.

Speakers:

Rob Berman
University of California-Davis
Ray's blackboard – the beginnings of an attribute theory of memory and new ways to think about the design of memory experiments

Andrea Chiba
University of California-San Diego
Time, space, and affect

Ramona Hopkins
Brigham Young University
Attributes, memory and the hippocampus: Comparison of human and animal models

Paul Gilbert
San Diego State University
A process oriented approach to the attribute model

Ryan Hunsaker
University of California-Davis
How to build a better mousetrap – using the attribute model to extend the utility of rodent disease models

Business Meeting:

Time: 7:00-7:15 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 – $40.00 for registrants and guests*

Cash Bar: *Friday, Saturday, Sunday evenings*

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