Program At A Glance

Jan 9	3-4 PM	Registration
	4-6 PM	Dave Olton Data Blitz
	6:30-8 PM	Pizza Party
	8-10 PM	Session 1: Don't forget about it! Mnemonic contributions to reinforcement learning and decision making (Nina Rouhani)
Jan 10	8-9:30 AM	Session 2: Molecular and cellular mechanisms of memory: synapses to engrams in health and disease (Jason Shepherd)
	4-5:30 PM	Session 3: Neural substrates of social learning and memory (Betsy Murray)
	5:30-8:30 PM	dinner on your own
	8:30-10 PM	Session 4: Extrahippocampal contributions to memory (in remembrance of David Bucci) (Tim Allen)
Jan 11	8-9:30 AM	Session 5: Reactivation of past experience and its role in the retrieval and modification of episodic memories: what have we learned from fMRI? (Mick Rugg)
	11:30 AM, 1 PM	The Hoffman High West Distillery Tour (contact kari.hoffman@vanderbilt.edu to be added to tour, first come / first served) **note** two tours, one at 11:30 AM and one at 1 PM
	4-6 PM	Session 6: Role of hippocampal sharp-wave ripples in learning and memory (Antonio Fernandez-Ruiz)
	7:30 PM	Banquet

Thursday, January 9, 2020

4-6 PM Dave Olton Data Blitz

Send your data blitz submissions (title, name, and affiliation) to Mark Baxter (mark.baxter@mssm.edu) and Aaron Mattfeld (amattfel@fiu.edu). Submissions are due on November 26th for full consideration, after which we will continue to accept data blitzes on the basis of availability. The David Olton Data Blitz session is one of the great features of the meeting. Please send us your amazing work and join the tradition!

8-10 PM Session 1: Don't forget about it! Mnemonic contributions to reinforcement learning and decision making

Organizer: Nina Rouhani (Princeton)

Speakers: Aaron Bornstein (UC, Irvine), Nina Rouhani, Akram Bakkour (Columbia University), Erie Boorman (UC, Davis)

The aim of this session is to discuss and integrate work characterizing how memory systems exert an influence on decision making. Memory processes and reinforcement learning have been traditionally studied separately, in part because these functions are attributed to distinct underlying systems in the brain, and in part because the behavioral tasks in these fields differ considerably. Nevertheless, learning and memory processes clearly interact, both neurally and in principle. Indeed, there has been growing interest and

research in understanding how memory, such as the episodic memory system, can achieve computational feats like one shot learning. Moreover, there is accumulating evidence that memory directly modulates reinforcement learning; for example, instead of integrating across all previous outcomes, learners can sample individual (episodic) experiences or reactivate previous contexts when determining the value of a choice.

Aaron Bornstein, “The dynamics of memory-guided decisions”
Akram Bakkour, “A role for the hippocampus in value-based decision making: evidence from fMRI and amnesia”
Nina Rouhani, “Joy division: reward prediction errors enhance memory and segment past experiences”
Erie Boorman, “Constructing, navigating, and combining abstract cognitive maps”

Friday, January 10, 2020

8-9:30 AM Session 2: Molecular and cellular mechanisms of memory: synapses to engrams in health and disease

Organizer: Jason Shepherd (University of Utah)

Speakers: Jason Shepherd, Jim Heys (University of Utah), Moriel Zelikowsky (University of Utah)

This panel will describe ongoing work that aims to dissect how information is normally processed and stored in neural circuits and how these processes are affected by chronic stress. Jason Shepherd will describe a new cell-to-cell communication pathway required for long-term memory. Jim Heys will describe work aimed at how neuronal circuits encode time in order for sequential events to be stored as memory. Moriel Zelikowsky will describe molecular mechanisms that underlie state-dependent changes in memory and behavior under chronic stress conditions. Taken together, these talks will integrate multiple levels of analysis and systems that underlie memory mechanisms.

4-5:30 PM Session 3: Neural substrates of social learning and memory

Organizer: Betsy Murray (NIMH)

Speakers: Stephen Allsop (Yale), Eliza Bliss-Moreau (UC Davis), Benjamin Basile (NIMH)

The medial frontal cortex, especially the anterior cingulate cortex (ACC), has been shown to play a role in social behavior in rodents, nonhuman primates, and humans. To explore the neural circuits and mechanisms underlying social cognition we bring together three speakers investigating different aspects of social learning and memory in rodents and nonhuman primates. Stephen Allsop will present data on social observational learning in mice. Using a combination of electrophysiological and optogenetic approaches, he investigates how information is encoded and transmitted from the ACC to the basolateral amygdala in mice observing another mouse undergo associative fear conditioning. Information derived from observation about the aversive value of the cue is transmitted from the ACC to the basolateral amygdala and this routing of information is critical for acquisition of observational fear learning. Eliza Bliss-Moreau will discuss the role of primate ACC in learning about cues that lead to presentation of social or nonsocial information. Control monkeys learned the association between stimuli and information type and demonstrated a consistent group-level preference for viewing videos depicting other monkeys interacting (social information). In contrast, despite their ability to learn stimulus-stimulus associations, monkeys with ACC lesions showed no preference for viewing social videos. Ben Basile will present data on the role of ACC in vicarious reinforcement in

macaque monkeys. Monkeys will work to give reward to conspecifics, a prosocial tendency called vicarious reinforcement. In this study, actor monkeys faced a monitor and a familiar recipient monkey. Actors could accept or reject one of three juice offers signaled by distinct visual cues: to self, the other monkey, or neither monkey. Monkeys showed a moderate but reliable baseline preference for giving juice to the other monkey over giving it to neither monkey. After excitotoxic lesions of ACC, monkeys maintained their preferences for the preoperatively learned cues. However, none of the monkeys with ACC damage reacquired the same preferences with the new cues.

5:30-8:30 PM Dinner On Your Own

Break for dinner with enough time to check out eateries on Main Street for those interested! If you need suggestions for places to go, consult Mark, Aaron, or Brock.

8:30-10 PM Session 4: Extrahippocampal contributions to memory (in remembrance of David Bucci)

Organizer: Tim Allen (FIU)

Speakers: Tim Allen (FIU), Kari Hoffman (Vanderbilt), Danielle Fournier (Dartmouth)

The purpose of memory is to aid future behavior by retrieving past experiences, but the underlying neurocircuitry governing retrieval is not well understood. This session will focus on recent physiological, neuroanatomical, and behavioral studies in primates and rodents suggesting a fundamental role for retrosplenial cortex circuitry in linking together sensory information, and for nucleus reuniens of the thalamus circuitry in prefrontal cortex guided retrieval, with respect to hippocampus-dependent memories.

We will use this session to remember our friend and colleague David Bucci, who passed away in October 2019.

Kari Hoffman, “Retrosplenial-hippocampal dynamics in long-term visuospatial memory retrieval”
Tim Allen, “Reuniens pathways in the retrieval of hippocampal-dependent memories”
Danielle Fournier, "Retrosplenial cortex and sensory integration"

Saturday, January 11, 2020

8-9:30 AM Session 5: Reactivation of past experience and its role in the retrieval and modification of episodic memories: what have we learned from fMRI?

Organizer: Mick Rugg (UT Dallas)

Speakers: Sarah Dubrow (University of Oregon), Jesse Rissman (UCLA), Mick Rugg (UT Dallas)

In studies of memory retrieval, reactivation refers to the reinstantiation in the brain of representations and processes that were active when a retrieved event or sequence of events was initially experienced. Reactivation has been proposed to a play a role in diverse aspects of memory processing, including memory consolidation, integration and modification, as well as in supplying the 'content' of episodic recollection. With the benefit of multi-voxel analysis approaches, fMRI has proven to be a powerful method to examine these and other aspects of memory reactivation in healthy humans. Each of the three speakers has both contributed empirical findings to this literature, and put forward theoretical accounts of episodic memory

retrieval predicated on these and related findings. In this session, they will describe these contributions and their implications for our understanding of the mechanisms underlying episodic retrieval, including the role of the hippocampus in orchestrating reactivation across the cortex. An important goal is to stimulate discussion about how these and related findings and ideas can most profitably be integrated with analogous research in non-human animals.

Mick Rugg, “Item- and category-level cortical reinstatement reflect distinct mnemonic processes and are differentially associated with retrieval-related activity in the hippocampus”
Jesse Rissman, “Decoding brain activity patterns during the retrieval of memories for real-world events and virtual reality experiences”
Sarah Dubrow, “Comparing behavioral and neural evidence for incidental sequence reactivation and segmentation”

4-6 PM Session 6: Role of hippocampal sharp-wave ripples in learning and memory

Organizer: Antonio Fernandez-Ruiz (NYU)

Speakers: Anna Guillespie (UCSF), Azahara Oliva (Columbia), Shnatanu Jadhav (Brandeis), Antonio Fernandez-Ruiz (NYU)

The hippocampus is believed to play a key role in learning and memory, in a two-step process: initial encoding during learning and subsequent consolidation during sleep. Hippocampal cells that have been active during a recent experience are reactivated during highly synchronous network events known as sharp-wave ripples (SWRs). For example, if an animal learned to follow a specific trajectory through a maze to retrieve a hidden reward, hippocampal ‘place cells’ will fire at discrete positions through that trajectory. During SWRs, the same place cells will fire in the same ordered sequence but highly compressed in time. This “replay” of behaviorally relevant sequences during sleep after a new experience is believed to mediate memory consolidation. Similar mechanisms have been postulated for the consolidation on diverse types of episodic memories in rodents and other species, including humans. SWRs are especially frequent during non-REM sleep but they also occur during behavior in the absence of locomotion. However, the functional role of awake SWRs is much less understood, although it has been proposed that they support planning and working memory. Most works supporting the role of sharp-wave ripples in learning and memory have been correlational so far. However, in recent years, advances in recording techniques, real-time data processing and optogenetics have allowed for causal manipulations of SWRs in behaving rodents. Speakers in this session have leveraged these recent methodological advances to perform close-loop manipulations of hippocampal and cortical activity during SWRs in order to shed light into their functional role and cellular mechanisms.

Anna Guillespie "Operant Conditioning of Hippocampal Sharp Wave Ripples"
Azahara Oliva "CA2 ripples are necessary for social memory consolidation"
Shnatanu Jadhav "Hippocampal-prefrontal replay supports spatial learning"
Antonio Fernandez-Ruiz "Long-duration spontaneous and optogenetically prolonged hippocampal sharp wave ripples improve spatial working memory"