2:09 PM **Will chimpanzees delay gratification by accepting tokens in lieu of rewards?**

Theodore A. Evans, Michael J. Beran (Language Research Center, Georgia State University), & Daniel Hoyle (Department of Biology, Georgia State University)

60 Tokens inherently introduce an element of delay between behavior and reward. For this reason, token studies may help us understand how animals process delays and anticipate future events. In this light, we presented 4 chimpanzees with choices between visible food items that were immediately available for consumption and tokens that could be later exchanged for food items on a one-to-one basis. In one test in which chimpanzees were allowed to exchange tokens for rewards after each choice trial, they were willing to choose tokens over food items when there were more tokens than visible rewards, and given that delay to reward was equated across response options. However, when chimpanzees were presented with repeated choices between two different token amounts and were allowed to exchange tokens for rewards only once at the end of each session, they quickly learned to collect at least a moderate number of tokens before ending the session and exchanging the tokens. Therefore, chimpanzees were willing to delay gratification by selecting and holding tokens, but only when no visible food items could be selected and immediately consumed.

2:21 PM

Memory (Chair - Jennifer Vonk)

2:21 PM **Episodic memory in human toddlers tested on a what-where-context task**

Frances Balcomb, Nora S. Newcombe, Katrina Ferrara, & Amanda Y. Funk (Temple University)

61 The developmental origins of episodic memory (EM) are poorly understood. Children don't show compelling evidence of EM until 2-3 years, although in infancy they show complex, but arguably semantic, declarative memory. In humans, EM is typically tested verbally. In non-human animals, EM has been explored by testing memory for combinations of bound associations, e.g. what-where-when, or what-where-context. In two experiments adapted from animal work (Eacott and Norman, 2004) children's ability to remember bound associations (what-where-context) was tested at 16-24 months. Children learned that a toy was hidden in one of four containers in two different rooms, each room containing the same containers but varying in contextual cues including features and spatial configuration. Although the containers in both rooms were the same, the toy was hidden in a different container per room, requiring children to remember the unique context to find the toy. After 1 familiarization trial per room, children's recall for the toy's location was tested in each room. Data from both experiments suggest that the ability to make bound contextual associations emerges at about 20 months, but only when children are provided with explicit (Exp 1) vs. indirect (Exp 2) recall cues.

2:35 PM **Rapid Change-Detection Learning**

Anthony Wright, (U Texas Med School-Houston), John Magnotti (Auburn University), Almut Carolus (U Texas Med School-Houston), Jacquelyne Rivera (U Texas Med School-Houston), Sarah Baum (U Texas Med School-Houston), Caitlin Elmore (U Texas Med School-Houston), Jeffrey Katz (Auburn University)

62 Pigeons were trained to observe, but not respond to object pictures in a sample array. They readily learned to choose the changed object in a test array. They learned change-detection in a fraction (1/10) of the time, performed at a substantially higher accuracy, and transferred considerably better to new objects than pigeons not trained to withhold responding to sample objects.

2:49 PM **Array Location Stability and Object Variability Affect Rats' Working Memory for Missing Object**

Marium Arain, Jouseph Barkho, Jerome Cohen (University of Windsor)

63 We report a series of experiments in which rats have to remember a missing object from an array of objects arranged in a square (four objects) or a rectangle (six objects) in a foraging chamber. Various types of information rats might use to retain the missing object are investigated by systematically manipulating array locations and within- array object positions. We report that rats' accuracy for finding the missing object is greater when array location and object positions are maintained than when either is varied between 'study' and 'test' segments of a trial. Varying the orientation of the rectangular array has a greater disruptive effect when the array consists of identical than different objects.

3:03 PM **Rats retrieve episodic memory when their memory is probed**

Wenyi Zhou & Jonathon D. Crystal (University of Georgia)

64 The objective was to document that rats retrieve episodic memories when their memory is probed. Rats encountered chocolate at one and chow at three randomly selected radial-maze arms in a daily study phase. After a 2-minute retention interval, all doors were opened and chow was available at previously inaccessible locations. The replenishment of chocolate (at its study-phase location) depended on two factors: time of day (morning vs. afternoon) and the presence or absence of chocolate pellets in the central hub at the start of the test phase. Because replenishment could not be decoded until the test phase, rats could not use differential encoding at study to solve the task. Instead, to predict chocolate replenishment, the rats had to retrieve a memory about the study episode at the time of test. The rats revisited the chocolate location more in replenishment than non-replenishment conditions, which documents episodic-memory retrieval. Next, we transferred the rats to an unfamiliar time of test while maintaining the familiar time of study and observed immediate transfer, which documents memory of when the study episode occurred. We conclude that rats retrieved episodic memories of the study episode when their memory was probed.

3:10 PM **Delayed alternation by California sea lions with naturally occurring hippocampal damage**

Peter Cook & Colleen Reichmuth (University of California Santa Cruz)

65 The hippocampus is essential for memory function. Its exact role, however, and those of the surrounding medial temporal brain areas, has not been determined in humans or animals. New research suggests that the hippocampus may support explicit recollection and the surrounding brain areas a feeling of familiarity; further, stimulus recognition, which has been the paradigm of most of the hippocampal ablation work in animals to date, may be supported independently by both memory mechanisms, thus accounting for spared recognition ability in ablated animals. By contrast, performance in a delayed alternation procedure in a T-Maze should be supported predominately by recollection, not familiarity. Restricted hippocampal damage does not interfere with rats' ability to acquire this basic alternation task, which is likely supported by procedural learning, but damage strongly impairs delayed testing. In the present experiment, stranded California sea lions with naturally occurring hippocampal damage, and control animals without damage, were tested on alternation in a T-Maze at two delay durations. MRIs were conducted on each subject following testing. Training and testing is remote and does not interfere with potential release. More than 12 sea lions have successfully completed testing, and preliminary findings indicate that the paradigm is sensitive to hippocampal damage.