# Fall Meeting of the Comparative Cognition Society 2013


November 14, 2013
8:00 – 5:30
Sheraton Centre Hotel
Toronto, Ontario

www.comparativecognition.org

# Fall Meeting of the Comparative Cognition Society 2013

**All Sessions Held in Dominion North**

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| 8:00-9:10 | **Sequence Learning, Timing, and Perception** |
| 9:20-10:10 | **Social and Prosocial Behavior** |
| 10:20-11:20 | **Communication, Categorization and Reasoning** |
| 1:00-2:00 | **Memory and Metacognition** |
| 2:10-3:10 | **Choice Behavior** |
| 3:20-4:10 | **Spatial Cognition** |
| 4:20 – 5:20 | Keynote Presentation – Nora Newcombe |

***Important Note to Presenters: Talks should be no longer than eight minutes (two additional minutes scheduled for discussion and transition)***

## Comparative Cognition Society

President: Jeff Katz
Secretary: Olga Lazareva
CO3 Conference Chair: Debbie Kelly
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Student Members: Jeffrey Pisklak, Jason Long

Conference Technical Support: Adam Goodman

Please consider joining us in March for the 21st annual *International Conference on Comparative Cognition*

CCS thanks the Psychonomic Society for its support and help

# Sequence Learning, Timing, and Perception

**Session Chair: Michael Brown**

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| 8:00 | **Welcome and Introduction** |
| 8:10 | Rachel C. Lapidus, Alexander Posell, Clinton D. Chapman, & Nancy K. Dess (Occidental College)<br>**Vocalization in Rats Selectively Bred for High or Low Saccharin Intake: Context and Early Results**<br>For more than 20 years, we have selectively outbred albino rats for differential saccharin intake (HiS and LoS lines) and explored phenotypic correlates, with an eye toward possible (epi)genetic and functional linkages. Studying rats individually, we have observed that relative to HiS rats, LoS rats are more anxious, jumpier, less inclined to self-administer psychoactive substances, more strongly nocturnal, and more sensitive to metabolic perturbations. Forays into social behavior began with the recently published observation that in head-to-head food competition, LoS rats become socially subordinate to HiS rats. This summer, we began to study ultrasonic vocalization in these lines. Intriguing preliminary results will be presented. |
| 8:20 | Kaitlyn Iannicello, Micael Tavolieri, & Jerome Cohen (University of Windsor)<br>**What Type of 'Rule' Do Rats' Learn From a Fixed Sequence of Signals in a Serial Reaction Time Task?**<br>Rats learned to 'nose' poke a series of successively lit keys on an FR-3, fixed sequence (e.g., move left then move back). To determine the nature of the rules rats might have learned, we interspersed sequence violations during occasional probes of either the same movement sequence 'rule' in the opposite direction (e.g., move right then back) or 'rule violation' in the same or opposite direction (e.g., keep moving left; keep moving right). Whether rats had learned a general 'abstract' sequence 'rule' (go back to first signal at the end of a sequence) or a simpler response-chain association was determined by the degree of disruption each type of sequence violation elicited as measured by increased reaction time and nose poke errors. |
| 8:30 | Carl Erick Hagmann (Tufts University/MIT)<br>**Conception of Temporal Rhythmic Structure in Audition and Vision by Birds and Humans**<br>Pigeons, starlings, and humans were trained to discriminate between fast and slow tempos with auditory and visual stimuli. When the organization of beats produced ambiguous tempos, rhythmic processing behavior reflected modality-specific temporal integration strategies. Visually, the pigeons and starlings tended to track stimulus duration instead of the tempo of beat onsets. The starlings and humans behaved similarly towards auditory beats, though, and showed evidence of an amodal tempo concept. Further tests of the pigeons explored within-trial switching of critical stimulus features and revealed the fundamentally different nature of their auditory and visual tempo discriminations. These results have implications for the role of vocal learning and animal class in crossmodal temporal integration. |

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| 8:40 | Kenneth J. Leising, Joshua Wolf, & Chad M. Ruprecht (Texas Christian University)<br>**It's Not the Size that Counts, It's How You Display It: Investigations into the Influence of Visual Stimulus Positioning on Learning in a Visual Discrimination Task with Rats**<br>We recently developed software to use an iPad-equipped touchscreen apparatus to study learning and memory in rats. The current experiments explored different factors that may enhance learning of a simultaneous visual discrimination. In Experiment 1, the visual discriminative stimuli differed in brightness and were presented in one of three arrangements: in the upper or lower portion of the display, or in the lower portion with a response required to a response key positioned above the stimulus. Rats with the brighter stimulus as the S+ displayed an S-R compatibility effect, while no differences existed between any other rats. When these rats were subsequently tested with a novel discrimination (line orientation), all rats performed similarly. In Experiment 2, the discriminative stimuli differed in pattern (graphic images) and were again presented in one of the three possible arrangements. Rats with the stimuli positioned in the lower portion of the screen performed significantly better than the other two groups, which did not differ from one another. Subsequent manipulations investigated the difference between groups. In sum, these experiments support the use of the iPad in visual discrimination tasks and inform future studies investigating learning and memory within a touchscreen-equipped (iPad or other) apparatus. |
| 8:50 | Muhammad A. Qadri & Robert G. Cook (Tufts University)<br>**Self Animating Illusory Motion Perception with Pigeons**<br>Self-animating illusory motion is the perception of motion from a static image. This motion illusion can be generated readily in humans using Repeated Asymmetric Patterns (RAPs) and a specific luminance patterning scheme. Three pigeons trained in a go/no-go task to detect changes in brightness, size, and position of a single square on a computer screen were trained to also detect changes in the positions of shifting tiles of circular elements within a grid. The trained displays varied in the color, density, and size of the visual features in the display, and they contained no illusory motion patterning. The pigeons were reinforced for pecking when displays were static and were given a variable timeout for pecking to motion displays. Tests with stimuli that induce illusory motion perception in humans revealed that the pigeons perceived the self-animated motion in those displays, evidenced by pecking less to those stimuli than feature-matched controls. This suggests that birds process motion using a similar visual algorithm as humans. |
| 9:00 | Caroline DeLong, Amanda Heberle, Kayla Mata, Brandon Dziedzic (Rochester Institute of Technology), & Whitlow W.L. Au (University of Hawaii)<br>**Discrimination of Fish Prey at Different Aspect Angles by Human Listeners Using Dolphin Echoes**<br>Dolphins use echolocation for object recognition, and objects ensonified by dolphins produce echoes that can vary significantly as a function of orientation. In this experiment, human listeners had to classify echoes from four fish species (sea bass, pollock, grey mullet, and Atlantic cod) ensonified with dolphin signals. Participants were trained to discriminate among the objects using an echo train stimulus from a 25 degree range of aspect angles, then tested with novel aspect angles across a 330 degree range. Participants succeeded in discriminating among the fish during training (*M* = 66% across the last 32 trials). However, they were often unsuccessful discriminating among the fish during transfer trials in a test session with no feedback (*M* = 38%) and a test session with feedback (M = 47%). Human listeners did not show view-invariant auditory object recognition. This study can provide insight into auditory object constancy in dolphins. |

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| 9:10 | **Ten Minute Break** |

# Social and Prosocial Behavior

**Session Chair: Nancy Dess**

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| 9:20 | Noam Miller, Ariana Strandburg-Peshkin & Iain Couzin (Princeton University)<br>**Collective Learning and The Emergence of Producer-Scrounger Dynamics**<br>Animals foraging in groups can use decisions made by their conspecifics as a source of information for locating rewards. However, when resources are limited, it may be advantageous to learn about environmental cues and reach foraging sites first (i.e., to be a producer) and costly to merely copy the choices of others (to be a scrounger). Scroungers may arrive too late to be rewarded and thus also limit their opportunities to learn about correlations of environmental cues with rewards. On the other hand, when resources are plentiful, information scrounging may be a successful strategy, making learning unnecessary. Using both experimental data from schools of fish and simulations we show how the richness of a resource determines the range of learning strategies that emerge in groups that forage collectively. |
| 9:30 | Sylvain Fiset, Pierre Nadeau-Marchand (Université de Moncton) & Nathaniel J. Hall (University of Florida)<br>**Ontogenetic Development of Object Permanence and Sensorimotor Intelligence in Grey Wolves**<br>In this study, we explored the ontogenetic cognitive development of grey wolves. To reach this objective, we examined the development of object permanence and sensorimotor intelligence of four wolf puppies from the same litter. We administered tests of object permanence from the age of 4 to 12 weeks. During the same period, we also recorded wolves' interaction with social and/or physical objects. The results indicate that the development of object permanence in wolves is limited to the understanding of visible displacement of objects. Moreover, the behaviors of wolf puppies are directed predominantly towards conspecifics, suggesting an early development of social cognition. However, by Week 10, wolves' interest in inanimate object increases significantly and correlates with the understanding of object permanence. |
| 9:40 | Audrey E. Parrish, Bonnie M. Perdue, Theodore A. Evans, & Michael J. Beran (Georgia State University)<br>**Chimpanzees (*Pan troglodytes*) Transfer Tokens with Social Partners to Accumulate Rewards in a Self-Control Task**<br>There has been surprisingly little research investigating the interaction between social behavior and self-control in primates. Here, chimpanzees transferred a token with a partner animal in order to accumulate food items. Either individual could terminate the trial by taking the accumulating food at any time; thus both chimpanzees had to exhibit self-control to earn the maximum amount. Chimpanzees readily engaged the task with their partner, accumulating the majority of rewards across a number of test phases including a new-partner phase, experimenter-absent phase, and food-within-reach phase. In a second experiment, chimpanzees chose between an immediately available food option and the token that could be transferred back and forth with their partner to obtain a more delayed but potentially larger food quantity. In this phase, chimpanzees often chose the option that led to the larger quantity of food, even if it meant foregoing the immediately available food option. |

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| 9:50 | Jennifer Hamilton & Jennifer Vonk (Oakland University)<br>**Are Bats Prosocial?**<br>In order to test the hypothesis that the capacity for prosocial concerns is unique to humans (Silk & House, 2011), researchers have presented various primate species with the opportunity to donate food rewards to group mates (chimpanzees; Silk et al., 2005; Vonk et al., 2008; capuchins; Cronin et al., 2009; Lakshminarayanan, & Santos, 2008). Few non-primate species have been tested. Bats are likely candidates for prosocial sentiments, given that vampire bats are known to share blood with hungry roostmates (Wilkinson, 1984) and many other bat species live in close-knit communities where females sometimes protect or even nurse unrelated young (Kunz et al. 1994; LeBlanc 2000). Altruism has been less explored in bats other than vampire bats. In the current study we provide members of various bat species the opportunity to provide recipients with food when given the opportunity. |
| 10:00 | Juan F. Duque & Jeffrey R. Stevens (University of Nebraska Lincoln)<br>**Pinyon Jays Share...Sometimes? The Role of Dominance and Reciprocity in Food Sharing**<br>Prosocial behaviors are those that improve the welfare of others. In the case of sharing food, a recipient gains a benefit at the expense of another individual, the donor. While expected in parent-offspring and pair-bonded individuals, it is unclear why, and under what circumstances this takes place in other cases. Here we examine factors that may influence an individual's propensity to voluntarily share food. In pinyon jays, we have documented many donor-initiated sharing events using two adjacent cages where one bird has access to food and another does not. Though some birds share, other individuals never share, suggesting that individuals differ in their propensity to share food. Furthermore, specific pairings of birds lead to more sharing, indicating a synergistic or dyad-specific effect. Ongoing research is examining the interplay between dominance position and propensity to share, and also whether sharing events tend to be reciprocated. The spontaneous, voluntary sharing observed suggests a level of prosociality previously unknown in this corvid, and provides a model for testing proximate mechanisms underlying this behavior. |
| 10:10 | **10 Minute Break** |

## Communication, Categorization and Reasoning

**Session Chair: Suzanne MacDonald**

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| 10:20 | Eduardo Mercado III, Matthew G. Wisniewski, Brittany McIntosh (University at Buffalo, SUNY), Lauren M. Guillette, Christopher B. Sturdy (University of Alberta)<br>**Can Singing Chickadees use Echoes to Coordinate Their Actions?**<br>Chickadee songs may provide listeners with information about the locations of singers. The current study explored which features of songs might provide useful information about a singer's location. A novel acoustic cue was discovered that provides clear indications of how far a song has traveled. Singing chickadees could potentially use this cue to coordinate their movements. If they use this cue to judge distances, then this may explain why they maintain constant pitch intervals in their songs. |

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| 10:30 | Molly McGuire (Oakland University), Lauri Torgerson-White, Melissa Thueme, Jennifer Thomas (Detroit Zoological Society) & Jennifer Vonk (Oakland University)<br>**Aesthetic Preferences in Adult Gorillas (*Gorilla gorilla gorilla*)**<br>A Likert scale is being developed for use with three adult male gorillas at the Detroit Zoo to determine preferences for items presented as images on a touch-screen computer. The gorillas are being trained to differentiate between chimpanzee emotion expressions via a match-to-sample task in which four different expressions are paired. Play faces (positive) and fear faces (negative) can then be used as images to represent ends of the scale. The gorillas are also being trained on a two-alternative-forced-choice procedure in which they receive the food item that corresponds to the chosen image to determine preferences. These items will be used for training the correct use of the scale so the gorillas can later indicate their like or dislike for other familiar items. This procedure will allow them to communicate preferences to their caretakers and can be used as a communication tool to improve animal welfare and determine the aesthetic preferences of gorillas. |
| 10:40 | Moriah Galvan, Jennifer Vonk (Oakland University), & Alexis Garland<br>**Canine and Feline Responsiveness to Cues of Human Emotion**<br>Four domestic dog puppies and eleven adult domestic cats were tested on their ability to discriminate human emotion expressions. The puppies were presented with an unfamiliar experimenter displaying either a happy or angry expression under two different conditions; with and without happy and angry vocal cues. They were tested at four, five, and six weeks of age to determine when recognition of human emotion expressions might emerge. The cats were presented with both a familiar and an unfamiliar experimenter displaying angry or happy emotion expressions without vocal cues. Results from the puppies indicate that there was no effect of emotion in the vocal conditions, but the puppies were slower to approach in the angry condition without vocal cues. There were large individual differences in the behavior of the cats, which has prompted further testing. |
| 10:50 | Zakrzewski, A. C. (SUNY Buffalo), Johnston, J. J. R. (SUNY Buffalo), Roeder, J. (UC Santa Barbara), Boomer, J. (SUNY Buffalo), Ashby, F. G. (UC Santa Barbara), Church, B. A. (SUNY Buffalo), & Smith, J. D. (SUNY Buffalo)<br>**Analogical Transfer of Categorization in Humans (*Homo sapiens*) and Monkeys (*Macaca mulatta*)**<br>One cognitive neuroscience category learning framework dissociates two systems: implicit (associative) and explicit (rule-based). We used an analogical-transfer paradigm to ask whether nonhumans might share these systems. Subjects learned categories that fostered implicit or explicit categorization because they had an information-integration (II) solution or a rule-based (RB) solution. They were transferred to new areas of the stimulus space. Transfer in the II task was impaired, suggesting that II category learning is yoked to the integrated stimulus. Transfer in the RB task was nearly seamless, suggesting that RB category learning may be abstract and independent from the integrated stimulus. The results from this as well as ongoing experiments suggest that macaques share structural components of humans' capacity for explicit categorization. |

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| 11:00 | Zoe Johnson-Ulrich (Oakland University)<br>**Using an arbitrary control to assess physical reasoning in keas (*Nestor notabilis*)**<br>Keas (Nestor notabilis) are a species of parrot distinguished for their curiosity and destructiveness in the wild and have performed similarly to ravens on many tests of physical cognition. These tests generally attempt to elucidate what subjects understand about the physical mechanisms of a problem. Humans have the ability to understand the physical mechanisms connecting two causally connected events, and can apply that understanding to new situations. Whether or not any non-human animals also have this ability is questionable, although there is some support that apes may understand certain physical problems. In this study I presented keas with several physical support tasks along with arbitrary controls. The tasks were learned by all subjects, yet those that could be solved using physical cognition were not solved faster than the arbitrary controls. This suggests that keas do not have an understanding of the physical concepts involved in this particular task and may instead be excellent associative learners. |
| 11:10 | Robert I. Bowers & William D. Timberlake (Indiana University)<br>**Further explorations of causal reasoning in autoshaping**<br>An important assumption of a Bayes networks perspective on conditioning is that the events and associations in a learning situation are treated by the learner as discrete and conditionally independent. Views on associative learning vary on this point, some envisioning a network of discrete event representations; some not. Extinction tests indicated that rats treated a trained sequence of events leading to food as a complex predictor of food, rather than as a chain of independent causes and effects, in violation of the assumption from Bayes Networks. These results put pressure on views that assume independent or discrete associations, in particular such views' use of Bayes networks as a source of predictions. |
| 11:20 | **Lunch Break** |

## Memory and Metacognition
### Session Chair: Jon Crystal

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| 1:00 | Deepna T. Devkar, Anthony A. Wright (University of Texas Medical School at Houston), Wei Ji Ma (Baylor College of Medicine)<br>**Monkeys show the same basic mechanisms of visual short-term memory as humans**<br>There has been disagreement about basic processes underlying visual short-term memory (VSTM) in humans. Studying these same processes in a nonhuman primate may help resolve this controversy. We tested two rhesus monkeys in a change detection task where they identified the changed item from a display of previously seen items. Monkeys viewed two displays: a sample display and a test display. The sample display contained 2-5 oriented lines presented simultaneously, followed by a 1-s delay. Then, a test display containing two items was presented – one item was identical to one of the sample items (same location and orientation), and the other item had randomly changed to a new orientation. Accuracy varied with magnitude of change (10 – 90 degrees) and inversely with the number (2 – 5) of to-be-remembered lines. Performance was modeled according to four current models of VSTM – |

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| | fixed item-limit, slots-plus-resources, equal precision, and variable precision models. Performance was best accounted for by the variable precision model, as had been previously shown for humans, suggesting that memory resource is distributed and variable across all items. The worst account was by the fixed-capacity, item-limit model, reinforcing a similar result from humans. Similar processing by monkeys and humans adds strong evolutionary support for the basic mechanisms underlying VSTM. |
| 1:10 | Christina Meier, Stephen Lea (University of Exeter), & Guido De Filippo (University of Auckland)<br>**Out of Sight, Out of Mind**<br>We trained pigeons on go-left/go-right discriminations in which a target stimulus was presented in the centre of a touchscreen. Pigeons had to peck it to obtain two response keys appearing to either side of the stimulus; pecking at the correct response key indicated by the stimulus resulted in a food reward. With white disks as response keys, pigeons failed to approach the success criterion within 20 sessions. Using a procedure in which, after the stimulus in the centre was pecked, it reappeared in the response-key locations instead of the white disks, pigeons reached the criterion within 8 sessions; pigeons that had been unsuccessful when using white response keys learned the task within 4 sessions after changing to the alternative method. The original failure was most likely due to a lack of memory for the stimulus in the centre, as it was not easily visible when facing a response key. |
| 1:20 | Heidi L. Marsh (Bucknell University)<br>**Information Seeking in Lion-tailed Macaques (*Macaca silenus*): A Generalized Search Strategy After All?**<br>Old World primates seek information about the location of a hidden food item, unless they are privy to the hiding process, which has been interpreted as evidence of metacognition. Here, lion-tailed macaques were tested on an object choice task. Conditions varied as to whether the hidden food was shown to subjects before a choice was required, and whether the food's location could be inferred by logical exclusion. Additionally, the hidden food could be located visually before a choice was made, by peering under the objects through a Plexiglas tray. Across conditions, monkeys looked for food when it had not been seen, even if its location could be inferred. This suggests that apparently 'metacognitive' information seeking in monkeys may instead reflect a generalized search strategy, in which subjects reach for food when it is seen, or search until it is spotted. |
| 1:30 | Jonathon D. Crystal & Wesley T. Alford (Indiana University)<br>**Validation of a rodent model of source memory**<br>Source memory is a representation of the origin of information. Crystal et al (2013; Source memory in the rat. Current Biology 23 387-391) recently proposed that rats remember the source of encoded episodes. The encoding-failure hypothesis proposes that rats encoded to-be-rewarded locations (and otherwise failed to encode), thereby succeeding in our earlier studies without remembering the episode. Here we asked if rats remember the source of encoded information while ruling out encoding failure. Food replenished (or failed to replenish) based on 4 pieces of information: location, flavor (chocolate/chow), source information (walking/placement feeding), a retrieval cue (food/no-food). Because the retrieval cue occurred immediately prior to memory assessment, the rats needed to encode all pieces of information to selectively revisit the replenishment location. Our data validate a rodent model of source memory. |

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| 1:40 | Regina Paxton Gazes, Kimberly Burke, & Tara S. Stoinski (Zoo Atlanta)<br>**Memory Monitoring by Orangutans and Gorillas**<br>Humans will adaptively seek more information or actively avoid making memory judgments when their memory is lacking. To understand the evolutionary development of this memory monitoring ability, we tested the extent to which two of our ape relatives, gorillas and orangutans, alter their behavior based on the content of their memory. Subjects were presented with a 3 choice match-to-location task in which they could decline to respond to the task by selecting a forth bailout option that always contained a less preferred reward. Gorillas were additionally presented with a 4 choice match-to-location task in which they could seek more information about the location of the reward. Initial results from both tasks indicate that subjects make responses consistent with meta-cognitive performance by showing increased information seeking and choice of the bailout response on trials in which they have weak memory for the location of the reward. The implications of these findings for the evolution of meta-cognition will be discussed. |
| 1:50 | Michael Baum & J. David Smith (University at Buffalo)<br>**Self-Report in Rhesus Macaques?**<br>We examined whether rhesus macaques (Macaca mulatta) can report on their actions in a matching task. Initially, monkeys participated in a task that was split into two phases. First, the monkeys matched two objects based on the properties of shape or color. Second, the monkeys selected an icon that identified the matching property. Although the monkeys learned the matching task, they were at chance when picking the icon. We then developed a scaffolding task to help the monkeys learn the icons' meanings. A monkey learned to select the correct icon with both objects present, but remained at chance in the initial paradigm. To lighten memory load, we are running a two-phase task that displays the chosen object during the icon phase. Results suggest self-report is difficult (if not impossible) for rhesus macaques. |
| 2:00 | 10 Minute Break |

## Choice Behavior
### Session Chair: Marcia Spetch

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| 2:10 | Jessica P. Stagner & Thomas R. Zentall (University of Kentucky)<br>**The Monty Hall Dilemma : Can Pigeons and Rats Choose Optimally?**<br>In the Monty Hall Dilemma (MHD), three doors are presented with a prize behind one. Participants choose one. One of the unchosen doors is then shown to not have the prize and the participant can choose to stay with their door or switch to the other one. The optimal strategy is to switch. Herbranson and Schroeder (2010) found that humans performed poorly on this task, whereas pigeons learned to switch readily. However, we found that pigeons learned to switch at level only slightly above humans. We also found that pigeons stay nearly exclusively when staying is the optimal strategy and when staying and switching are reinforced equally. Rats were run under these same conditions to observe if differences in foraging strategies would influence performance. We predicted that rats would learn the optimal switching strategy faster than humans and pigeons. |

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| 2:20 | Andrew T. Marshall, Jeffrey Hyder, & Kimberly Kirkpatrick (Kansas State University)<br>**Probabilistic Choice in Rats: the Effects of Differential Losses and Alternative Outcomes**<br>Previous research has suggested that food outcomes may be encoded as gains or losses relative to a certain choice reference point (Marshall, 2013). The present study examined the effects of certain choice magnitudes and varying probabilities of multiple losses on choice behavior. Rats chose between an uncertain outcome that probabilistically delivered 0, 1, or 11 pellets, and a certain outcome that always delivered food. The certain outcomes differed across groups (2 or 4, 1 or 5 pellets). Choice behavior was differentially affected by the probability of uncertain outcomes, the different certain choice outcome magnitudes, and the outcome of the previous choice. These results advance our understanding of the effects of reward magnitude on choice, as well as the reference point that rats use to gauge outcomes as gains and losses. |
| 2:30 | Aaron P. Smith, & Kimberly Kirkpatrick (Kansas State University)<br>**Delay Exposure as a Potential Mechanism to Increase Self-Control in Rats**<br>Research on impulsive individuals has increasingly considered sensitivity to time as a key factor in impulsive choice behavior. The current study assessed a targeted behavioral intervention to increase self control by increasing sensitivity to time. Two experiments trained 24 rats of different strains (Sprague-Dawley and Lewis in Experiments 1 and 2, respectively) on an impulsive choice task and assessed the effect of additional exposure to fixed- or variable-interval schedules of reinforcement on choice behavior. Both strains showed increases in self-control and changes in timing behavior under both schedules of reinforcement, indicating that delay exposure may be an effective means to decrease impulsivity. The results of Experiment 2 were particularly interesting in that Lewis rats have shown deficits in self-control in previous studies (e.g., Garcia & Kirkpatrick, 2013). |
| 2:40 | Elliot A. Ludvig (Princeton University), Christopher R. Madan, Jeffrey Pisklak, & Marcia L. Spetch (University of Alberta)<br>**Risky Choice in Pigeons and People**<br>There is a stark inconsistency between the literatures on risky choice in humans and non-human animals. Humans are generally risk averse for gains, while animals are often observed to be risk seeking for food rewards, especially when faced with variable delays or under significant deprivation. A key difference between these literatures is that humans are often directly told about the risky options, while non-human animals must learn about them from their own experience. In this talk, I present data from people and pigeons in formally identical choice tasks where all outcomes are learned from experience. The data support an extreme-outcome rule, whereby the largest and smallest rewards in a given context are overweighted in risky choice. As a result, both people and pigeons are more risk seeking for larger rewards than for smaller ones. This extreme-outcome rule is a first step toward a consilience of these two disparate literatures, identifying some common features that drive risky choice across phyla. |

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| 2:50 | Jennifer R. Laude, Jessica P. Stagner, Joshua S. Beckmann, Carter W. Daniels & Thomas R. Zentall (University of Kentucky)<br>**Degree of Delay Discounting Affects Gambling-Like Choice by Pigeons: Reduced Conditioned Inhibition as a Mechanism**<br>Pigeons prefer a sub-optimal option with a low-probability of a high-payoff over an optimal option that results in more food. This finding is analogous to sub-optimal human monetary gambling in humans because in both cases there appears to be an underemphasis of the losing event. We have found that pigeons that were less impulsive as indexed by a delay-discounting task were less likely to show this sub-optimal choice behavior compared with more impulsive pigeons. One mechanism for this effect may be that the signal for no food is an ineffective conditioned inhibitor for impulsive pigeons. These results have implications for the mechanisms underlying sub-optimal choice by humans (e.g., problem gamblers) and they suggest that high baseline levels of impulsivity can enhance acquisition of a gambling habit and may be a result of decreased conditioned inhibition to negative outcomes. |
| 3:00 | Krista Macpherson & William A. Roberts (Western University)<br>**Interval Timing in Domestic Dogs**<br>Interval timing is an important skill that allows animals to approximate how much time has elapsed since a given event. Little, however, is known about interval timing in domestic dogs. In an initial experiment, a peak procedure was used with a 2-year-old rough collie named Sedona. Sedona was initially trained on 30 second fixed intervals. When 1 minute probe trials were introduced, Sedona's rate of responding decreased after 30 seconds, despite the fact that she had not been rewarded. These findings are consistent with previous studies using rats and pigeons. In a second experiment, a bi-section task was used in which dogs had to learn to approach one feeder when given an 8 second signal, and another when given a 2 second signal. The signal had both visual (white light) and auditory (a tone) properties. The visual and auditory properties were eventually dissociated in order to determine which had more influence over the dogs' behavior. Results and implications of this study will be discussed. |
| 3:10 | **10 Minute Break** |

## Spatial Cognition
### Session Chair: Jeff Katz

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| 3:20 | Bradley R. Sturz & Karen Z. Naufel (Georgia Southern University)<br>**Males Show Improved Perspective-Taking Performance when Female Images Occupy the Locations in the Spatial Array: Preliminary Evidence Consistent with Sexual Selection of Spatial Abilities?**<br>One tenet of sexual selection theory posits that females select males on the basis of physical attributes because these attributes serve as indicators of fitness. Relatively recently, evolutionary psychologists have suggested that females also select males on the basis of cognitive attributes because such attributes also serve as indicators of fitness. Spatial abilities are hypothesized to be one such cognitive attribute, but evidence supporting this hypothesis is lacking. We tested this hypothesis by having human male participants engage in a perspective-taking task (imagine standing at object A, facing object B, point to object C). We manipulated the content of the objects forming the spatial array to present either images of human females, animals, or kaleidoscope snippets. Pointing accuracy for males viewing images of females was superior to that of males viewing animals or kaleidoscope snippets. Results appear to provide preliminary evidence consistent with sexual selection of spatial abilities. |
| 3:30 | Kent D. Bodily & Samuel P. Police (Georgia Southern University)<br>**The Effect of Beacon Sensory Modality on Human Reorientation by Enclosure Geometry**<br>After learning to find a goal near a distinctive beacon in a rectangular room, humans primarily search in the correct and opposite corners when the beacon is removed. This ubiquitous finding suggests that incidental learning of the enclosure shape occurred. The purpose of the present study was to investigate whether the stimulus modality of beacons influences subsequent reorientation in their absence. During training, each corner of a rectangular enclosure contained a distinct visual and white-noise auditory beacon (Visual Group), or a white visual and distinct auditory beacon (Auditory Group), one of which reliably marked the goal location. During testing, white visual and white-noise auditory beacons were placed in each corner of the enclosure for both groups. Where participants searched was compared between groups. Results and implications will be discussed. |
| 3:40 | Kevin Leonard & Debbie M. Kelly (University of Manitoba)<br>**Geometric and Featural Cue Use by Mice in Aversive and Appetitive Search Tasks.**<br>Geometric and featural cues within an environment may be used by animals for reorientation. Many species have shown an implicit encoding of geometry even within a feature-rich environment. During our study, mice (Mus musculus) were trained to either search for a hidden platform in one corner of a feature-rich rectangular watermaze or search for food hidden under substrate in a feature-rich rectangular open-field. Upon completion of training, transformation tests which manipulated specific properties of the environment were conducted to examine whether the mice used geometric cues to reorient in the absence of features, as well as whether the mice showed a cue preference when these cues provided conflicting information as to the desired location. We will discuss the differences found in the encoding of geometric information between these aversive and appetitive search tasks. |

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| 3:50 | Tomokazu Ushitani (Chiba University), Clint Perry, Andrew Barron, & Ken Cheng (Macquarie University)<br>**Spatial Learning Differences between Normal and Precocious Honeybee Foragers (*Apis mellifera*)**<br>Several environmental factors cause honeybees to begin foraging at an early age. It is hypothesized that these precocious bees are poorer performers than normal-aged and that this may be a potential cause of colony decline. We manipulated hive structure to accelerate behavioral development and tested whether this developmental difference affected cognitive ability. We individually trained bees to find a sugar feeder located on a platform where three landmarks could be used to locate the feeder - one placed near to the feeder and two distant landmarks constantly forming a right triangle with the near landmark. When the near landmark and feeder were removed, precocious foragers searched at a specific area around the far landmarks, suggesting they are used as substitutes for the near landmark. Normal-aged foragers circled either of the far landmarks revealing a difference in navigational strategies used by foragers with different developmental histories. |
| 4:00 | Blythe Alexander (University of the District of Columbia) & Rudolf Jander (University of Kansas)<br>**Distinct Functions of Place and Compass knowledge in the Cognitive Mapping of the Homing House Mouse (*Mus musculus*)**<br>The concept of a cognitive map states that an animal can deduce a novel shortcut to a goal by using only a map-based computation. Past studies have unsuccessfully tested rodents for this map-based shortcutting by failing to design an experiment that excludes all other forms of novel shortcutting, e.g., path integration. In this study, we propose a testable hypothesis — viewpoint extrapolation—that refers to an animal's ability to extrapolate three-dimensional spatial information known from one perspective to a known goal in order to successfully navigate to the goal from a novel place. We tested this hypothesis using house mice, and our experimental results indicate that mice failed to navigate via viewpoint extrapolation, and so were unable to compute a novel map-based shortcut home. |
| 4:10 | **10 Minute Break** |

# Keynote Address
# Nora Newcombe (Temple University)
**Introduced by Michael Brown**

4:20 -5:20

## Studying Development Comparatively

Studying developmental change comparatively is an exciting enterprise, offering theoretical and methodological purchase on understanding cognition. From a theoretical point of view, comparative developmental research defines similarities and differences in development across species, thus delineating the species-specific and the species-general aspects of development and placing development in overall evolutionary perspective. Methodologically, comparative developmental research allows for triangulation and convergence. We can use a much wider overall array of methods when we study the same question in various species of various ages. Sharing of paradigms across species and ages is, however, crucial to the success of this strategy. The comparative approach to cognitive development will be illustrated with specific examples from research on topics in the spatial domain (reorientation, water maze, perspective taking, mental rotation, search errors such as A-not B) as well as from studies of episodic memory.

# Please Consider Joining the Comparative Cognition Society

Founded in 1999, the Comparative Cognition Society (CCS) is a scientific society dedicated to gaining a broad scientific understanding of the nature and evolution of cognition in human and nonhuman animals. The Comparative Cognition Society is a nonprofit scientific society with no doctrine or philosophy, except the scientific method as it is commonly understood in all natural sciences. Anyone who studies perception, learning, memory, or any other cognitive or representational process in animals is welcome. Our members include faculty members, animal behavior professionals, and students in psychology, biology, anthropology, applied animal behavior science, and related fields.

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- A primary activity of CCS is sponsorship of the annual International Conference on Comparative Cognition (CO3), which has been held annually each March in Melbourne, Florida since 1994. Both Faculty/Professional Scientist members and Student members of CCS receive a discount on CO3 conference fees. To promote student interest in comparative cognition, student conference fees are kept at a minimum. CCS sponsored a second conference in 2008 and 2009 (Fall conference held in coordination with the annual meeting of the Psychonomic Society.
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  - Two cyberbooks have been published in cooperation with the society
    - *Avian Visual Cognition*
    - *Animal Spatial Cognition: Comparative, Neural, and Computational Approaches*
  - *Proceedings of the Annual Conference on Comparative Cognition* - conference proceedings include some full-text PowerPoint™ presentations

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