Fall Meeting of the Comparative Cognition Society 2011

November 3, 2011
8:15 AM
Sheraton Seattle Hotel
Metropolitan B
Seattle, WA

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Fall Meeting of the Comparative Cognition Society 2011

All Sessions Held in Metropolitan B

8:15-9:10	Memory and Metacognition
9:20-10:20	Associative Processes and Relational Learning
10:30-11:20	Choice Behavior
1:00-1:50	Space and Quantity
2:00-3:00	Categories, Concepts, & Ordinal Knowledge
3:10-4:00	Attention, Perception, & Recognition
4:10 – 5:10	Keynote Presentation – Sheri Mizumori

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

Comparative Cognition Society

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Memory and Metacognition

Session Chair: Jon Crystal

8:15	**Welcome and Introduction**
8:20	Catherine Mingee (University of Toledo) **Retention of a Brightness Discrimination Task in Paramecia, *P. caudatum*** Previous research into the possibility of learning in paramecia in our laboratory has shown that these organisms can learn to go to and remain in a specific location based on cathode shock reinforcement. The present experiments were designed to determine whether paramecia could retain the learned brightness discrimination task and, if so, for approximately how long. Results from the first experiment indicate that the retention interval for this task in paramecia may be shorter than six minutes. The second experiment tests shorter intervals to determine if paramecia can "remember" for more than just a few moments. It is possible that longer term remembering requires a nervous system.
8:30	Angelo Santi, Sabrina Simmons, & Shannon Mischler (Wilfrid Laurier University) **Asymmetric retention functions for hedonic samples in rats: The effect of differential head entry behavior** Rats were trained in a symbolic delayed matching-to-sample task to discriminate hedonic sample stimuli that consisted of food or no food. Retention functions decreased more rapidly on trials initiated by a food sample, than on trials initiated by a no-food sample when retention intervals were manipulated within session. Head entry into the food magazine during sample presentation occurred on over 95% of the food-sample trials and 20% of the no-food-sample trials. During the retention interval, head entry occurred on over 60% of the trials regardless of whether the preceding sample was food or no food. The asymmetric retention functions for food and no food cannot be explained in terms of a similarity of head entry behavior during no-food samples and the retention interval.
8:40	Marium Arain & Jerome Cohen (University of Windsor) **Rats' Hierarchical Retrieval of Redundant Information from Working Memory** Rats were exposed in a foraging arena to four food sites, three of which were cued and baited during a study segment and the fourth cued and baited in the test segment of a trial. On some probe non-rewarded test segments, we dissociated the spatial and non-spatial characteristics of the remaining food site by slightly moving the location of new object and/or the array. When forced to search all food sites during probe tests, rats displayed strong hierarchical search patterns by initially choosing a site based on non-spatial cues (the missing object) followed by choosing sites based on previously non-cued site's local and then global position. We also report the effects of inter-segment (retention) interval, object conditions (identical vs. different) and size of pool of objects on rats' hierarchical retrieval patterns.

8:50	Wenyi Zhou & Jonathon D. Crystal (Indiana University) **Rats answer an unexpected question after incidental encoding** Animal models of episodic memory have been criticized as being semantic in nature (i.e., solved based on well-learned rules). When encoding is incidental and a memory test is unexpected, people can report details about an event. We tested the hypothesis that rats can answer an unexpected question after incidental encoding. Rats were initially trained in Task 1 (win-shift search for food) and Task 2 (discriminate food vs. no-food; e.g., turn left/right after food/non-food sample) in a radial maze. When starting on one task, rats likely expected to complete that task. In the probe, rats searched for food in Task 1 (incidentally encoding the presence or absence of food). Subsequently, they were unexpectedly asked to report if they had eaten or not in a Task-2 test. Rats answered the unexpected question "Did you just eat or not?" Rats remember an earlier event after incidental encoding.
9:00	Timothy D. Hackenberg, Jessica Dennis, & Nicholas Kappeyne van de Coppello (Reed College) **Self-Awareness and Metacognition in Rats** In studies of metacognition, animals typically are given a discrimination problem, and on some trials, are provided an opportunity to escape (terminating the trial with a smaller but certain reward). In the present study, rats produced two distinct patterns of behavior and were then asked to report on their most recent behavioral pattern. Accuracy of this self-discrimination varied inversely with retention interval—the delay between the behavioral pattern and the self-report. When given an opportunity to escape, rats did so more frequently on trials with longer retention intervals. Accuracy also tended to be higher on free-choice trials (with escape option present) than on forced-choice trials (without escape option). Both of these outcomes—differential escape on low-accuracy trials and differential accuracy on free vs. forced-choice trials—are commonly accepted criteria for metacognition. By including a self-discrimination component, the present research makes explicit the relationship between metacognition and self-awareness.
9:10	**Ten Minute Break**

Associative Processes and Relational Learning

Session Chair: Marcia Spetch

9:20	Federico Sanabria & Gabriel J. Mazur (Arizona State University) **Spatial Pavlovian Conditioning** Associative learning research has traditionally focused on how conditioned stimuli (CS) disambiguate the temporal-but not spatial-location of unconditioned stimuli (US). A series of experiments demonstrate that spatial overlap and correlation of CS and US are sufficient to elicit a sign-tracking conditioned response (CR) in pigeons. This demonstration was conducted under temporal parameters that, by themselves, did not support sign-tracking. These results suggest that spatial and temporal relations between stimuli contribute to their association. If stimuli are not too distant in one dimension (time or space), a CR may be elicited by the proximity of the stimuli in the other dimension.
9:30	Cody W. Polack, Mario A. Laborda, & Ralph R. Miller (SUNY – Binghamton) **The role of the excitatory context in renewal** In two experiments we assessed the role of excitatory contexts in renewal paradigms. In Experiment 1, the training context in an AAC renewal preparation was either extinguished or remained excitatory. When the training context remained excitatory, renewal was not observed; however, AAC renewal emerged following extinction of the training context. Thus, the excitatory status of the training context is one determinant of whether AAC renewal will be observed. In Experiment 2, a similar approach was taken to address the finding that ABA renewal is sometimes stronger than ABC renewal. We found ABA>ABC when the acquisition context is excitatory and that responding in ABC and ABA preparations are similar when the acquisition context has been extinguished. These findings further demonstrate that the excitatory status of the training context partially determines how much renewal will be observed.
9:40	Gonzalo Miguez, Henry Cham, & Ralph R. Miller (SUNY-Binghamton) **Spontaneous recovery and renewal of conditioned fear after retroactive cue interference in rats** Retroactive cue interference refers to the observation that cue B-Outcome (B-O) during Phase 2, following A-O in Phase 1 weakens responding to A at test, relative to A-O followed by B unpaired with O. Using rats in a fear conditioning preparation (i.e., lick suppression) we found in Exp. 1 that a delay between Phase 2 (i.e., the interfering phase) and testing results in a recovery from the reduction observed in responding due to cue interference. In Exp. 2 we found that a context shift between Phase 2 and test also recovers responding from retroactive cue interference. These results are analogous to the spontaneous recovery and renewal effects observed following extinction treatments (i.e., a retroactive outcome interference paradigm), suggesting the possibility that similar associative mechanisms underlie cue and outcome interference.

9:50	Mario A. Laborda, Gonzalo Miguez, & Ralph R. Miller (SUNY – Binghamton) **Spaced extinction training and recovery from extinction** Three fear-conditioning experiments with rats evaluated the conjoint effect of spacing extinction trials (with intertrial intervals spent in the experimental context) and spacing the extinction sessions (with intersession intervals spent in the home cage) in reducing recovery of extinguished conditioned responses in a situation in which spontaneous recovery and renewal summate to encourage recovery. Exp 1 and 2 found that spacing the extinction trials and sessions each reduce recovery from extinction. Exp 3 evaluated whether the combination of spacing extinction trials and spacing extinction sessions attenuated this type of recovery more than either recovery-attenuating treatment alone. This experiment corroborated our previous results; spacing extinction trials and spacing extinction sessions each reduced recovery from extinction. Furthermore, the combination of these techniques was more effective preventing recovery from extinction than either of them by itself.
10:00	Adam M. Goodman, Jeffrey S. Katz (Auburn University), & Anthony A. Wright (University of Texas Medical School at Houston) **Effects of Relative Training Set-Size and Stimulus Reversals on Relational Learning in Pigeons** Abstract-concept learning tasks have provided evidence supporting the presence of relational learning for nonhuman species. A critical manipulation demonstrating control of relational learning in these tasks is the stimulus set-size utilized in training. Reversal discrimination learning has yet to be studied in assessing abstract-concept learning. Four pigeons were trained in a same/different task with a large (1024) training set-size. Once steady-state performance was reached, the contingency was reversed, followed by subsequent reversals. After reversal training, pigeons were tested using sessions containing novel-item trials intermixed with trained-item trials. Then, training with a small (2) set-size commenced and followed by another transfer test. Pigeons fully transfer to novel stimuli with the large training set-size, indicating they continue to solve the same/different task relationally. Under the small training set-size, pigeons do not transfer to novel stimuli, indicating that the domain for relational learning expands and constricts for novel-items, based on the training set-size.
10:10	Tatyana Obozova, Anna Smirnova and Zoya Zorina (Lomonosov Moscow State University) **The Orange-Winged Amazons Comprehending of First- and Second-Order Relations** Two juvenile Orange-winged amazons (*Amazona amazonica*) were trained in a two-alternative simultaneous matching-to sample task with stimulus sets of three different categories: color (black versus yellow), shape (Arabic numbers 1 and 2), and number of elements (arrays of one and two items). The training was continued until the criterion (80% correct choices over 96 consecutive trials) had been reached for each of the three sets. In the experiment 1, the parrots successfully transferred the matching rule to sets of novel stimuli: blue and red colors, different types of shading, numbers and arrays ranging from 3 to 8. In the experiment 2, the birds proved to be able to match items based on the relationship between the sample and comparison stimuli (same size, first-order relation) at above-chance levels. In the experiment 3, both parrots were able to

	perceive the relationship between items in the sample stimulus pair and match this relation to that between items in the comparison stimulus pair (same size, same shape and same color between items, second-order relation). This latter finding demonstrates that young amazons are capable of abstracting relations between relations.
10:20	**10 Minute Break**

Choice Behavior

Session Chair: Jeff Katz

10:30	Andrew Marshall & Kimberly Kirkpatrick (Kansas State University) **Probabilistic Choice in Rats** The goal of the present experiment was to determine the effects of previous-trial outcomes on subsequent choices in a probability-discounting task. Twenty-four rats were trained to choose between an outcome that always delivered food (certain) and an outcome that probabilistically delivered food [uncertain; p(food) = .1, .33, .67, .9]. Food delivery for a certain choice was either one or three pellets (p = .5); for an uncertain choice, three or nine pellets (p = .5). Overall choice of the uncertain outcome was sensitive to the probability of food on that side. Additionally, the probability of staying on the uncertain side following food omission and the probability of switching from the certain to uncertain side were a function of the probability of food on the uncertain side. The results suggest that future analyses should examine the effects of both global and local factors in probabilistic choice behavior.
10:40	Jennifer R. Laude, Jessica P. Stagner, & Thomas R. Zentall (University of Kentucky) **Effect of Inhibition to a Non-Reinforced Stimulus on Sub-Optimal Choice in Pigeons** When pigeons are given a choice between two alternatives, one leading to a stimulus signaling 10-pellets of food 20% of the time or a stimulus signaling no food 80% of the time (an average of 2 pellets), and the other leading to one of two stimuli both signaling 3-pellets of food, pigeons strongly prefer the first alternative. This preference occurs in spite of the fact that, overall, the second alternative provides 50% more reinforcement than the first. We tested for the possibility that the stimulus signaling no food had not developed inhibitory value. Thus, that the apparent choice was between the 10 pellet stimulus and the 3 pellet stimulus.

10:50	Tiffany Galtress & Kimberly Kirkpatrick (Kansas State University) **Individual Differences in Delay Discounting** When choosing between a sooner-smaller and a larger-later reward, two factors impact on choice behavior: the delay to reward and the magnitude of the reward. Delay discounting studies have typically dealt with mean differences in discounting rate without identifying any underlying sensitivity to reward magnitude or delay. This study measured individual discounting rates in rats using a discrete-trial choice procedure. Choice behavior was then correlated with sensitivity to reward magnitude, measured by a reward matching task, and sensitivity to delay, measured by a temporal discrimination task. The results provide a deeper understanding of sources of individual differences in choice behavior, and also may provide new approaches for developing screening techniques for impulse control disorders.
11:00	Jessica P. Stagner, Rebecca Rayburn-Reeves, & Thomas R. Zentall (University of Kentucky) **Does increased effort produce an ownership effect in pigeons?** The Monty Hall problem is a task in which three doors are presented and participants are required to choose one. One of the unchosen doors is then opened to reveal that this choice is incorrect. The participant is then given the option to either stay with their choice or switch to the remaining unchosen door. In this task, it is optimal to switch to the unchosen door. However, Herbranson et al. (2010) found that humans perform poorly on this task because they fail to understand that the probability of their initially being correct (33%) is still the same when one unchosen door has been revealed as incorrect. Herbranson et al. (2010) found that pigeons performed better than humans on this task. It may be that humans tend to take "ownership" of their choices and therefore find it harder to switch from their initial choice, whereas pigeons do not. We asked if we could create an ownership-like effect in pigeons by increasing the number of responses required to make an initial choice. Although we found no evidence of an ownership effect, we did replicate Herbranson's finding. Thus, under the present conditions, pigeons appear to be more sensitive to the probability of reinforcement than humans.
11:10	Jeffrey R. Stevens (University of Nebraska-Lincoln) **Reproducible Research in Comparative Cognition** Replication is a critical aspect of scientific research. Despite its central importance, replication is not as common in comparative cognition as it should be. This likely results from low samples sizes in animal studies, a bias in journals against publishing replications, and a lack of proper communication of methods, data, and analyses. I will discuss how recent cultural shifts in the field and technological advances have reduced previous barriers to replication of both methods and data analysis. These changes can allow comparative cognition to be a more open and rigorous science.
11:20	**Lunch Break**

Space and Quantity

Session Chair: Suzanne MacDonald

1:00	Bradley R. Sturz (Armstrong Atlantic State University) & Kent D. Bodily (Georgia Southern University) **Is Surface-Based Orientation Influenced by a Proportional Relationship of Shape Parameters?** We investigated the extent to which parameters of environmental shape – namely the major and minor principal axes of space which pass through the centroid and approximate length and width of the entire space, respectively, were subject to similar psychophysical principles as those involved in distance discriminations. We developed an orientation task that allowed us to manipulate the ratio of the major to the minor principal axes of an enclosure during training and control for orientation by alternative cues other than principal axes such as wall lengths or corner angles during testing. Participants trained in an environment with a larger hypothetical discriminability ratio allocated more responses to locations specified by the principal axes of space across novel enclosure types compared to a group trained with a smaller hypothetical discriminability ratio. Results suggest that psychophysical principles may operate on the discrimination of environmental shape parameters and delineate a potential mechanism for experiential and developmental changes in orientation ability.
1:10	Tomokazu Ushitani & Masako Jitsumori (Chiba University) **Integration of Spatial Cofinguration of Multiple Landmarks by Pigeons** We investigated whether pigeons would integrate two different sets of spatial configuration consisting of geometric figures (landmarks) in a touch-screen-based goal-searching task. We trained four pigeons to peck at one of 11 goal locations, with a goal in each trial defined by Landmarks A and B or B and C. The pigeons successfully learned to peck at the goals defined by the landmarks, and they were then tested on probe trials in which the Landmarks A and C appeared instead of A and B or B and C. All the pigeons chose the correct goals highly accurately. This finding suggests that they could integrate the separately learned A-B and B-C configurations through B.
1:20	Eric Legge (University of Alberta), E.A. Ludvig (Princeton University) & Marcia Spetch (University of Alberta) **Integration of proximal and distal cues in pigeons in an open-field** Previous literature has shown that pigeons can redundantly encode both proximal (local) and distal (global) cues for later retrieval of hidden goals. However, it is unclear exactly how pigeons deal with situations in which such cues provide conflicting information. Our present experiment is an attempt to answer this question by training pigeons to locate a hidden goal relative to two unique landmarks (small proximal and large distal) in the open-field. After initial training but prior to testing, each landmark was presented to pigeons to determine an individual's reliance on each cue for pinpointing the location of the hidden goal. In testing, pigeons were presented with tests in which the distance and direction of each cue was manipulated to provide various conflict situations. How pigeons integrated (or did not integrate) the information in each type of conflict test will be discussed.

1:30	Bonnie M. Perdue (Georgia State University & Zoo Atlanta), Kate Talbot (Georgia State University), Adam Stone (Zoo Atlanta), & Michael J. Beran (Georgia State University) **Putting the Elephant Back in the Herd: Elephant Relative Quantity Judgments Match Those of Other Species** When an animal is given a choice between two sets of food, accurate performance (i.e., choosing the larger amount) typically decreases as the ratio between two quantities increases (ratio effect) or the absolute difference between the items decreases (distance effect). A recent study (Irie-Sugimoto et al., 2009) reported that elephants did not exhibit ratio or distance effects, suggesting that elephants may process quantitative information in a qualitatively different way from all other nonhuman species that have been tested. However, the results of this study were confounded by several methodological issues. We tested African elephants (*Loxodonta Africana*) housed at Zoo Atlanta to more thoroughly investigate relative quantity judgment in this species. In contrast to the previous study, we found evidence of both ratio and distance effects for visible and nonvisible sequentially presented sets of food. Thus, elephants appear to represent quantities in much the same way as other species, including humans when they are prevented from counting.
1:40	Eran Shifferman (Konrad Lorenz Institute for Evolution & Cognition Research) **Cognitive Aspects of Sperm Competition** Parker's sperm competition (SC) model mathematically describes male investment in sperm production in relation to varying levels of competition. My critique of this model highlights the previously overlooked role of the cognitive aptitude of quantity estimation (QE). I argue that Parker's models tacitly assume the ability of males to estimate accurately the number of competitors present. To substantiate my critique, I first offer a novel analysis of QE and its evolutionary trajectory. I then show that Parker's assumptions about the abilities of males to estimate their competition size are non-trivial. I demonstrate how 1) SC is a behavior of paramount biological importance, which utilizes QE aptitudes, and 2) QE theory improves SC models by embedding them in the discourse of animal cognition and behavioral ecology. This new framework will improve future experimental design in both fields.
1:50	10 Minute Break

Categories, Concepts & Ordinal Knowledge

Session Chair: Olga Lazareva

2:00 Joseph Boomer, J. David Smith, Barbara A. Church (University at Buffalo, SUNY), Michael J. Beran (Georgia State University), Matthew J. Crossley, & F. Greg Ashby (University of California, Santa Barbara)

Category Learning Strategies in Capuchin Monkeys (*Cebus apella*)

Recent evidence supports that macaques can learn categories by using dimensional rules. This strongly suggests that category learning in these primates is not always mediated by stimulus-response associations to specific stimuli but could be mediated by the use of decision strategies that closely resemble human strategies. We explored the possibility that a new world primate species could show a similar behavioral preference for categorizing multidimensional stimuli. We tested four capuchin monkeys (Cebus apella) in rule-based (RB) and information-integration (II) categorization tasks. These monkeys learned the RB task faster and better than the II task, a fact that may be due to the monkeys' use of robust decision rules. The results point to an interesting continuity between the cognitive architectures of multiple primate species.

2:10 Fabian A. Soto & Edward A. Wasserman (University of Iowa)

Spatial Frequency Use in Categorizing Human Faces: Comparing People and Pigeons

We trained two groups of people and two groups of pigeons to categorize 16 photographs of human faces that resulted from all possible combinations of four identities and four emotional expressions. One group from each species received training to categorize the photographs according to their identity and the other group according to their emotional expression. We tested subjects using a modification of the "bubbles" procedure, which revealed the spatial frequency information that was used by people and pigeons to recognize identity and emotional expression. People relied on lower spatial frequencies than pigeons. People also showed a greater tendency to use different spatial frequencies in the two categorization tasks than pigeons. Finally, humans' behavior more closely matched the optimal use of spatial frequencies than pigeons, according to an ideal observer analysis.

2:20 Edward A. Wasserman, Leyre Castro, & John H. Freeman (University of Iowa)

Same-Different Concept Learning in the Rat

Deciding whether two or more stimuli are the same as or different from one another is a basic feat of human cognition, requiring attention to the relations between or among the stimuli beyond the particulars of the stimuli. Mounting evidence indicates that this feat is not uniquely human; birds and nonhuman primates too learn such discriminations and reliably transfer them to novel stimuli. Missing from the animals thus far reported to have acquired same-different concepts is the rat. Using a spatial discrimination task, we report that rats can effectively discriminate arrays of visual stimuli containing all same from all different items and later transfer this discrimination to arrays of novel items. This finding may speed progress toward elucidating the neural mechanisms of same-different conceptualization, given the popularity of the rat as a model animal in neuroscience.

2:30	Thomas A. Daniel, Jeffrey S. Katz (Auburn University), & Anthony A. Wright (University of Texas Health Science Center at Houston) **Oddity-from-Sample Abstract-Concept Learning by Pigeons** Pigeons were trained on oddity-from-sample through a set-size expansion method previously used in matching-to-sample (Bodily, Katz, & Wright, 2008) and same/different (Katz & Wright, 2006). Pigeons were trained with 3 cartoon stimuli items. The pigeons were required to respond to the sample stimulus (FR 10) and then select which of the two comparison stimuli was different from the sample. Once the pigeons demonstrated consistent performance with this task (85% accuracy), novel stimuli were presented systematically in a series of 4 trial unique transfer sessions to test for abstract-concept learning. During these transfer sessions, 12 of the 96 trials presented the trial unique pairings. The set size was then systematically doubled (8 times), increasing from the initial 3-item set size to 768 items. Consistent with similar studies, transfer performance increased as the number of training items increased. A comparison of transfer as a function of set size will highlight the similarities and differences between matching and oddity tasks.
2:40	Marisa Hoeschele (University of Alberta), Robert G. Cook (Tufts University), Lauren M. Guillette, Allison H. Hahn & Christopher B. Sturdy (University of Alberta) **Abstract concept learning in black-capped chickadees** Concept learning and abstraction abilities were once thought to be unique to humans, but have since been demonstrated in many other species. Discriminating "same" from "different" relations (SD) is one abstract concept that has been studied frequently. Here we used an auditory SD paradigm to test whether black-capped chickadees could discriminate sets of 12-note sequences as consisting of same or different sounds. We found that the chickadees were highly successful at solving this task. The chickadees were also able to transfer their SD discrimination ability to both novel combinations of familiar notes used during initial acquisition and to novel notes. However, chickadees could not transfer their SD discrimination ability to a range of pitches that was not used in training, a common finding in songbirds usually attributed to their finely tuned absolute pitch abilities.
2:50	Damian Scarf & Michael Colombo (University of Otago, New Zealand) **Knowledge of the Ordinal Position of List Items in Pigeons** Ordinal knowledge is a fundamental aspect of advanced cognition. It is self-evident that humans represent ordinal knowledge, and over the past 20 years it has become clear that nonhuman primates share this ability. In contrast, evidence that pigeons represent ordinal knowledge is missing from the comparative literature. To address this issue, in the present experiment we trained pigeons on three 4-item lists and then tested them with derived lists in which, relative to the training lists, the ordinal position of the items was either maintained or changed. Similar to the findings with human and nonhuman primates, our pigeons performed markedly better on the maintained lists compared to the changed lists, and displayed errors consistent with the view that they used their knowledge of ordinal position to guide responding on the derived lists. These findings demonstrate that the ability to acquire ordinal knowledge is not unique to the primate lineage.

3:00	**10 Minute Break**

Attention, Perception and Recognition

Session Chair: Debbie Kelly

3:10	Kelsea Ryan, W. David Stahlman, Daniel T. Blumstein, Dennis Garlick, & Aaron P. Blaisdell (UCLA) **Modulation of attention by stimulus concordance in the terrestrial hermit crab (Coenobita clypeatus)** Hermit crabs have been shown to react more slowly to a looming visual threat in the presence of an auditory stimulus than in a silent condition (Chan et al., 2010). In a laboratory experiment, we measured crabs' latencies to hide to a visual predator across three conditions: white noise from a speaker located next to the visual threat (Concordant Condition), white noise from a speaker located far from the visual predator (Discordant Condition), and a Silent Condition. If prior results were due to attention being drawn to the noise, then the crabs should react more slowly in the Discordant Condition than in the Concordant Condition. We found that crabs reacted significantly faster to the visual threat in the Concordant than in the other two conditions. Moreover, crabs were more likely to freeze prior to hiding in the Silent and Concordant Conditions than in the Discordant Condition.
3:20	Muhammad A. Qadri & Robert G. Cook (Tufts University) **The Effects of Continuously Changing Lighting and Perspective on Shape from Shading in Pigeons** Five pigeons were trained to peck differentially at different concave or convex surface shapes presented in a computerized touchscreen chamber. During this training, the surfaces had been rendered from four fixed light sources and four fixed angular perspectives. These birds were then tested with videos in which either the lighting or perspective continuously changed during a presentation as the light source or camera circled the surface. Discrimination was not affected by the motion of the light source, but perspective changes impacted performance for rotationally asymmetric structures. These results are consistent with the hypothesis that differential shading provides important cues for shape perception in birds.
3:30	Lauren M. Guillette, Marisa Hoeschele, Allison H. Hahn, & Christopher B. Sturdy (University of Alberta) **A Comparative Account of Stimulus Control in Acoustic Species-Based Discriminations** Previously we reported that the D note of the 'chick-a-dee' call, common to black-capped and mountain chickadees, had significant stimulus control over species-based discriminations, compared to other note-types in this call (i.e., A, B, and C notes; Guillette et al. 2010). Each species' D notes are acoustically distinct (i.e., noisier and longer) compared to the other note-types (i.e., more tonal and shorter). This begs the question: What is driving the birds' discrimination ability? Here we set out to determine whether discrimination performance was controlled by the D notes because of stimulus-specific properties (i.e., acoustic complexity) or because of species-specific cues

	contained in the notes. We did this by testing very distantly-related songbird species, zebra and Bengalese finches, that are also unfamiliar with black-capped and mountain chickadee vocalizations, on the same species-based discrimination that black-capped and mountain chickadees were previously trained on.
3:40	Christopher B. Sturdy, Marc T. Avey, Marisa Hoeschele, Michele K. Moscicki (University of Alberta), & Laurie L. Bloomfield (Algoma University) **Allometry of Neural Response to Threat in Chickadees is Learned** Songbird auditory regions are most activated to playback of conspecific vocalizations. We investigated whether neural response to conspecific and heterospecific vocalizations, assessed using immediate early gene (IEG) expression, varies with the information content encoded in the vocalization. We compared IEG expression in response to mobbing calls that signaled predators to IEG expression in response to predator vocalizations. We found that higher threat signals (mobbing calls or predator vocalizations) produced more IEG expression than lower threat signals. Hand-reared chickadees, not exposed to predators, had similar levels of IEG expression in response to mobbing calls as those seen in wild-caught birds, but not for predator vocalizations, suggesting a learned component to threat perception.
3:50	Tetsuya Matsui, Yukio P. Gunji, Takayuki Niizato & Yuta Nishiyama(University of Kobe) **Soldier crabs (*Mictyris guinotae*) don`t distinguish between "individual" and "swarm"** Animals that form swarms recognize other members. But when they recognize a far-off member they are seemed to regard some individuals as one unit. *Mictyris guinotae* (soldier crab) form and keep large swarms and have tendency to be attracted by other crab. We experimented that whether *Mictyris guinotae* can distinguish "large individual" and "swarm" .Firstly we experimented about whether crabs distinguish between densely distributed crabs and sparsely distributed crabs. Secondly we experimented whether crabs distinguish between a swarm and the same size individual (mirror images). As a result crabs are attracted by more densely distributed swarms and mirror images. These results suggest crabs have tendency to be attracted to larger and densely distributed images regardless of that they are swarms or individuals.
4:00	**10 Minute Break**

Keynote Address
Sheri Mizumori (Washington University)
Introduced by Michael Brown

4:10 -5:10	**Neural Systems Analysis of Decision Making During Goal-Directed Navigation** The ability to make adaptive decisions during goal-directed navigation is a fundamental and highly evolved function that requires the continual coordination of perceptions, learning and decision-making, and the planning of behaviors. A neurobiological model will be presented that begins to account for such a complex process, one that integrates literatures on spatial context analysis by the hippocampal system during experience-dependent navigation, how hippocampal information comes to impact midbrain and striatal decision making systems, and the role of the striatum in the implementation of behaviors based on recent decisions. Thus, studying decision making during goal-directed navigation may reveal fundamental organizing principles within and across neural systems, as well as between neural systems functions and behavior, of most vertebrate species.

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.

Membership in the society supports the following activities:

- 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.
- CCS has been a leader in electronic publishing and in an effort to provide the products of our science to scientists, students, and the general public at no cost and in a format that allows dynamic illustrations of animal behavior and analyses of that behavior. The current portfolio of electronic publications supported by members of the society includes:
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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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