

Comparative Cognition and Learning

Fall Conference Sponsored by the Comparative Cognition Society



November 13, 2008
Chicago Hilton Hotel
(Meeting Room: Boulevard A)

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Comparative Cognition and Learning:

Fall Meeting Sponsored by the Comparative Cognition Society

All Sessions Held in the Boulevard A Meeting Room

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|----------------|---|
| 8:30 | Spatial Learning and Memory |
| 9:10 | Discrimination Learning |
| 10:00 | Associative Learning |
| 10:40 | Object Recognition |
| 11:30 | Response to Uncertainty |
| 12:00 | Lunch Break |
| 1:30 | Representational and Metacognitive Processes |
| 2:20 | Patterns, Categories, & Hierarchies |
| 3:10 | Social Learning and Numerical Competence |
| 4:00 – 5:00 | Keynote Presentation – Daniel Povinelli |

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Spatial Learning and Memory

Chair: Michael Brown

- 8:30 **Michael E. Young, M.H. Clark, Andrea M. Goffus, and Michael R. Hoane (Southern Illinois University at Carbondale)**
Nonlinear Mixed Effects Modeling of Morris Water Maze Learning
Morris water maze data is most commonly analyzed using traditional repeated measures analysis of variance. This approach, however, may lack power, relies heavily on post hoc tests of daily performance which can complicate interpretation, and does not target the nonlinear trends evidenced in learning data. The present project used Monte Carlo simulation to compare the relative strengths of the traditional approach with both linear and nonlinear mixed effects modeling. Both mixed effects modeling approaches showed much greater sensitivity to identifying real effects, and the nonlinear approach provided uniformly better fits of learning trends. The common practice of removing a rat from the maze after 90 s, however, proved more problematic for the nonlinear approach because it produces an underestimate of y-axis intercepts; the practice inflates the Type I error rate for nonlinear mixed effects models. Implications for the analysis of all forms of learning data will be discussed.
- 8:40 **Emily R. Batty, Laurie L. Bloomfield, Marcia L. Spetch & Christopher B. Sturdy (University of Alberta)**
Black-capped and Mountain Chickadees' Use of Geometric and Featural Information in a Spatial Orientation Task
Lab-reared and wild-caught black-capped chickadees and wild-caught mountain chickadees searched for food hidden in one corner in a rectangular environment. Previous research has shown that mountain chickadees do not spontaneously encode geometric information when a salient feature is present near the goal location. Using a slightly different training and testing procedure, we found that both lab-reared and wild-caught black-capped chickadees encoded geometric information, even in the presence of a salient landmark. Some but not all of the mountain chickadees also encoded geometric information. Overall, our results suggest that use of geometric information may be a less preferred strategy for mountain chickadees than black-capped chickadees.
- 8:50 **Alexandra Twyman, Nora S. Newcombe & Wendy L. Shallcross (Temple University)**
Spinning in Circles: Feature Based Reorientation
Many mobile creatures occasionally lose track of their position in the world. Some species, such as rats, seem to reorient more readily with geometric information while for other species, such as pigeons or chicks, feature information is flexibly integrated with geometric information. However, it is unclear if feature information is used as a reorientation cue. Alternatively, the creature may partially reorient using the geometry of the space and then, while still partially disoriented, use feature information as a beacon to the target (Lee, Shusterman & Spelke, 2006). In our experiment, 4 year old children were asked to search for a toy hidden. In the absence of unique geometric information and with a large, stable feature, children were able to focus search at the correct hiding location. This data supports the idea that feature information can be used for reorientation, in contrast to a recent two-step modular reorientation model.
- 9:00 **Suzanne E. MacDonald (York University)**
Spatial memory and social foraging in common marmosets (Callithrix jacchus jacchus)
Most primates live in social groups, and forage in those groups. However, we do not yet clearly understand how the presence of a foraging partner affects an individual's foraging behavior. In the first study, I will present data on how the presence of a foraging partner affects spatial memory and retrieval patterns in marmoset monkeys in a naturalistic foraging task. In the second study, I will examine the effect of a 'virtual' foraging partner on foraging efficiency and retrieval accuracy of hidden food items.

Discrimination Learning

Chair: Ed Wasserman

- 9:10 **Schmidtke, K. A., Katz, J. S. (Auburn University) & Wright A. A. (University of Texas Medical School at Houston)**
Differential Outcomes Facilitate Relational Strategy use in a Same/Different Task
Differential outcomes have been thought to enhance learning through unique stimulus-reward associations. Here the differential outcomes procedure is shown to affect relational learning. In our same/different task, pigeons are presented with two pictures and a square. If the pictures are the same, then pecking the picture is rewarded; but if they are different, then pecking the square is rewarded. Pigeons were trained with either same or the different outcome(s). Both groups repeatedly acquired the task with increasingly larger sets of pictures (8, 16, 32, 64, 128, 256, 512, 1024) and after each acquisition were tested with novel pictures. Correct responding to novel pictures suggests that the relational associations control performance. After acquiring the task with 32 pictures, the different outcomes group had responded more accurately to novel pictures than the same outcomes group. These results show for the first time that training with different outcomes can facilitate control by relational associations.
- 9:20 **Leyre Castro, Philip L. Kennedy, & Edward A. Wasserman (The University of Iowa)**
Conditional Same-different Discrimination in Pigeons: Effects of Number of Items and Stimulus Mixtures
Pigeons learned to discriminate between simultaneously presented arrays of 16 identical (same) or 16 nonidentical (different) items, conditional on the color of the background: red or blue. Learning was extremely fast; moreover, pigeons exhibited strong transfer to novel testing arrays. We then tested the birds with arrays comprising more and fewer items. Accuracy was high for 24-, 20-, 12-, and 8-item arrays; accuracy decreased for 4- and 2-item arrays, but it was still significantly above chance. Finally, we tested the birds with mixture arrays comprising some identical and some nonidentical items. Accuracy increased as the disparity in entropy between the arrays increased. The pattern of data is consistent with a logarithmic rather than a linear relationship between entropy and discrimination performance.
- 9:30 **Daniel I. Brooks & Edward A. Wasserman (University of Iowa)**
Mechanisms of Same/Different Discriminations by Pigeons
We have recently reported successful trial-unique same/different discrimination learning by pigeons (Brooks & Wasserman, 2008). In that discrimination, we took special steps to ensure that low-level visual characteristics of the stimuli could not have mediated performance. Nevertheless, the mechanisms by which pigeons discriminated these displays remain an open question. We conducted three new tests to better elucidate those mechanisms: a test in which the number of items was varied, to investigate the effects of manipulating display entropy; a test in which the size of the items was changed, to explore the contribution of object-scale and surface area; and, a test in which a single textured stimulus was presented, to investigate the contribution of global perceptual mechanisms. These tests further implicate the comparison of objects and display variability as mechanisms that are vitally involved in same-different discrimination by pigeons.
- 9:40 **Marco Vasconcelos & Peter J. Urcuioli (Purdue University)**
Proprioceptive Sample Stimuli and Associative Symmetry in Pigeons
Two experiments evaluated emergent symmetry in a matching-to-sample task with proprioceptive / location sample stimuli. In Experiment 1, pigeons had to peck either to the left or right key to produce red and green comparisons. On probe trials in which the same comparison was presented on both side keys, pigeons pecked significantly more to the side which originated that correct comparison choice in the matching task. A subsequent manipulation in which pigeons learned contingencies either consistent or inconsistent with the alleged symmetrical relations again returned evidence consistent with symmetry. In Experiment 2, different patterns of sample responding were required to produce the comparisons. Although this requirement increased the distinctiveness of sample responding, no symmetry was observed. These results confirm the emergence of symmetry when “pecking on the right” vs. “pecking on the left” are used as samples, but cast doubts about the role of differential proprioceptive stimulation in this effect.

10 Minute Break

Associative Learning

Chair: Jon Crystal

10:00
(20 Minutes)

Igor Dolgov, Federico Sanabria, Peter Killeen (Arizona State University)
Persistence-Pavlov-Skinner Model of Conditioning and Extinction Dynamics

We modeled behavior in a probabilistic reinforcement paradigm in which pigeons exhibited erratic bouts of responding on the CS. Responding depended on: (a) Keypecks on prior trial (Persistence/behavioral momentum); (b) food delivery on prior trial (Pavlovian contingency) and, (c) co-occurrence of food and pecking on prior trial (Skinnerian contingency). In 3 experiments, a linear-learning model accounted for much more data than a default moving average, according to their AICs. In Exp. 1 we varied ITI; rarer reinforcement enhanced persistence and Pavlovian association. Variation of trial duration in Exp. 2 had modest effects on model parameters. In the final experiment, probabilistic delivery was accelerated by pecking in one condition, or delayed by pecking in another. The model parameter associated with Skinnerian conditioning was responsive to both contingencies. Our experiments provide a framework for trial-by-trial accounts of conditioning and extinction that greatly increase the information available from data.

10:20

James E. Witnauer, Heather T. Sissons, & Ralph R. Miller (SUNY-Binghamton)
Spontaneous Recovery of Excitation and Inhibition

In two conditioned fear experiments with rats as subjects, we examined two classes of accounts of spontaneous recovery. One view suggests that spontaneous recovery is attributable to greater temporal instability of inhibitory associations than excitatory associations, whereas the other posits that spontaneous recovery occurs due to greater temporal instability of second-learned associations than first-learned associations. The accounts diverge in predictions concerning spontaneous recovery when the first-learned association is inhibitory and the second-learned association is excitatory. Using different designs, Experiments 1 and 2 found spontaneous recovery of both excitation and inhibition. The results support the view that spontaneous recovery occurs due to faster waning of second-learned associations and are inconsistent with the view that spontaneous recovery is driven by greater instability of inhibitory associations. Problems with prior reports to the contrary will be discussed.

10:30

Neil McMillan & William A. Roberts (University of Western Ontario)
Blocking Effects on Interval Timing in Pigeons

The effects of cue competition on timing were studied in both overshadowing and blocking operant procedures. A white center key delivered reward when pecked 30 s after a red side key was presented, and 10 s after presentation of the green side key on the other side. For overshadow-condition pigeons, key presentations were concurrent during training trials, while for control birds, side key presentations were separated across trials. In the experiment to be presented, a new set of pigeons experienced the same procedure as in the original experiment, except some were given preexposure trials to either the red or green sidekey conditions to emulate a blocking method. Peak time curves are compared between blocking and control conditions to determine if preexposure to either cue (long or short fixed interval) interfered with timing based on the other cue.

Object Recognition

Chair: Olga Lazareva

10:40

Carole Parron, Joël Fagot (Mediterranean Institute of Cognitive Neurosciences), & David Washburn (Language Research Center)

Contrasting the Edge- and the Surface-based Theories of Object Recognition: Behavioural Evidence in Macaques
In order to assess whether monkeys rely more on the edges or on the surface information of an object to store its representation, macaques were trained to discriminate simple volumetric objects (geons) and tested for their ability to recognize line drawings, silhouettes and light changes of these geons. Macaques performed above chance for all testing stimuli, and showed equal transfer to line drawings and silhouettes, suggesting the use of the outline shape. They also showed a better transfer for the geons with a light changes, highlighting the importance of the shading information. Moreover, the recognition performance for geons filled with new textures showed that a radical change in the surface cues does not prevent object recognition. Our findings rather support a prevalence of a surface-based theory of object recognition in macaques but do not exclude the importance of the edges, especially when surface details are not available.

- 10:50 **Kent D. Bodily (Georgia Southern University), Bradley R. Sturz (Armstrong Atlantic State University), Jeffrey S. Katz (Auburn University), Debbie M. Kelly (University of Saskatchewan)**
Evidence against Integration of Spatial Maps in Humans: Similarity across Real and Virtual Environments
In an open-field search task, human participants searched for a goal hidden in one of 16 bins. In Phase 1, the goal was hidden between two landmarks (blue T and red L). In Phase 2, the goal was hidden to the left and in front of a single landmark (blue T). Following training, goal-absent trials were conducted in which the red L from Phase 1 was presented alone. Bin choices during goal-absent trials assessed participants' strategies. Results were consistent with Sturz, Bodily, and Katz (2006). Specifically, participants used a generalization strategy followed by a shift in search behavior away from the test landmark, and these results were confirmed by a control condition in which a novel landmark was presented during testing.
- 11:00 **Fabian A. Soto & Edward A. Wasserman (University of Iowa)**
Stimulus Generalization in Two Axes of Rotation of a Three-dimensional Object by Pigeons
We present a new quantitative framework for interpreting the results of multidimensional stimulus generalization experiments in animals using concepts from the geometrical approach to human cognition. The resulting general model includes several combination rules proposed in the animal learning literature as special cases. We apply this framework to the analysis of two stimulus generalization experiments in pigeons involving several views of a three-dimensional object rotated in depth across two of its internal axes. We used two tasks to gather generalization data in two experiments: a go/no-go task in Experiment 1 and a choice task in Experiment 2. For both experiments, pigeons' generalization behavior could best be described using a model that incorporates a Euclidean metric in computing the distance between stimuli, which has been associated with the integrality of stimulus dimensions in human generalization behavior.
- 11:10 **Marcia L. Spetch, Alinda Friedman (University of Alberta) & Quoc Vuong (Newcastle University)**
The Role of Motion in Object Perception
Previous research has suggested that both humans and birds can recognize object structure from motion cues, but it remains unclear whether motion facilitates recognition of novel views. We trained pigeons and humans to discriminate between two objects that rotated in depth, either coherently or non-coherently, across a range of views. We then tested their recognition across novel views. Across conditions and experiments, we varied whether the objects were decomposable shapes or non-decomposable blobs, and whether test trials presented the objects dynamically as in training or as static images. Pigeons showed effects of object type and test view but no effects of motion coherence. Humans showed effects of object type and test view, but importantly, they also showed effects of type of motion: With non-decomposable objects, humans' recognition speed and accuracy was enhanced with coherent motion relative to non-coherent motion, especially for views between and following the training views.
- 11:20 **Robert G. Cook, Nicholas Commons-Miller & Art Kieres (Tufts University)**
Shape from Shading in Pigeons
Five pigeons were trained with shaded surfaces that were either concave or convex in appearance. Using a go/no-go discrimination, the pigeons rapidly learned a discrimination between a rounded "mound" and a corresponding "valley" presented at different viewing angles. Subsequent tests showed good transfer to new lighting sources moved in space and new viewing angles of the surface relative to the camera. Finally, the birds showed good transfer to new shapes using different configurations of shading to indicate their apparent depth from those used in training. The results indicate that surface shading is a powerful cue both to shape and depth for pigeons in their perception of the world.

Response to Uncertainty

Chair: Bob Cook

11:30

Jeffrey R. Stevens (Max Planck Institute for Human Development), Sarah R. Heilbronner, Alexandra G. Rosati, Brian Hare (Duke University), & Marc D. Hauser (Harvard University)

The Ecological Rationality of Risk Sensitivity in Chimpanzees and Bonobos

The ecological rationality hypothesis (ERH) predicts that decision mechanisms should reflect the typical environment in which decisions are made. Previous work supported the ecological rationality of intertemporal choice in common chimpanzees (*Pan troglodytes*) and bonobos (*Pan paniscus*). Here, we tested this hypothesis for risky choices in these apes. Given differences in the risky nature of food acquisition in chimpanzees and bonobos, we predicted species differences in risk preferences. Specifically, the inherent risks involved with hunting predict that chimpanzees should prefer risk more than bonobos. We offered subjects repeated choices between a fixed food reward and a variable food reward with equal expected value. We found that chimpanzees are reliably risk seeking—an unusual characteristic of nonhumans—and are more risk seeking than bonobos. Together, these data support the ecological rationality hypothesis because the decisions reflect species differences seen in natural populations of chimpanzees and bonobos.

11:40

Jessica Stagner, Casandra Gipson (University of Kentucky), Jérôme Alessandri (Université de Lille 3), Holly Miller and Tom Zentall (University of Kentucky)

Preference for 50% Reinforcement Over 75% Reinforcement by Pigeons

When pigeons are given a choice between one alternative that results in either a stimulus associated with 100% reinforcement or one associated with 0% reinforcement (overall 50% reinforcement) and another alternative that always results in a stimulus associated with 100% reinforcement they show a modest preference for the alternative associated with 100% reinforcement. We decreased the reinforcement density for the second alternative to 75% and found a significant preference for the 50% reinforcement alternative. We propose that this “maladaptive” behavior results from positive contrast between the expectation of reinforcement associated with the 50% reinforcement alternative and the stimulus associated with 100% reinforcement that often follows, but complementary negative contrast does not develop between the expectation of reinforcement associated with the 50% reinforcement alternative and the stimulus associated with 0% reinforcement that often follows.

11:50

Justin J. Couchman, Mariana V. C. Coutinho (University at Buffalo), Michael J. Beran (Georgia State University), & J. David Smith (University at Buffalo)

Task-General Uncertainty Responses by Humans and Rhesus Monkeys Absent Associative/Reinforcement Cues

As researchers explore metacognition comparatively, some paradigms allow the competing explanation that animals avoid difficult trials based on reinforcement histories and stimulus aversion—not based on monitored uncertainty. To explore this possibility, we placed humans and three monkeys in several successive uncertainty-monitoring tasks. The tasks were qualitatively different, ensuring that associative cues would not transfer across tasks. In addition, task transfer occurred under conditions of deferred/rearranged feedback—both species completed blocks of trials followed by summary feedback. This ensured that animals received no trial-by-trial reinforcement. Despite distancing performance from associative and reinforcement cues in this way, humans and monkeys maintained their ability to make adaptive uncertainty responses by declining the most difficult trials. The dissociation of performance from reinforcement has theoretical implications concerning the status of reinforcement as the critical binding force in animal learning. The deferred-feedback technique has many applications within comparative psychology, including within the field of comparative metacognition.

Lunch Break

12:00 – 1:30

Representational and Metacognitive Processes

Chair: Suzanne MacDonald

- 1:30 **Kate Tappenden (Victoria University, Wellington)**
Mental Representation in the Domestic Dog
Some studies into canine cognition attribute certain mental states to the domestic dog. While some of these suggest that dogs are using mental representations to complete the tasks required, none are clear on what these representations might be. This study examines whether domestic dogs have the capacity for mental representation or concept possession. On the basis that dogs can and do manipulate concepts, this study provides a model for the nature of the types of concepts dogs are able to possess.
- 1:40 **Miranda C. Feeney, William A. Roberts, & David F. Sherry (University of Western Ontario)**
Do Black-capped Chickadees Have Episodic-like Memory?
Clayton and Dickinson (1998) have reported evidence for episodic-like memory in scrub jays. We conducted similar tests for episodic-like memory in another food-storing bird, the black-capped chickadee (*Poecile atricapillus*). During Phase 1 of Experiment 1, chickadees found concealed sunflower seeds and mealworms in selected sites of a testing board in their home cage. Birds were later allowed to re-visit these sites after either a short (3 h) or a long (123 h) retention interval. After the long retention interval preferred mealworms were degraded. Chickadees showed some evidence of memory for what kind of food they had encountered and where, but showed no memory for when food had previously been found. Experiment 2 employed the same testing methods, except that chickadees now searched for hidden seeds and mealworms in artificial trees in an indoor aviary. These more natural conditions increased both the spatial scale of the task and the effort required to find food. There was some indication that birds remembered when foods had been previously encountered in the aviary, but spatial accuracy was reduced compared to Experiment 1.
- 1:50 **Kate M. Chapman & Daniel J. Weiss (The Pennsylvania State University)**
*Learning the Ropes: Motor Planning in Cotton-top Tamarins (*Saguinus oedipus*)*
Recent research with cotton-top tamarins has demonstrated they are capable of more sophisticated motor planning abilities than previously ascribed (Weiss, Wark, & Rosenbaum, 2007). We further investigated these abilities using a rope-pulling task, in which tamarins pulled on a rope to reel in a food reward. The initial distance of the reward from the subject varied across conditions (short, intermediate, and long). We measured the grasp type, body posture, distance between pulls, and distance the rope traveled to explore whether the tamarins planned differently for longer and shorter sequences of pulling. Our findings suggest that motor behaviors do differ as a function of distance from the goal. We discuss these results in light of cognitive theories of motor planning.
- 2:00 **Olga F. Lazareva (Drake University) & Edward A. Wasserman (University of Iowa)**
Nonverbal Transitive Inference in Adults: Effects of Task and Awareness on Performance
We studied nonverbal transitive inference in two different paradigms: with choice stimuli orderable along a physical dimension and with non-orderable choice stimuli. We taught 96 participants to discriminate four overlapping pairs of choice stimuli: A+ B-, B+ C-, C+ D-, and D+ E-. Half of the participants were provided with post-choice visual feedback stimuli orderable by size; the other half were not provided with orderable feedback stimuli. In later testing, we presented novel choice pairs: BD, AC, AD, AE, BE, and CE. We measured task awareness with a questionnaire developed by Greene et al. (2001). Contrary to earlier results, transitive responding depended on task awareness for all participants. Additionally, participants given ordered feedback showed clearer task awareness and stronger transitive responding than participants not given ordered feedback. These and other results suggest that ordered and non-ordered transitive inference tasks support decidedly different patterns of performance.
- 2:10 **Jerome Cohen, Caitlin Siu, Jouseph Barkho, Parvati Dadwal, Natasha Rafo (University of Windsor)**
The Role of a Central Executive Function in Rats' New Object Recognition Working Memory Task
Previous research from our laboratory on a reinforced new object recognition task reveals that increasing the number of study objects improves rats' performance for finding new objects during test segments. The present study asks whether this effect results from rats' improving their encoding/maintenance processes or their search strategies, either of which could be attributed to a central executive function (Baddeley, 2006). We report the findings of two experiments. In the first experiment we varied the number of study segment objects, six, nine, and twelve, while keeping the number of test segment objects containing one new 'jackpot' object at six. In the second experiment we kept the number of study segment objects at twelve but varied the number of test segment objects between three, six, and twelve, each set containing one jackpot object. Our data suggest that increasing study segment set size enhances rats' encoding/maintenance processes (Experiment 1) while increasing test-segment set size (Experiment 2) promotes an information retrieval strategy.

Patterns, Categories, & Hierarchies

Chair: Jeff Katz

2:20

Bradley R. Sturz (Armstrong Atlantic State University), Michael F. Brown (Villanova University), & Debbie M. Kelly (University of Saskatchewan)

Facilitation of Spatial Pattern Learning with Visual Cues in Real and Virtual Environments

Participants searched in a real-environment or interactive three-dimensional virtual-environment open-field search task for four hidden goal locations arranged in a 2 x 2 square configuration in a 5 x 5 grid of raised bins. Participants were randomly assigned to one of two groups: Pattern Only or Cues + Pattern. Participants experienced a Training phase followed by a Testing phase. Visual cues specified the goal locations during Training only for the Cues + Pattern group. Both groups were then tested in the absence of visual cues. Results in both environments indicated that choices were controlled by the spatial configuration of goal locations. However, visual cues during Training facilitated learning of the spatial configuration of the goal locations: in both environments, participants trained with the visual cues made fewer errors during Testing than those trained with the pattern only. Results suggest that spatial pattern learning may not be susceptible to cue-competition effects.

2:30

Laura R.G. Pickens & Stephen B. Fountain (Kent State University)

Effects of Adolescent Nicotine Exposure on Adult Serial Pattern Learning in Rats

Large daily doses of nicotine over 35 days in adolescence cause impairments in adult rat serial pattern learning (Fountain et al., 2008). We examined whether a chronic dose of 6 mg/kg/day via osmotic pump over postnatal days (P) 30-48 would produce similar results. In adulthood (beginning P95), we required nicotine-exposed and control rats to learn a serial pattern of nose-poke responses for water reinforcement in an 8-lever circular array of nose poke receptacles. The pattern was a repeating 8-chunk, 24-element response sequence with a violation element. We will report the rates and types of errors made by rats in each group to conclude whether nicotine exposure in adolescence via this method affects adult rat serial pattern learning and to provide additional evidence regarding the extent to which adolescent nicotine exposure is a threat to adult cognitive capacity.

2:40

Joseph Boomer (University at Buffalo, The State University of New York)

Effects of Feedback on Maintaining Categorization Strategy in Humans and Rhesus Macaques (Macaca mulatta)

We investigated whether categorization by humans and rhesus monkeys depends on direct feedback signals. Members of both species learned to classify multicolored disks into one of two categories through trial-by-trial feedback. After category learning to criterion, participants were tested further, either without feedback (humans) or with feedback deferred until after each block of trials (humans and monkeys). Human performance continued at high levels, demonstrating a capacity to hold in mind their categorization strategy and continue applying it. Performance of the monkeys quickly fell to chance after immediate feedback was withdrawn. Monkeys showed a deficit in their ability to bridge from trial to trial using only their own internal task construal. Humans demonstrated a more robust capacity to sustain a cognitive set without feedback, perhaps indicating their use of a verbalizable response-mapping system.

2:50

Eric L. G. Legge, Emily R. Batty, & Marcia L. Spetch (University of Alberta)

Local vs. Global Cue use in Pigeons (Columbia livia) with Various Oriented Training Arrays in a Touch-screen Task

Building on research conducted in the open field by Spetch and Edwards (1988), we investigated whether pigeons prefer global or local cues for spatial localization in a touch-screen task. Pigeons encoded both local and global cues, but the orientation of the training array on the screen (vertical, horizontal or diagonal) influenced the type of cue information they favored. Specifically, when subjects were trained with vertical arrays, they favored global cues. When trained with horizontal arrays, they favored local cues. When trained with alternating horizontal, vertical, and diagonal arrays, control by both local and global cues still emerged and the pattern of results remained consistent with global cues exerting more control in the vertical dimension. Our results are consistent with Spetch and Edwards in showing hierarchical control by redundant spatial cues, but suggest that the dominant cue differs depending on the orientation of the array.

10 Minute Break

Social Learning and Numerical Competence

Chair: Tom Zentall

- 3:10 **Julie J. Neiworth (Carleton College) & Julia Greenberg (Max Planck Institute)**
Competition Does Not Increase Cooperation in Monkeys
Cooperation in primates is thought to arise either from competition for resources (the competitive cognition hypothesis) or due to social tolerance within the species (the emotional reactivity hypothesis). Tamarins were tested in pairs for evidence of cooperation in a task which required them to pull ropes simultaneously in order to move an object forward to obtain rewards. A relative comparison of their rates of cooperation was made across various social conditions, including intradyad competition, intergroup competition, and in an altruism condition. The evidence strongly suggests that cooperation is a low frequency activity that is effected negatively by competition, especially across groups.
- 3:20 **Holly Miller, Rebecca Rayburn-Reeves and Tom Zentall (University of Kentucky)**
Imitation and Emulation by Dogs Using a Bidirectional Control Procedure
A successful procedure for studying imitative behavior in non-humans is the bidirectional control procedure in which observers are exposed to a demonstrator that responds by moving a manipulandum in one of two different directions (e.g., left vs. right). In the present study, when odors were controlled for, dogs imitated the direction of a screen push demonstrated by another dog more than in a control condition in which they observed the screen move independently but another dog was present. Furthermore, we found that dogs would match the direction of screen push demonstrated by a human and they were equally likely to match the direction in which the screen moved independently but a human was present.
- 3:30 **Rebecca Rayburn-Reeves, Holly Miller and Tom Zentall (University of Kentucky)**
Numerical Competence by Pigeons
Pigeons were trained to peck a lit response key on a fixed ratio (FR) 10 schedule of reinforcement for three successive reinforcements followed by a fourth FR 10 that was not reinforced (a sequence). Sequences were separated by 2 min. Latency to complete the FR 10 did not vary significantly over the first three reinforcements; however, it was significantly longer following the third reinforcement. Adding time between reinforcements did not affect the latency following the third reinforcement nor did adding a nonreinforced FR10 at the beginning of the sequence. Thus, pigeons did not appear to be timing the duration of the sequence.
- 3:40 **Michael J. Beran (Georgia State University)**
Chimpanzees Accurately Judge Concurrently Accumulating Sets of Food Items
Some animals can judge two sequentially presented sets of food items. However, rarely has food accumulation alternated between the sets throughout the trial. Rather, each set is presented to completion, or subsets are added to each choice set at discrete times. Here, four chimpanzees observed as 1 to 9 food items accumulated in two food sets through random placement of each item into either set. All chimpanzees succeeded in selecting the larger set, although performance indicated that this was a more difficult version of the problem than previously presented. Then, three such sets were presented in the same manner. Performance was lower, but still exceeded chance levels, indicating that chimpanzees can judge three concurrently accumulating sets. This demonstrates a quantitative ability in nonhuman primates that reflects enumeration or summation of stimuli presented in a complex sequential manner.
- 3:50 **10 Minute Break**

Keynote Presentation

Introduction: Marcia Spetch

- 4:00-
5:00 **Daniel J. Povinelli & Derek C. Penn (University of Louisiana)**
Humanizing the Human Mind
After 150 years of emphasizing the similarities between human and animal minds, comparative psychology seems to have taken a turn toward understanding what makes the human mind human. Several recent theories attempt to describe and explain the unique cognitive abilities of *Homo sapiens*. We review these theories and describe major points of disagreement among them. In doing so, we outline an agenda for restoring comparative psychology to its rightful place in understanding human nature.

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 (Fall conference held in Chicago 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:
 - *Comparative Cognition and Behavior Reviews* - The first three volumes of this annual online journal of reviews are available.
 - 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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2009 Annual Dues: Faculty - \$50 Student/Post-doc - \$20

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