Fall Meeting of the Comparative Cognition Society 2014

November 20, 2014
9:15 – 5:00
(Coffee Hour 8:15-9:15)
Hyatt Regency Long Beach
Long Beach, CA

www.comparativecognition.org

Fall Meeting of the Comparative Cognition Society 2014

Regency Ballroom B, Hyatt Regency Long Beach

8:15-9:15	**Coffee Hour**
9:15-10:35	**Spatial Behavior and Cognition**
10:50-11:50	**Discrimination Processes**
1:45-2:30	**Abstract Concept Learning and Inferential Processes**
2:45-3:45	**Choice and Memory**
4:00–5:00	**Keynote Presentation – John Wixted**

Important Note to Presenters: Talks should be no longer than 12 minutes (three additional minutes scheduled for discussion)

Comparative Cognition Society

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Please consider joining us in April for the 22nd annual *International Conference on Comparative Cognition*

CCS thanks the Psychonomic Society for its support and help

Spatial Behavior and Cognition

Session Chair: Michael Brown

9:15	**Welcome and Introduction**
9:20	Kenneth J. Leising, Joshua Wolf, Joe Leyva, Megan McKeehan, & Chad M. Ruprecht (Texas Christian University) **Spatial Response Strategy as a Function of Task Complexity and Overtraining** We still know little about the conditions that support the use of different spatial response strategies (e.g., place responding). We trained rats to locate a hidden food reward across 4 small-scale spatial tasks that varied in complexity (i.e., an open field with 25, 4, or 2 search locations, or a plus-maze). Each apparatus was shifted following acquisition of the task to gauge whether rats used extramaze cues (i.e., place responding) to locate the goal, or searched in the direction of the goal relative to both intramaze and extramaze cues (i.e., directional responding). With each apparatus, half the rats were tested immediately after the acquisition criterion, whereas, the remaining rats received extended training. The results indicate that the 25-cup maze and plus maze supported place responding and directional responding, respectively, whereas rats on the 4-cup and the 2-cup mazes gradually shifted their responding from place to directional as a function of training.
9:35	Kevin Leonard & Debbie M. Kelly (University of Manitoba) **Ability to Reorient Using Geometric and Featural Cues Declines with Age in C57Bl/6 Mice** Geometric (e.g., distance and direction) and featural cues (e.g., colour and texture) within an environment can be used by mobile animals to guide reorientation. Many species studied to date have shown an implicit encoding of geometric cues, even within a feature-rich environment. During the present study, three month old mice (*Mus musculus*) were trained to search for a hidden platform in one corner of a feature-rich rectangular water maze. 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 preference for geometric or featural cues when the cues provided conflicting information as to the location of a hidden platform. The same mice were then trained and tested at 15 months to evaluate their retention of spatial knowledge and their ability to recuperate previously learned associations. Results show that the presence of uninformative features strongly facilitates reorientation based on geometric cues. Aged mice do retain some knowledge of the trained environment after 8 months of inactivity, and they benefit greatly from a brief period of retraining. Furthermore, young and aged mice show marked differences in their weighting of geometric and featural cues.

9:50	Neil McMillan, Pierre Nadeau-Marchand, Yu Du, Christopher R. Madan, & Marcia L. Spetch (University of Alberta) **Landmark integration by pigeons in a one-dimensional, spatial search task** Spatial goal localization can be made more precise by the use of multiple landmarks, but this can result in conflict if the landmarks move. We studied how pigeons weigh landmarks to find hidden goals. Subjects were presented with two distinct cues on a line, and required to peck on a hidden location (varied by trial) between the cues in order to obtain reinforcement. During baseline training, both cues were always in the same locations relative to the goal location, with one cue always closer to the goal. During probe testing with both landmark cues shifted away from the goal, some birds' initial searches deviated toward the nearer landmark, while others' deviated equally to either side of the goal.
10:05	Bailey Mack, Jeffrey Kraft, & Olga Lazareva (Drake University) **An analysis of internal consistency of SNARC tasks using dimensions of magnitude, length, area, and brightness** The spatial-numerical association of response codes (SNARC) effect describes a tendency respond to Arabic numerals representing smaller quantities (e.g., 1 or 2) faster if the response is located on the left than if it is located on the right; the opposite is true for the numerals representing larger quantities (e.g., 8 or 9). The SNARC effect has been interpreted as an evidence of automatic spatial organization of numerical information from left to right. Recently, the SNARC effect has been reported for many non-numerical dimensions such as orientation or even emotion. It is not yet clear, however, whether these findings imply that non-numerical information is also organized spatially, just like numbers are. If it is, then we should see an internal consistency across multiple SNARC tasks (e.g., an individual showing weak SNARC effect in numerical task should also show weak SNARC effect in a non-numerical task). We presented five SNARC tasks (parity, magnitude, area, line length, and brightness) in a within-subject design. We found little consistency across multiple SNARC tasks suggesting that multiple mechanisms underlie the tasks despite their procedural similarity.
10:20	Pierre Nadeau-Marchand & Sylvain Fiset (Université de Moncton) **Spatial perseveration error in domestic dogs and grey wolves** Osthaus, Marlow and Ducat (2010) found that domestic dogs, after having learned to bypass a barrier (opaque or transparent), committed a perseverative error when the gap at the end of the barrier was shifted to the other side. However, to what extent these results can be generalized to wolves, and whether social cues given by humans prevent canines to commit this perseverative error is yet to be known. Eight dogs and eight wolves were trained for four consecutive trials to bypass a barrier to access food. On the next four trials, the gap between the edge of the barrier and the adjacent wall was shifted to the other side of the barrier. To solve the task on trials 5 to 8, the animals had to use allocentric cue (the gap) and restrain themselves from using their previously learned egocentric navigational cue (established path). Three conditions were administered: One with a transparent barrier, one with an opaque barrier and

	one with an opaque barrier and the presence of a social cue (distal pointing) provided by an experimenter. We are currently collecting data but our preliminary results suggest a positive effect of social cueing on domestic dogs and socialized wolves.
10:35	**15 Minute Break**
	Discrimination Processes **Session Chair: Olga Lazareva**
10:50	Blaisdell, A. P., Shragai, T., Ping, X., Lee, J. S., Garlick, D., & Blumstein, D. T. (UCLA) **What Manipulations of a Threatening Visual Display Reveal About Anti-Predator Response in the Caribbean Hermit Crab (*Coenobita clypeatus*).** We have developed a procedure to study learning and attention in the Caribbean hermit crab (*Coenobita clypeatus*) that relies on presenting a threatening visual image on a color LCD monitor. In the current experiments, we assessed the effectiveness of various presentation and image attributes on anti-predator behavior. We report the following results. An expanding, but not contracting or static, image caused subjects to hide in their shells. This suggests that subjects perceived the expanding display as a looming threat. Manipulations of the rate of expansion revealed faster expansion rates elicit shorter hide latencies. This suggests that, the faster the rate of expansion on the screen, the faster the perceived rate of approach of the looming threat. Presentations of simple shapes of different colors revealed that Red images were less effective than were Blue or Green images. Finally, habituation-unhabituation tests revealed that a Blue image was more effective than a Green image at eliciting hiding behavior. These last two experiments reveal that hermit crabs have some capacity for color vision.
11:05	Matteo Bernabo, Laura Pinnault , Jerome Cohen (University of Windsor) **Repeated novel object recognition performance by mice as a function of delay** The typical novel object recognition task with rats and mice usually is given for one or only a few times because animals typically stop investigating objects in an open environment either due to habituation or anti-predator reactions. That is, rats and especially mice begin to stay near walls or at corners in the chamber rather after a few trials in it. This reaction prevents long-term assessment of rodents' age-related changes in their working memory as measured by this otherwise simple task. We report a refined technique that allows such with-in subject assessment. In our task we superimposed a novel object recognition task with a foraging task where mice had to find hidden food randomly located in recessed food wells in the large open arena. Two identical objects occurred during the study segment and a novel object replaced one of them during the test segment of a trial. We tested NOR performance over several months with animals that always had food and for animals that never had food. We

	also varied the retention (inter-segment) interval between 15 min., 1 h, and 24 h. to establish possible forgetting curves in this working memory task.
11:20	Muhammad A. Qadri, Robert G. Cook (Tufts University) **How birds learn complex conditional discriminations** In a two-alternative, simultaneous choice task, it is often implied that animals evaluate both stimuli before making a choice. Using a genetic algorithm to track attention among varying properties, five pigeons and six starlings were given two shape discriminations in a conditional choice task using different combinations of triangles, squares, and pentagons (all subjects received Triangle+/Square- trials and Pentagon+/Triangle- trials). The results suggested that the pigeons solved this discrimination by evolving conditional cues across discriminations rather than comparing the stimuli within a trial, while starlings were unable to learn this conditional arrangement. Implications regarding the cognitive strategies and the comparative differences in solving complex visual discriminations are considered.
11:35	Audrey E. Parrish & Michael J. Beran (Georgia State University) **Context Counts! Chimpanzees (Pan troglodytes) Misperceive Food Amounts Based on Presentation Style** Humans often misperceive food portions on the basis of context effects (e.g., size and shape of dishware). Here, we investigated whether chimpanzees misperceived food quantities on the basis of presentation style. In the first study, chimpanzees chose between food quantities on different-sized plates. Chimpanzees were highly accurate in control trials, discriminating portions presented on equal-sized plates. In test trials, they judged same-sized and smaller portions to be larger in amount when presented on a small plate compared to an equal or larger portion presented on a large plate. In the second study, chimpanzees chose between two amounts of food presented in different-sized cups. When different quantities were presented in the same-sized cups or when the small cup contained the larger quantity, chimpanzees were highly accurate in choosing the larger amount. However, when different-sized cups contained the same amount or the smaller cup contained the smaller amount, the chimpanzees often showed a bias to select the smaller but fuller cup. These findings reveal that chimpanzees misperceive food quantity as a function of the context in which it is presented.
11:50	**Lunch Break**

Abstract Concept Learning and Inferential Processes

Session Chair: Marcia Spetch

1:45 John Magnotti (UT Medical School at Houston), Jeffrey Katz (Auburn University), Anthony Wright (UT Medical School at Houston), & Debbie Kelly (University of Manitoba)

Abstract Concept Learning in Magpies (*Pica pica*)

Understanding abstract relationships between stimuli is a necessary precursor for higher-order thinking. A wealth of research assessing same/different abstract-concept learning across species (once thought to be unique to humans) has shown the size of the training set (i.e., the number of unique exemplars) is a critical determinant of whether a given animal will learn relationally. We trained 7 magpies in a simultaneous visual same/different task using an expanding training set procedure (8, 16, 32, 64, etc.) and assessed relational learning via transfer tests with novel stimuli after learning at each set size. The experimental design was identical to one used previously with rhesus and capuchin monkeys, Clark's nutcrackers, and pigeons. Six of the 7 magpies showed evidence of abstract-concept by a training set size of 32. All magpies showed abstract-concept learning after training set size 64, on par with Clark's nutcrackers, but surpassing both monkey species (128 set size) and pigeons (256 set size).

2:00 David P. Goodman & Olga F. Lazareva (Drake University)

TrI Toolbox: Reinforcement-based models of transitive inference in MATLAB

Evaluating predictions of reinforcement-based models in nonverbal transitive inference tasks is critical for separating influences of reinforcement history from inferential processes. Due to their complexity, these models must be evaluated by performing iterative computations for several free-fitting parameters using subjects' responses during the experiment. We have developed the first software package, Transitive Inference (TrI) Toolbox, that can perform such computations for the two most prominent models of TI, Siemann-Delius (Siemann & Delius, 1998) and Wynne (1995). The TrI Toolbox uses the MATLAB platform, and can be compiled as a standalone application. Subjects' responses and their asymptotic training performance are uploaded by a user who selects a model to be applied. The program then searches for the combination of free-fitting parameters that provides the best-fitting performance to the training pairs using the least-squared error (LSE) method. The program next derives predicted performance to all testing pairs and, if the user provides subjects' performance to the testing pairs, it will also calculate the LSE between predicted and obtained performance. This software will give behavioral researchers an opportunity to evaluate their own data or to test different training protocols allowing for a more efficient study design.

2:15	Thomas A. Daniel (Auburn University), Robert G. Cook (Tufts University), & Jeffrey S. Katz (Auburn University) **Mid-Session Reversal Learning of MTS and NMTS in Pigeons** As a training set expands, learning shifts from item-specific responding to the application of relational rules. The current study examined how pigeons apply relational rules with a midsession reversal and expanding training set. Pigeons were trained on a match-to-sample (MTS) task featuring a midsession reversal halfway through the session. After reaching a high performance criterion, the training set was doubled from 3 items to 6 and 12. Abstract-concept learning was tested using a series of transfer tests after acquiring the 12-item set. Two groups were formed based on prior experience in other tasks: one group of pigeons that previously demonstrated abstract-concept learning in an MTS task, and another group of pigeons that previously demonstrated abstract-concept learning in a non-MTS task. While there were initial differences in acquisition during the 3-item set, groups did not show a difference on later set-sizes. Prior experience did affect transfer accuracy, with pigeons previously trained on MTS performing better on novel items in the first half of the session. Conversely, pigeons previously trained in NMTS showed transfer after the reversal, suggesting that while pigeons were able to apply relational rules, these rules were bound to a domain restricted by prior learning.
2:30	15 Minute Break

Factors Controlling Choice

Session Chair: Debbie Kelly

2:45	Joseph Boomer, Barbara A. Church, Alexandria C. Zakrzewski, Michael L. Baum (University at Buffalo, SUNY), Michael J. Beran (Georgia State University), & J. David Smith (University at Buffalo, SUNY) **Chronometrics of Solving a Temporally Extended Problem in Humans and Rhesus Monkeys** Solving a temporally extended problem indicates a degree of planning. We tested humans' and monkeys' ability to either commit to an extended maze trial, or opt out. The maze could be navigated successfully on half of the trials, but on the other half, it was blocked, and the appropriate response was to opt out. If subjects were planning their movement through the maze, their response latency to opt out would increase with the distance of the blockage from the origin point. Humans showed this pattern. One monkey showed a consistent negative pattern, suggesting he might have used a reversed search strategy. Another monkey showed no consistent pattern though he successfully opted out. Results indicated that though the monkeys can solve temporally extended problems, their search (and presumably, planning) strategies did not systematically follow the sequence of the upcoming action in the way that humans' strategies did.

3:00	Jeffrey Pisklak (University of Alberta), Margaret McDevitt (McDaniel College), Roger Dunn (San Diego State University), & Marcia Spetch (University of Alberta) **The Role of Negative Outcomes in Pigeons' Sub-Optimal Choice** When choices are followed by signals that reliably predict delayed food or timeouts, pigeons frequently will choose an option that provides less food overall. These sub-optimal choices appear to be due to the reinforcing effect of signals for food. However, signaled delays to no food appear to have little impact on preference, suggesting that the time away from the initial choice is not a controlling variable. We will present the results of two experiments in which pigeons chose between alternatives that each had relatively positive and negative outcomes. The positive outcomes on both alternatives were a short delay to food. The negative outcomes were either a longer delay to food or a timeout. Our results support the assumption that signals for timeout have surprisingly little negative impact on choice behaviour. The theoretical implications of our findings will be discussed.
3:15	Lisa A. Heimbauer (The Pennsylvania State University), Ting Qian (University of Rochester), Richard N. Aslin (University of Rochester), Daniel J. Weiss (The Pennsylvania State University) **Detection of Probabilistic Change by Rhesus Macaques (*Macaca mulatta*)** To effectively track statistical regularities in the environment, individuals must interpret when variance in observable statistics emanates from a single underlying causal structure or from multiple structures. In three implicit learning experiments, we examined whether nonhuman primates are capable of inferring and retaining new structures to the same extent as human learners (see Qian, Jaeger, & Aslin, in review). Using a serial reaction time joystick task, we asked whether six rhesus macaques (*Macaca mulatta*) could track shifting regularities without operant reward. Similar to humans, the monkeys were often more successful detecting multiple structures when correlated contextual cues (e.g., background color) were provided. The monkeys sometimes demonstrated retention of underlying statistical information, as the time to relearn familiar regularities was often reduced. We conclude that the ability to track probabilistic statistics in complex, changing environments may have a lengthy evolutionary history.
3:30	Jonathon D. Crystal and Alexandra E. Smith (Indiana University) **Source memory of multiple, interleaved events in rats** Source memory is a representation of the origin (source) of information. Human episodic memory relies on source information to bind together and differentiate between multiple, interleaved events. Previous research suggests that rats remember the source of encoded information. Here we asked if rats remember source information from multiple interleaved memories. Three lines of evidence implicate retrieval of multiple, distinct, and interleaved episodes. First, rats adjusted revisit rates to distinctive, replenishing locations based on the source of information. Second, by increasing memory load, we demonstrated that source information is encoded and remembered for each separate event. Third, when the similarity of multiple events was systematically manipulated to potentially produce patterns of interference and

facilitation, we observed consistently high source-memory performance. We conclude that rats separately represent multiple episodes. Our model should facilitate attempts to elucidate the biological underpinnings of source-memory impairments in human memory disorders.

Keynote Address
John Wixted (University of California – San Diego)
Introduced by Michael Brown

4:00 -5:00

From the Operant Lab to the Courtroom: ROC Analyses of Memory in Pigeons and People

More than 50 years ago, signal-detection theory inspired a method of analysis that has proven to be as useful for testing theories of memory and perception as it is for testing diagnostic systems that are used in the real world (e.g., medical tests, face recognition algorithms, police lineup procedures, etc.). That method is called receiver operating characteristic (ROC) analysis. Although a great deal of basic psychological research – with humans and nonhumans alike – has made use of signal-detection theory and ROC analysis to test theories, whole areas of applied psychology have lost sight of this methodology to test diagnostic procedures. For example, ROC analysis has been used to test models of pigeon memory (e.g., the default response hypothesis) and human memory (e.g., the theory that recollection is a threshold phenomenon), but, until very recently, it had not been used to test whether the police should use simultaneous lineups or sequential lineups for eyewitness identification in criminal investigations. Based solely on non-ROC research conducted by applied psychologists, 30% of law enforcement agencies in the U.S. have switched from simultaneous to sequential lineups without knowing which procedure yields higher discriminability. Recent ROC analyses suggest that simultaneous lineups are, in every way, diagnostically superior to sequential lineups. This unfortunate state of affairs calls for closer cooperation between basic and applied psychologists, and it appears to be a case study in what can go wrong when the emphasis shifts away from basic research in favor of research with more obvious translational implications.

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:
  - *Comparative Cognition and Behavior Reviews* - The first four volumes of this annual online journal of 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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