



Society for the Quantitative Analyses of Behavior

Denver



34th Annual Conference
Hyatt Regency, Denver, Colorado
May 26-28, 2011



The Society for the Quantitative Analyses of Behavior (SQAB) was founded in 1978 by M. L. Commons and J. A. Nevin to present symposia and publish material which bring a quantitative analysis to bear on the understanding of behavior. This International Society holds its annual meeting in conjunction with the Association for Behavior Analysis International (ABAI). Talks at SQAB focus on the development and use of mathematical formulations to: characterize one or more dimensions of an obtained data set, derive predictions to be compared with data, and generate novel data analyses.

You can retrieve more information about SQAB at our website: www.sqab.org

Executive Committee and Board Members

President

Alliston K. Reid
Department of Psychology
Wofford College
Spartanburg, SC 29303
Alliston.Reid@Wofford.edu

Program Chair

Timothy A. Shahan
Department of Psychology
2810 Old Main Hill
Utah State University
Logan, UT 84322
Tim.Shahan@usu.edu

Executive Coordinator

Darlene Crone-Todd
Department of Psychology
Salem State University
352 Lafayette Street
Salem, MA 01970
dcronetodd@salemstate.edu

Secretary / Treasurer & Newsletter Editor
Michael L. Commons & Patrice Miller
Dept. of Psychiatry
Harvard Medical School
Massachusetts Mental Health Center
74 Fenwood Rd
Boston, MA 02115-6196
commons@tiac.net

Tutorials / Media Coordinator
William L. Palya
Department of Psychology
Jacksonville State University
700 Pelham Rd.
Jacksonville, AL 36265

Past Presidents:

Randolph Grace (Board Member)
Michael Commons
William Baum
Armando Machado
Peter Killeen
John A. Nevin
Richard J. Herrstein

Michael Davison (Board Member)
Department of Psychology
University of Auckland, City Campus
Private Bag 92019
Auckland 1142, New Zealand

Leonard Green (Board Member)
Washington University
Dept. of Psychology, Campus Box 1125
St. Louis, MO 63130-4899

James E. Mazur (Board Member)
Psychology Department
Southern Connecticut University
New Haven, CT 06515

Cynthia Pietras (Board Member)
Department of Psychology
1903 W Michigan Ave
Western Michigan University
Kalamazoo, MI 49008-5439

Thursday & Friday

SQAB Begins

Ballroom D-E

Thursday Evening Reception
and Poster Session
5:00-8:00 pm

Abstracts for Thursday
Poster Session begin
on page 14

Welcome to ∫QAB 2011

Friday Morning:

7:00 – 8:00 Registration, Coffee and Pastries

8:00– 8:15 President's Introduction

Alliston K. Reid
Wofford College (USA)

Special Section on Extinction

8:15– 8:50 Extinction and Behavior: What Are We Modeling and How Do We Do It?

K. Matthew Lattal

Oregon Health & Science University (USA)

The study of extinction has been extremely important for understanding the relation between environmental contingencies and behavior, and for developing theories to account for the learning that occurs as conditioned responding is eliminated. In this talk, I will introduce the special thematic session on extinction by reviewing some of the key theoretical questions surrounding the study of extinction. These questions include: (1) what can extinction tell us about acquisition?, (2) what causes the elimination of behavior during extinction?, (3) what is being extinguished during extinction?, (4) what are the appropriate behavioral conditions for making inferences about extinction? , and (5) what can be said quantitatively about extinction? I will review strategies that have been taken to answer these questions and will review data from my laboratory showing that many of these answers depend on the ways in which performance is assessed.

8:50– 9:25 Extinction and Recovery: Theory, Current Research, and Potential Applications

Ralph R. Miller & Mario A. Laborda

SUNY-Binghamton (USA) and University of Chile

We view the response decrement resulting from extinction treatment as an interference effect, in which the reactivated acquisition memory competes with the reactivated extinction memory for behavioral expression. For each of the two memories, reactivation is proportional to the strength of the stored memory and the quality of the memory-specific retrieval cues present at test. We will review basic extinction phenomena and recovery from extinction phenomena, showing how each effect is explicable in this associative interference framework. Moreover, this orientation has and continues to dictate efficient manipulations for minimizing recovery for extinction, which in turn suggest procedures that might reduce relapse from exposure therapy for a number of psychological disorders. Some of these manipulations enhance the retrieval cues for the extinction memory that are present at test, whereas others simply strength the extinction memory. The latter generally have a greater efficacy as they do not constrain the conditions of testing.

9:25 – 10:00 Break -- Refreshments

10:00– 10:35 Extinction Effects on Sensory-Specific Associations

Andy Delamater

Brooklyn College – CUNY (USA)

Quantitative models of basic learning processes posit that extinction partially weakens an underlying association while at the same time can engage new learning. To address these issues, we have studied the effects of extinction upon learning sensory-specific associations between conditioned and unconditioned stimuli (CS, US) in both flavor preference and magazine approach conditioning paradigms. The work has revealed some similarities and differences in these two preparations. With magazine approach, extinction seems to have no impact on the integrity of sensory-specific CS-US associations, but such associations appear impaired by extinction in flavor preference learning. However, this effect likely reflects masking of control by underlying associations more than actual weakening of those associations. More recently, we have also observed in a magazine approach paradigm that control by sensory-specific CS-US associations can be reduced by extinction if it is introduced after limited, but not extensive amounts of acquisition training. However, a preliminary renewal study suggests that this effect of extinction may also reflect masking. Overall, we see no reason to suspect that the basic learning processes engaged by extinction in these two preparations differ, but that decisive methods for dissociating between true weakening or masking processes may not currently be available.

10:35– 11:10 Placing Prediction Into the Fear Circuit

Gavan P. McNally

The University of New South Wales (Australia)

Contemporary explanations of the neural circuitry necessary for the extinction of Pavlovian conditioned fear emphasise the role of amygdala NMDA receptors in extinction learning and the prefrontal cortex in regulating extinction expression. Recent work suggests the existence of a distributed neural circuitry regulating amygdala and prefrontal synaptic plasticity during fear learning and fear extinction. This circuitry, which involves the midbrain periaqueductal gray and projections from midline thalamus to prefrontal cortex, can be linked to prediction error and expectation modulation of fear learning as described by associative learning models. It controls whether, and how much, fear learning occurs by signalling whether the presence or absence of an aversive event is expected or unexpected. It is central to learning in response to negative prediction errors, such as during fear extinction as well as fear overexpectation, and clinical studies indicate that this prediction circuit may be recruited in humans during exposure-based treatments for clinical anxiety.

11:10– 11:50 Disentangling the Nature of the Nicotine Stimulus with Extinction Learning

Rick A. Bevins

University of Nebraska-Lincoln (USA)

Every reader will hopefully recognize and admit familiarity with interoceptive stimuli—pain from the sprained ankle, jittery feeling from drinking too much caffeine. Like external stimuli, internal stimuli are available to acquire control of behavior. For over 50 years, researchers using drug discrimination tasks have taken advantage of this to identifying the neuropharmacological processes underlying drug stimuli. These efforts have mostly used brief substitution or antagonism tests that provide little opportunity for learning. We have begun to ask whether conclusions based on this approach will change if there was an opportunity for learning. This research has found that ligands that share stimulus effects with nicotine in brief tests do not necessarily substitute (fully or partially) in more extensive and repeated extinction sessions. Further, the magnitude of responding in extinction does not always predict the extent to which this extinction learning will generalize back to the nicotine training stimulus.

12:00 – 1:45 Lunch

The SQAB Executive Committee
and Board will meet during lunch



1:45– 2:20 Contextual Control of Operant Extinction Learning

Mark E. Bouton, Travis P. Todd, Drina Vurbic, and Neil E. Winterbauer
University of Vermont (USA)

Although extinction in Pavlovian learning can be highly context-dependent, less research has systematically investigated the issue in operant learning. We report a series of experiments on the “renewal” effect, in which operant responding returns when the context is changed after extinction. We have produced clear evidence of ABA, ABC, and AAB renewal (where the letters correspond to the contexts of conditioning, extinction, and testing, respectively). The ABC and AAB effects suggest that extinction is more context-dependent than conditioning. We have also studied methods that might enhance or reduce operant renewal, and have demonstrated the phenomenon in non-deprived rats lever pressing for sucrose or sweet/fatty reinforcers. Other experiments suggest that “resurgence,” in which an operant that is extinguished while a second is reinforced recovers when the second behavior is extinguished, can be understood in similar terms. Operant extinction is at least partly context-dependent, and has strong parallels with Pavlovian extinction.

2:20– 2:55 Extinction as Discrimination

William M. Baum
University of California, Davis (USA)

The traditional molecular view of behavior explains extinction as the dissipation of strength, formerly built up by contiguous reinforcement. In obstinate opposition to this explanation was the partial-reinforcement effect: A partially reinforced response extinguishes more slowly than a continuously reinforced response. It suggests instead that extinction is discrimination. Four pigeons were exposed to daily sessions in which a variable period of food produced by pecking on a variable-interval schedule followed by extinction. The results confirmed and extended the partial-reinforcement effect; persistence of pecking and time to extinction were inversely related to rate of obtaining food. The results support the molar view of extinction, not as loss of strength of a particular discrete response, but as a transition from one allocation of time among activities to another. Although molecular theories dismiss discrimination due to repeated extinction, repeated extinction is probably typical of the environment in which most vertebrate species evolved.

2:55– 3:30 Resistance to Extinction and Behavioral Momentum

John A. Nevin

University of New Hampshire (USA)

Behavioral momentum theory asserts that all reinforcers in the presence of a discriminative stimulus contribute to the strength of an operant, where strength is identified with resistance to change. Extinction is a traditional method for assessing response strength; however, resistance to extinction depends complexly on the rate of reinforcement and the context within which training and extinction occur. A model that incorporates termination of contingencies and stimulus change, including the omission of reinforcers, accounts for a wide range of data for extinction in multiple schedules; the model must be modified for extinction after training in single schedules. The model implies that extinction involves the disruption of reinforced behavior rather than a loss of strength; this implication is confirmed by post-extinction recovery.

3:30 – 4:00 Break -- Refreshments

4:00– 4:35 Extinction Under a Behavioral Microscope

Federico Sanabria & Timothy H. C. Cheung

Arizona State University (USA)

Critical features of learning dynamics may be inferred from a high temporal resolution analysis of extinction and post-extinction performance. These inferences are particularly useful for identifying motivational, motoric, and schedule-like effects of pharmacological treatments on behavior. Performance parameters are contained in a model that assumes a bout-like organization of instrumental performance. The model also assumes that, under extinction, parameter values decay exponentially. The model is shown to provide an adequate description of extinction performance, and parameters are shown to be differentially sensitive to various experimental manipulations. On the basis of these findings, a theoretical account of extinction learning is advanced. The strengths of the theory and the challenges it faces are discussed.

4:35– 5:10 Inferring Asymmetries in Learning Curves for Acquisition and Extinction of Conditioned Responding

Daniel Gottlieb

Sweet Briar College (USA)

Using a novel compound testing procedure in rat conditioned approach and pigeon autoshaping procedures, Rescorla (2002) reported evidence suggesting that the learning rate parameter for reinforcement is greater than that for nonreinforcement. An implication is that the asymptotic associative strength of a stimulus reinforced half of the time is closer to that of a continually reinforced stimulus than to a nonreinforced stimulus. However, in a series of similar rat conditioned approach experiments, Gottlieb failed to replicate the bias. It is possible to reconcile both sets of findings by assuming that an asymmetry exists in the form and not the rate of learning. Empirical tests of this yielded mixed results; however, modeling of individual acquisition curves suggests that it may be useful to envision acquisition and extinction as asymmetric processes. An advantage of this approach is that it avoids the need to postulate biases in animals' encoding of uncertainty.

5:10– 5:45 Extinction from a Rationalist Perspective

C.R. Gallistel, A.M. Daniel & E.B. Papachristos

Rutgers University (USA)

From a rationalist perspective, the behavior observed in conditioning experiments is that of a rational information-seeking agent trying to reduce its uncertainties about behaviorally important parameters of its environment. This approach predicts a scalar partial reinforcement extinction effect without free parameters, because the dilution of the reinforcement schedule pre-extinction has a scalar effect on the number of trials required to achieve a given level of certainty that the CS-US contingency has changed. This explanation does not address the phenomenon of spontaneous recovery nor the surprisingly large amount of evidence for a change in contingency that is required to produce extinction of some (but not all) conditioned responses. To explain these results, the focus has to shift to the uncertainty about the temporal parameters of non-stationarity: How long may a change in contingency be expected to last? At least some features of post-extinction behavior appear to reflect sampling behavior rationally structured for gathering the information necessary to reduce this uncertainty.

6:00- 6:30 Business Meeting - All SQAB members are welcome

6:30–9:00 2nd Poster Session / Cash Bar (Abstracts begin page 27)

7:30 – 8:30 Registration, Coffee, Pastries

8:30– 9:05 Motivation and Timing

Kimberly Kirkpatrick & Tiffany Galtress
Kansas State University (USA)

Early research (e.g., Roberts, 1981) suggested that timing and motivation were independent processes. However, more recent investigations have raised questions about the degree of this independence. Several studies from multiple laboratories have demonstrated that changes in the magnitude or value of reward produce lasting effects on timing in both peak and bisection procedures. The effects appear to occur primarily under changes in reward, rather than as a result of differences in initial reward value. The present talk will review some recent evidence that has aimed to determine the mechanism behind the motivational effects on timing. The body of evidence points towards contrast-induced attentional deficits as the most likely explanation. Implications for timing theories will be discussed.

9:05– 9:40 Strengthening Versus Signaling Processes in Reinforcement

Nathalie Boutros, Michael Davison, & Douglas Elliffe
The University of Auckland (New Zealand)

In addition to their definitional response-strengthening functions, reinforcers can also work as discriminative stimuli, signaling the contingencies of their own delivery. Recent characterizations have suggested that all reinforcer-effects, even those which putatively reflect response-strengthening functions, should be considered as indicative of a discriminative function. I will discuss experiments conducted to find evidence for this view of reinforcement. These experiments, all conducted with pigeons key-pecking for grain reinforcers in two-alternative concurrent schedules, demonstrate some difficulties in eliminating a response-strengthening role for reinforcers and suggest that such a role may have to be retained, at least in some circumstances. An argument may be made that this limited purview for response-strengthening processes in reinforcement negates the utility of the term. Alternative characterizations which consider the phylogenetic history of the organism under consideration, may more accurately describe the mechanisms that lie behind an animal repeating a response previously followed by an appetitive stimulus.

9:40 – 10:00 Break -- Refreshments

10:00– 10:35 Warning Coloration in a Skinner Box: Quantifying the Benefits of Conspicuousness in an Experimental Simulation of Aposematic Signaling

David W. Stephens

University of Minnesota (USA)

Some prey animals seem to advertise themselves with bright, high contrast patterns. Biology textbooks have long explained that these conspicuous prey items are distasteful or unprofitable in some way so that their conspicuous advertises how bad they are, and helps predators avoid them. It is rather difficult to study this simple claim empirically because investigators typically define conspicuousness in terms of human senses, and because many key variables are difficult to control or measure in the nature. I will present a simple model, derived from signal detection theory that makes straightforward predictions about the predator avoidance advantages of conspicuousness. This model focuses on three variables: conspicuousness measured using signal detection theory d' parameter; the relative frequency of good and bad prey types; and relative 'badness' of the bad prey types. I present two experiments that explore the predictions of this model. Experiment 1 develops a technique to manipulate and control conspicuousness. Experiment 2 explores the interaction between conspicuous, prey abundance, and prey unprofitability. Specifically, experiment 2 shows that the 'predation avoidance' value of conspicuousness interacts with the abundance of the unprofitable (aposematic) prey type. Finally, I will discuss the importance of these results in the context of animal signal use and behavioral plasticity.

10:35 Panel Discussion

Mark E. Bouton *University of Vermont (USA)*

C.R. Gallistel *Rutgers University (USA)*

Ralph R. Miller *SUNY-Binghamton (USA)*

John A. Nevin *University of New Hampshire (USA)*

11:00 SQAB 2011 Closing Remarks

Alliston Reid

Wofford College (USA)



SQAB Preeminent Tutorials will be held in Ballroom D
as part of the annual meeting of the Association
for Behavior Analysis International



1:00– 1:50 Single-Case Research Designs: Useful Tools for 21st Century Applied Research

Neville M. Blampied

University of Canterbury (New Zealand)

The tutorial will outline some contemporary challenges facing applied psychological research, e.g., establishing the effectiveness as well as the efficacy of interventions. It will then review the history of the development of the standard model of psychological research, based on Fisher's Null-hypothesis Significance Testing (NHST), and will present some critical evidence indicating that NHST has serious problems and limitations, especially for applied research and for the scientist-practitioner model of applied psychology. The tutorial will summarise the origins of single-case research from its origins in the experimental analysis of behaviour and show how the standard suite of applied single case designs emerged. Reversal, Multiple-baseline, Changing-criterion, and Alternating-treatments designs and their visual analysis will be discussed in some detail, along with their strengths and limitations. Recent innovations in single-case designs will be presented, including ways of adapting them for evaluating group interventions. Finally, the general utility of single-case designs for meeting the challenges of contemporary applied research in psychology will be affirmed.

2:00– 2:50 Facets of Operant Extinction

Kennon A. Lattal

West Virginia University (USA)

Operant extinction is a cluster of procedures, all of which reduce the targeted response often while generating other responses. Procedures for reducing operant responses that have been labeled extinction include removal of the reinforcer, removal of the response-reinforcer relation, and rendering ineffective the reinforcer used to establish the responses. These different procedures are differentially effective in both eliminating the targeted response and in generating other responses. These generative effects include operant response bursts, spontaneous recovery, response induction, generalization, and recurrence phenomena such as reinstatement and resurgence. This tutorial reviews the varied effects of extinction on operant behavior; compares such effects to those of other procedures such as reinforcing other responses, punishment, and satiation; and critiques historical and contemporary research on these topics.

3:00– 3:50 Delay Discounting: Who, What, When, Where, Why, and How?

Amy L. Odum
Utah State University (USA)

Delay discounting is the decrease in the present value of an outcome when its receipt is remote in time. Many problematic behaviors (e.g., drug addiction, obesity, gambling) can be conceptualized as problems of extreme delay discounting. Delay discounting has been extensively studied in humans and non-humans, using a variety of procedures, populations, and outcome types. Most (but as yet not all) of the basic findings in the area have substantial generality across these features. In this tutorial I will describe how to conduct research in delay discounting. I will give examples of illustrative procedures to measure delay discounting and evaluate their utility in different research situations. I will then provide a step-by-step description of how to use quantitative modeling to analyze the resulting data. I will explain different models and their strengths and weaknesses. Finally, I will provide a summary of major findings in the literature and possible future directions for the field.

4:00– 4:50 Exploration, Visualization and Data Analysis with JMP

Mia Stephens
SAS Institute, JMP Division, JMP Academic Team

JMP, developed in the late 1980's by SAS Institute, is desktop software for data exploration and analysis. JMP is a stand-alone product, with a point-and-click graphical user interface. However, JMP can also be integrated with SAS, providing an easy to use and flexible front end. Intuitive, interactive and graphical, JMP lets researchers move quickly from numbers to meaningful statements about findings and results. JMP provides a complete array of statistical procedures, from basic to advanced, providing a vast framework for making rational decisions from data. All JMP output is dynamic and visual, making it easy to graphically explore data and interpret statistical results. In this tutorial Mia will demonstrate popular JMP tools for exploratory data analysis, including graph linking, Tabulate, Graph Builder®, Bubble Plots, the data filter, and new mapping tools. She will provide an overview of inferential methods commonly used by behavior analysts, and will introduce JMP tools for modeling, data mining and simulation.

1) Use of log-survivor functions to interpret adolescent nose-poke behavior.

Matthew T. Weaver, Melissa Levin, Kati Healey, Anthony Caggiula, Alan Sved, & Eric Donny

Department of Psychology University of Pittsburgh, Department of Psychiatry University of Pittsburgh, & Department of Neuroscience University of Pittsburgh (USA)

When nose poking behavior in adolescent rats was monitored using a commercially available apparatus designed for adult rats a consistent overestimation of responses, defined as a break in an infrared beam, was detected. This overestimation was corrected by converting the frequency distribution of inter-response times into a log-survivor function, which differentiated between behavior occurring within- and between-bouts of engagement with the apparatus. Once refined, patterns between-bout responding, operationally defined as "bout initiations," corresponded to patterns of reinforcement, and thus allowed for statistical control of the measurement error. Additionally, this helped assess effects of nicotine on behavior maintained by other reinforcers. Support: National Institute of Health: DA10464

2) The sunk time effect in the pigeon

Paula Magalhães & Geoffrey White

University of Otago (New Zealand)

The Sunk Cost effect is the tendency to continue an endeavour once an investment in money, effort or time has been made. We investigated the Sunk Time effect in pigeons. Two Fixed-Interval requirements were arranged on one key, and an escape option on a second (Navarro & Fantino, 2005). The different FI schedules were signalled in some conditions and unsignalled in others. Escaping was the behaviour of interest. There were two important results. The first was that in some unsignalled conditions the birds reliably escaped from the Long schedule, a novel result when compared to previous studies. The second result was that in other unsignalled conditions, the birds timed both FIs but did not escape from the long schedules.

3) Temporal learning in periodic schedules: transferring response control

Sarahí Gallardo, Florente López , & Marina Menez

Universidad Nacional Autónoma de México (Mexico)

Previous research has shown that temporal control under fixed interval (FI) schedules is speeded up by prior training on fixed time (FT) schedules of the same value (López & Menez, 2005; 2010). In order to evaluate the dependence of transference on the value of the pre-trained schedule, groups of rats were maintained under FI, FT or random time 30s schedules followed by a FI 90s schedule. Temporal control indexes corroborate the speeding up of the temporal learning in the rats subjected to the FT schedule. Results indicate that speeding up was a consequence of the transference of temporal control from HE to LP responding, in concordance with an adaptive view of temporal learning, not considered by current timing theories.

4) The effect of impulsive choice on locomotor activity and conditioned place preference in rats following administration of amphetamine or methylphenidate

Justin Yates & Michael Bardo
University of Kentucky (USA)

Impulsivity has been linked to increased drug abuse vulnerability in adolescents and young adults. The present preclinical study was designed to determine if a correlation exists between impulsivity and conditioned place preference (CPP) using either amphetamine or methylphenidate. Rats high in impulsivity spent more time in the compartment paired with amphetamine compared to those low in impulsivity following 0.5 mg/kg of amphetamine. Amphetamine-induced hyperactivity developed more rapidly across conditioning sessions in high impulsive rats than in low impulsive rats. In contrast, methylphenidate failed to produce CPP in either high or low impulsive rats; however, methylphenidate did produce hyperactivity in both groups. The results suggest that impulsivity may be related to differential sensitivity to amphetamine reward, but not methylphenidate reward.

5) Assessment of consistency and experience in experimental games

Ligia Colmenares & Carlos Santoyo
Universidad Nacional Autónoma de México (Mexico)

The aim of this ongoing research is to evaluate experience on a Repeated Dictator Game (RDG) effects upon choice in a Public Goods Game (PGG). 27 undergraduate students played a computer simulation of RDG and answered an Information Integration Theory (IIT) Instrument with the same structure, including free or costly access to information about endowment, probability of further interaction, effort in gaining endowment and public knowledge of choice. On IIT situation, participants showed a multiplicative integration pattern and two strategies due to differential sensitivity to parameters were found. In the computer RDG, two strategies appeared, related to those in ITT. Contributions in PGG were inversely related to donations in RDG experiences. Data are discussed based on conditional cooperation and learning.

6) How good is your PIE? The importance of reinforcer quality, quantity and type on the paradoxical incentive effect

Melissa M. M. Andrews, John R. Smethells, Dennis J. Hand, & Mark P. Reilly
Central Michigan University (USA)

The Paradoxical Incentive Effect (PIE) describes a counterintuitive finding; at low fixed-ratio schedules, response rates are inversely related to reinforcer quantity (Bizo, Kettle, and Killeen, 2001). The present study attempted to extend the PIE to reinforcer quality. Rats lever pressed for a 5% and 15% sucrose solution under fixed-ratio schedules. Failure to demonstrate the PIE with quality led to a quantity comparison with sucrose water (1 vs. 3 dipper presentations) and then quantity and quality comparisons using pellets—1 vs. 3 and sucrose vs. grain/sucrose, respectively. Neither sucrose water manipulation—quantity or quality—produced the PIE. The PIE was observed only with pellet quantity. Evidence exists that the different pellets used for the quality comparison were not distinct enough.

7) Direct comparison between a changeover delay and a fixed-ratio changeover requirement within a variable environment

Megan Mahan, William Baum, & Matthew Bell
Santa Clara University (USA)

Eight pigeons were used to analyze choice between concurrent schedules with the use of either a changeover delay or a fixed-ratio changeover requirement. This comparison was executed using seven reinforcer ratios randomly selected in each session, without signals or cues to identify them. Responding was measured during and after the changeover requirement in effect. Initial analysis pooled subject data, partitioned by changeover requirement, and investigated logarithmic ratios of pecks at the left and right keys. Sensitivities from the generalized matching law were compared reinforcer by reinforcer by fitting them to exponential growth curves. Sensitivity for the changeover delay was lower for longer requirement, but about the same for the two fixed-ratio requirements, demonstrating differences in matching based upon changeover requirements.

8) Contextual control of operant extinction learning: The effect of context pre-exposure procedure

Livia Sánchez-Carrasco, Rodolfo Bernal-Gamboa, & Javier Nieto
Instituto de Neurobiología Universidad Nacional Autónoma de México & Facultad de Psicología Universidad Nacional Autónoma de México (Mexico)

We analyzed the effects of context pre-exposure on ABA, ABC and AAB renewal in an operant procedure. In Experiments 1 to 3, we found that a reinforced pre-exposure to the contextual cues leads to ABA, ABC and AAB renewal, but pre-exposure to the context-only just leads to ABA and ABC renewal. Experiment 4 showed that extinguishing the context - reinforcer association established during pre-exposure attenuated AAB renewal. These results imply a differential effect of pre-exposure procedure on AAB vs both ABA and ABC renewal, their implications for retrieval information model are discussed.

9) Transitional and steady-state choice behavior under an adjusting-delay schedule

L Valencia Torres, S da Costa Araujo, CM Olarte Sanchez, S Body, CM Bradshaw, & E Szabadi
University of Nottingham (UK)

Twelve rats responded on an adjusting-delay schedule in which a smaller reinforcer was delivered immediately after a response and a larger reinforcer was delivered after a delay. Adjusting delays in successive blocks of trials were analyzed using the Fourier transform. The power spectrum obtained from individual rats had a dominant frequency that corresponded to a period of oscillation of the adjusting delay between 30 and 100 trial blocks (mean, 78). Power in the dominant frequency band was highest in the early stages of training, and declined with extended training. It is suggested that this method of data analysis may have utility in neurobehavioural studies of inter-temporal choice.

10) Behavioral economic analyses of orally self-administered MDMA ('Ecstasy') in rats

Lincoln Hely, Maree Hunt, & David Harper

Victoria University of Wellington New Zealand (New Zealand)

The reinforcing properties of orally administered MDMA ('esctasy') were examined by use of the self-administration procedure. Behavioral economic analyses were conducted in order to delineate the reinforcing effects of MDMA from that of its parent vehicle (saccharin). In addition, demand curve analysis using both the Linear-Elasticity model (Hursh et al., 1988, 1989) and the Exponential Model of Demand (Hursh & Silberberg, 2008) were compared in order to evaluate each model and assess the relative reinforcing efficacy of oral MDMA. Demand curves for the oral self-administration of MDMA revealed that responding for MDMA was more elastic (lower Pmax) than responding for the saccharin-alone indicating that saccharin functioned as stronger reinforcer than did MDMA+saccharin.

11) Selfishness and risk taking from the standpoint of discounting

Hiroo Yagi, Masato Ito, & Daisuke Saeki

Osaka City University (Japan)

The present study measured social discounting and probability discounting by using game situations to reveal a relationship between selfishness and risk taking. In the experiment, participants repeatedly played a social cooperation game in which they indicated their preferences between a smaller reward for themselves and a larger reward to be shared with the other player. They also repeatedly played a risky choice game where they made choices between a smaller certain reward and a larger probabilistic reward. Indifference points were estimated from the choice responses for each game and for each participant. As a result, there was a significant positive correlation between the social discounting and probability discounting. The present result suggests selfishness and risk taking have a common process.

12) Differences between obese and lean Zucker rats in sensitivity to relative reinforcement rates

Jessica Buckley, Steven Boomhower, & Erin Rasmussen

Idaho State University (USA)

The present study examines differences in matching in obese and lean Zucker rats using concurrent schedules of reinforcement. Lever-pressing of nine lean and ten obese Zucker rats was placed under three concurrent variable-interval variable-interval (conc VI VI) schedules in which the reinforcer ratios for 45-mg food pellets were 5:1, 1:1, and 1:5. Allocation of responses was characterized using the generalized matching equation. Though both groups exhibited undermatching, obese Zucker rats matched significantly better than leans with sensitivity values closer to 1. This efficient pattern of responding lead to overall higher deliveries of food pellets compared to lean rats. Sensitivity to varying rates of reinforcement then, may be another behavioral mechanism that contributes to an obese phenotype.

13) Extending the reward-enhancing effects of nicotine to reinforcer demand.

Scott T. Barrett & Rick A. Bevins Ph.D.

University of Nebraska – Lincoln (USA)

The present study assessed the reward-enhancing effects of nicotine on behavior maintained by sensory reinforcement and applied a reinforcer demand model to quantify the relationship between reinforcer cost and reinforcer presentations earned. Male Sprague-Dawley rats (16) were trained to lever-press for presentations of a visual stimulus (VS) in daily 1-h sessions. The unit cost of the VS was increased over blocks of 10 sessions. Rats received pre-session injections of either 0.4 mg/kg nicotine or saline on alternating days. Hursh's reinforcer demand model was fit to the data and the values of the parameters Q0, PMax, OMax, and α were ascertained. Nicotine administration enhanced both the intensity and persistence of VS-maintained responding, suggesting it enhanced the essential value of the VS.

14) Interpreting the effects of nicotine on the essential value of food

Rachel N. Cassidy & Jesse Dallery

University of Florida (USA)

Rats' demand for food across a sequence of fixed ratio schedules was assessed under 1- and 2-pellet per reinforcer delivery conditions in a closed economy. Then, subjects were administered nicotine at a dose of 3 mg/kg/day. The Exponential Demand Equation was fitted to the relation between normalized FR value and the logarithm of normalized reinforcer consumption and estimates of the alpha parameter, a putative measure of value, were obtained. The magnitudes of change in alpha values as a function of nicotine were compared using graphical representation, as well as descriptive and inferential statistical methods. Despite a large reduction in the level of demand, nicotine did not appear to substantially alter the essential value of food at either magnitude tested.

15) Analysis of postures for a visually guided arm reaching task

Ángel Andrés Jiménez, Felipe Cabrera, & Pablo Covarrubias

Universidad de Guadalajara Centro de Investigaciones en Ergonomía & Universidad de Guadalajara Centro Universitario de la Ciénega (Mexico)

Individuals participated in an experiment where the action modes used to reach for a block placed on a table at various distances from them were assessed using a discrete trials procedure. The choice of the reaching mode when varying the distance of the block was accurately described by a ratio principle. Most participants switched from the reaching using only arm extension to a mode of reaching using the upper torso to lean forward at closer distances than their own absolute critical boundary, beyond which the former action was no longer afforded. Results are discussed from a molar view of choice (Baum, 2002, 2004). It is suggested that ecological principles for action modes are congruent with behavior analysis.

16) Within- and between-session acquisition of temporal control in a rapid acquisition multiple peak interval procedure

Nathaniel Rice & Elizabeth Kyonka

West Virginia University (USA)

In the present experiment, four pigeons pecked in a rapid acquisition multiple peak-interval procedure in which pairs of delays changed mid-session. Delays in effect during the second half of a session remained in effect during the first half of the next session. Start and stop times, individual-trial measures of temporal control, were obtained on occasional no-food trials. Start and stop times were controlled by current delay for all subjects. However, patterns of acquisition and of adjustment when delays changed mid-session differed across subjects. Comparison of the present results with previous rapid acquisition research indicates that session onset can facilitate adjustment to unpredictable changes in delay.

17) Discounting the value of education in unemployed adults

Mikhail N. Koffarnus, Lucy Billiter, & Kenneth Silverman

Johns Hopkins University School of Medicine (USA)

Unemployed adults often fail to take advantage of educational opportunities that could increase their chances of employment, even when freely available. This study examined discounting of the value of employment opportunities as a function of the duration of additional education required. Unemployed, heroin-dependent adults enrolled in a therapeutic workplace intervention to promote drug abstinence and adherence to methadone were asked to make a series of choices between immediately available, lower-wage jobs and higher-wage jobs that would be available after completing varying durations of additional education. A standard monetary discounting task was also administered. Discount rates for both tasks, which were not correlated with one another, will be presented as a function of previous educational achievement and other factors.

18) Individual differences in impulsive choice behavior in different strains of rats

Ana Garcia, Angela Crumer, & Kimberly Kirkpatrick

Kansas State University (USA)

Different studies have examined impulsive choice behavior in Lewis (LEW) and spontaneously hypertensive rats (SHR) as possible pre-clinical models for disorders including ADHD. However, neither of these strains has been specifically bred for impulsivity and, as a result, their appropriateness as a model is questionable. In the current experiment, these two strains along with their controls were evaluated for impulsivity in a discrete-trial choice task. Individual differences among the rat within a strain accounted for a significant proportion of the total variance and contributed more variance than the strain of the rat. These results indicate that the SHR and LEW strains are not sufficiently homogeneous in their impulsive choice behavior to be considered as viable models for impulse control disorders.

19) Group and individual foraging behavior in a dynamic environment

Lavinia Tan & Timothy Hackenberg
Reed College (USA)

Group and individual foraging in an unpredictable environment was investigated with rats. Five subjects were tested, individually and as a group, in a free-ranging foraging situation where reinforcement was dispensed according to variable time (VT) schedules. Five reinforcement ratios, 1:1, 1:4, 1:8, 8:1, 4:1, were presented in 6-minute components in irregular sequences within and across sessions. Competitive ability, in terms of ability to obtain resources, was also assessed by delivering reinforcement only at one feeder. The ability of the generalized matching law and the Ideal Free Distribution to predict individual and group behavior, as well as the relationship between individual and group foraging performance were evaluated.

20) Temporal control of schedule-induced drinking in rats

Angeles Perez-Padilla, Pilar Flores, & Ricardo Pellon
UNED & Almeria University (Spain)

Rats were exposed to multiple fixed-time fixed-interval schedules of food pellet presentation which varied in inter-reinforcement interval length (30, 60 or 120 s). Rates of schedule-induced licking and schedule-controlled lever pressing generally decreased as food frequency decreased, with licking being located at the beginning of inter-food intervals and lever pressing at the end. Despite the different temporal locations, peak of responding shifted to the right as inter-food interval increased (roughly maintaining the same proportional location) both for adjunctive licking and operant lever pressing. Results conform to the suggestion that schedule-induced behaviour is control by operant contingencies.

21) Effects of the surface predictability on rodents' acceleration

Pablo Covarrubias, Rodrigo Guzmán, & Felipe Cabrera
Universidad de Guadalajara Centro Universitario de la Ciénega & Universidad del Valle de México (Mexico)

Little is known about how the predictability of surfaces within an environment affects rodents' performance. In two experiments, the predictability of turning right or left when hamsters and rats approached the corner was manipulated ($p=0.5$, or 1.0). The results were robust for both species: the rodents run faster when approached to the unpredictable corner ($p=0.5$). A more detailed analysis showed that rats' acceleration was higher during the first segment of the maze, under the low predictability.

22) Cessation of daily cocaine administration is associated with enhanced behavioral momentum: Some preliminary data

David R. Maguire & Marc N. Branch
University of Florida (USA)

Key-pecking in six pigeons was reinforced according to a multiple fixed-interval, fixed-time schedule of grain presentation. Effects pre-session feeding were assessed first during a period in which a moderate dose of cocaine was administered daily prior to each session. After at least 50 sessions of withdrawal (i.e., cessation of daily cocaine administration), effects of pre-session feeding were re-determined. Initially, in the context of daily cocaine administration, prefeeding produced amount-dependent disruptions in responding. During withdrawal, effects of prefeeding were attenuated. Results suggest that chronic-cocaine administration may enhance sensitivity of responding to effects of behavioral disruptors such as pre-session feeding.

23) A novel methodology for assessing delay discounting

Jin H. Yoon
Baylor College of Medicine (USA)

Delay discounting (DD) research has increased dramatically in the last decade. Various methods exist for assessing DD in humans. By and large, different DD tasks make trade-offs between sensitivity, task duration, and variety in presented values. Additionally, the sensitivity of the task can decrease when using commodities with relatively large prices. In the current proposal, we present a novel methodology for conducting an adjusting-amount, DD task. We will present data showing that the task is relatively sensitive, yet able to be completed within a reasonable amount of time. Additional features of the task include presentation of a variety of commodity values as well as commodities of relatively high prices and the ability to adjust in case of participant error.

24) Optimal foraging theory and NCAA basketball

Adam E. Fox & Elizabeth G. E. Kyonka
West Virginia University (USA)

Human risky choice for monetary outcomes is well described by the 'energy-budget rule' – an optimal foraging model. Presently, the energy budget rule was applied to data from men's college basketball during the 2010-11 season. A positive budget was defined as being ahead, tied or behind one point, while a negative budget was defined as being behind by 2 or more points. Consistent with the predictions of optimal foraging, players took 2-point shots more often in positive than in negative budgets. The proportion of shots consistent with the model's predictions in the negative budget increased as the game progressed. This is consistent with previous human operant research and extends those findings to naturalistic settings and non-monetary reinforcers.

25) Amount-dependent delay discounting in rats

Daniel Hutchison & Amy Odum

Utah State University (USA)

In humans, the degree of discounting by delay decreases as outcome magnitude increases. This magnitude effect is not found with non-human animals. Most studies assessing the magnitude effect with non-human animals have used adjusting delay or amount procedures. The current experiments examine the effect of outcome magnitude on delay discounting in rats with the more commonly used within-session Evenden and Ryan (1996) procedure. Self-control decreased when outcome magnitude was increased in Experiment 1. Baseline self-control was too low to allow strong conclusions, however, so in Experiment 2 we increased baseline self-control by reducing delays for the larger outcome. Thus far, the effects of outcome magnitude on delay discounting in rats in this procedure appear opposite to those obtained with humans.

26) Effects of short-term nicotine abstinence on delay-discounting

Gabriel Searcy & Cynthia Pietras

Western Michigan University (USA)

This study investigated how acute nicotine deprivation affects cigarette smokers' decision making in the delay-discounting tasks for money rewards. Sensitivities to reward amount and delay were independently investigated. This was accomplished using four tasks investigating: 1) typical delay-discounting, 2) delay sensitivity (amount held constant), 3) amount sensitivity (delay held constant), and 4) delay-discounting with reward amounts and delays matched to tasks two and three. Choice in 15 adult cigarette smokers was examined following a period of ad lib smoking and 24-hours of nicotine abstinence. Ten adult nonsmokers were included as a comparison group. Smokers' typical delay-discounting rates changed in a manner that indicates greater impulsivity. Results suggest that changes in discounting were a result of changes in amount sensitivity.

27) Effects of fixed- and random-ratio schedules on opioid demand in rhesus monkeys

Carla H. Lagorio & Gail Winger

University of Michigan (USA)

An organism's consumption of a good is determined by a variety of factors, including price, baseline levels of unrestricted consumption, availability of substitutes or compliments, and income. More recently it has been demonstrated that reinforcement schedule also affects demand, with random ratio schedules supporting more behavior than fixed ratios at large response requirements. The current study extends this work by analyzing demand for different doses of Remifentanil – a potent short-acting opioid – under increasing fixed and random ratio work requirements. Results confirm that random-ratio schedules maintain higher response rates at larger ratios. These data will be discussed with respect to unit price (relation between response requirement and drug dose) and behavior maintained by variable delays to reinforcement.

28) Effects of preference rating task on choice between human face images

Emily Foreman, Nicole Roberts, & Elias Robles
Arizona State University (USA)

Subjective value is often estimated by measuring patterns of choice between concurrently available goods. Previous research has revealed dynamic changes in response time (RT) during choice tasks, depending on the amount of exposure to and the relative preference for each stimulus. In this study, college students (N=40) were randomly assigned to alternative orders of exposure to two tasks. In the sequential task subjects were asked to rate their liking of a human face image on a 10-point scale. In the concurrent task participants were asked to choose the most liked face from pairs of images. The results replicate earlier findings, and show systematic effects of the order of completion of the tasks on preference ranking and RT.

29) D-amphetamine affects start and stop times on the long interval in a response-dependent temporal bisection procedure.

Hutsell Blake A. & Newland M. Christopher
Auburn University (USA)

Recent research has demonstrated that dopaminergic drugs may differentially affect timing of one interval when subjects are required to time multiple intervals simultaneously. The present study employed a temporal bisection procedure in which sample offset was response-dependent. Subjects were required to respond on either the short or long response alternative to transition from sample presentation to the choice phase. A range of doses of d-amphetamine (0.056 – 1.7 mg/kg) were administered ip to 6 BALB/c mice. D-amphetamine administration primarily affected within-sample responding at the long response alternative. Specifically, d-amphetamine disrupted timing by decreasing start times and increasing stop times on the long response alternative. in discounting were a result of changes in amount sensitivity.

30) How many FRs are needed? A comparison of demand curve equations.

Wendy Donlin Washington & Brian Coleman
University of North Carolina – Wilmington (USA)

Constructing demand curves requires many FRs. Food demand curves were used as a baseline for examining punishment effects. With 14 FRs used, it was difficult to maintain weight, establish 14 stable baselines and examine the effects of punishment. Identifying the most important FRs in the demand curve would facilitate methods refinement. Asymptotic consumption (Q_0), price at maximum responding (P_{max}) and essential value (α) were compared when permutations of 0 to 10 FRs were omitted from the calculation. High FR omission changed the overall demand curve more than omitting low FRs. However, up to half of the FRs without appreciably altering the function values.

31) Chronic stress impairs performance in a response-withholding task

Gabriel J. Mazur, Agnieszka Mika, Ann N. Hoffman, Cheryl D. Conrad, & Federico Sanabria
Arizona State University (USA)

Performance of rats on a fixed minimum interval (FMI) task was compared pre and post 28 days of chronic (6h/d) restraint stress. The FMI task required rats to press a lever and subsequently withhold a head entry into a food receptacle for a fixed interval, in order to receive a sucrose reinforcer. Compared to non-stressed controls, chronically stressed rats showed reduced motivation to initiate the FMI sequence, and significant deficits in the ability to withhold the reinforced response.

32) Social discounting of the stress-mitigating effect of social support

Jorge A. Ruiz
Universidad Nacional Autonoma de Mexico (Mexico)

It was determined if the value to a person of stress-mitigating effect of social-support provided by another person, follows a hyperbolic function of the social distance between receiver and supporter. A group of students were asked to estimate the stress magnitude in a situation in which they had to cope with life-events of imprisonment and change of responsibilities. It was found that the magnitude of the stress-mitigating effect of social support followed a hyperbolic function of social distance between receiver and supporter. This function was stepper for imprisonment than for change of responsibilities. In conclusion, there is a social discounting of stress-mitigating effect of social support as well as when social discounting is measured in allocation of available resources.

33) Transitions between unpredictably changing and unchanging terminal-link immediacy ratios have differential effects on response allocation at the beginning and ends of sessions

Elizabeth Kyonka & Randolph Grace
West Virginia University (USA) & University of Canterbury (New Zealand)

Pigeons pecked in concurrent-chain schedules with fixed-interval terminal links. Programmed terminal-link immediacy ratios either changed unpredictably across sessions ('rapid acquisition') or did not change within a condition ('steady state'). Log initial-link response allocation, a measure of preference, was recorded for each of 6 blocks of 12 initial- and terminal-link cycles in each session. Preference stabilized within rapid acquisition sessions and steady state conditions. When conditions were changed from rapid acquisition to steady state or vice versa, response allocation in the first block adjusted gradually but response allocation in the final block adjusted within 1-2 sessions. These results were consistent with predictions of a linear-operator 'decision' model for choice.

34) Influence of immediate amount presentation on degree of discounting in a hypothetical money choice task

Rodzon Katrina S., Berry Meredith S., Odum Amy L., & Jordan Kerry E.
Utah State University (USA)

In delay discounting, a common measure of impulsivity, participants choose between a smaller immediate reward versus a larger delayed reward. Previous results have found that different sequences of smaller reward presentation (i.e., ascending, descending, random) produce different degrees of discounting. The present experiment determined whether the initial amount presented influences the degree of discounting for \$100 (hypothetical). The order of amount presentation was randomized for each delay (e.g., small then large then medium). The degree of discounting was affected by the initial amount presented at the first delay. Smaller initial amounts produced higher levels of impulsivity while larger amounts produced lower levels of impulsivity. The initial framing of choices can influence the degree of discounting shown in laboratory choice procedures.

35) Extinction in an animal model of ADHD: A bout-response analysis identifies deficits beyond baseline performance

Ryan J. Brackney, Jade Hill, Katrina Herbst, & Federico Sanabria
Arizona State University (USA)

An extinction deficit may serve as a behavioral marker of ADHD (Sagvolden et al, 2005), yet supporting evidence remains equivocal. For instance, differences in extinction performance between ADHD and control subjects may simply reflect baseline performance differences (Alsop, 2007). We compared the extinction performance of an animal model of ADHD, the Spontaneously Hypertensive Rat (SHR), to its control strain, the Wistar Kyoto (WKY). Parameters of the dynamic bi-exponential model of instrumental performance (Brackney et al, 2011, under review) were estimated. The model dissociated bout initiation rate, within bout response rate, and bout length and allowed them to decay during extinction. Results suggest that, aside from baseline differences, perseveration in SHRs during extinction reveals deficient reinforcement processing.

36) Dissociating motivation and trait impulsivity using the Fixed Minimum Interval (FMI) schedule

Elizabeth Watterson & Federico Sanabria
Arizona State University (USA)

Response disinhibition is a variety of impulsivity that is often assessed using the differential reinforcement of low rates (DRL) schedule. Mechner and Guevrekian (1962) modified DRL by separating the location of the responses that demarcate the withholding interval, calling it the fixed minimum interval (FMI) schedule. We examined the effect of motivational manipulations on FMI performance. The effects of reinforcement rate (VI 30 vs. VI 90) and magnitude (2 s vs. 6 s grain access) on latencies and withholding intervals were examined. Longer latencies were observed with (1) higher reinforcement rate, (2) smaller reinforcers, and (3) following reinforced trials. Withholding intervals were insensitive to experimental manipulations. These results support the use of FMI to measure trait impulsivity in non-human animals.

37) Reinforcer devaluation in a heterogeneous chain schedule depends on the food restriction

Tyson W. Baker, Ronald G. Weisman, & Richard J. Beninger

Queen's University (Canada)

The present experiment exposed an important limitation on the devaluation of conditioned reinforcers by extinction of responding for the primary reinforcer: reducing rats' food motivation even slightly below a level that supported successful reinforcer devaluation eliminated the effect without eliminating reinforcer-based learning. Rats pressed a lever in a heterogeneous chain schedule to produce a conditioned reinforcer, associated with the opportunity to obtain a reinforcer (food) by pulling a chain. How and how much rats were deprived mattered very much: restricting meal duration to one hour daily produced more lever pressing during baseline training and a greater reductive effect of devaluation on lever pressing by extinction of chain pulling. Restricting body weight to 80% of a control rat's weight reduced the effect of devaluation to nil. Further analysis suggested that meal-duration restriction produced devaluation effects because it was more effective than weight restriction in reducing rats' body weights, which increased the incentive value of a conditioned reinforcer.

38) A novel serial rank-ordering paired comparison procedure reveals competitive disadvantages caused by early seizures.

John Neill

Long Island University (USA)

Whether brief seizures in premature human infants cause long term deficits in learning and behavior is controversial. In the present experiments, male rat pups were administered eight brief seizures on postnatal days 6-9. Control animals were given no seizures, but had identical conditions otherwise. During adolescence and adulthood animals were tested in plus maze exploration and go-no go auditory discrimination. Early brief seizures induced persistent deficits in exploration and auditory extinction learning. These effects were not evident when analysis was performed using group statistics, but were clearly evident when data of individual animals were compared using a novel serial rank-ordered paired comparison procedure. This unique analysis revealed that brief early seizures confer long-term competitive disadvantages.

End First Poster Session



1) Reinforcers and stimuli

Cowie Sarah, Davison Michael, & Elliffe Douglas
University of Auckland (New Zealand)

Research suggests that reinforcers may act as stimuli signaling future food-location contingencies. In a modified concurrent VI VI procedure the overall food ratio was held at 1:1, and food deliveries were available according to a VI 5-s schedule on the not-just-productive key, or on a VI 50-s schedule on the just-productive key. The last-food location was signaled during the next inter-reinforcer interval by a red keylight, and the duration and temporal location of this signal was varied across conditions. Local preference was jointly controlled by the likely sooner-food location and by the characteristics of the signal.

2) Testing a model of resurgence: Time in extinction and repeated resurgence tests.

Mary M. Sweeney & Timothy A. Shahan
Utah State University (USA)

Resurgence is a relapse phenomenon that occurs when an alternative source of reinforcement introduced during extinction of an operant response is subsequently removed. Using pigeons, this series of experiments tested two predictions of a quantitative model of resurgence developed by Shahan and Sweeney (2011). First, the model predicts that resurgence should decrease as time in extinction with alternative reinforcement increases. Second, the model characterizes resurgence as resulting from movement between two separate extinction functions, one with the additional disruption produced by the presence of the alternative reinforcement and one without. The results were generally consistent with the quantitative predictions of the model.

3) Reinforcement of saccadic peak velocities.

Laurent Madelain & Celine Paeye
Universite Lille Nord de France (France)

Purpose: In these experiments we ask whether saccadic peak velocities may be controlled by operant conditioning. Methods: Five human subjects made saccades to a stepped target. In a first experiment ($n=3$), a tone signaling points was delivered when the peak velocity was higher than the 60th percentile (based on the 100 preceding saccades). In a second experiment ($n=2$), the tone was delivered when the peak velocity was lower than the 40th percentile. Results: Peak velocity increased by about 14% in the first experiment and decreased by about 12% in the second experiment. Conclusions: The ability to reinforce specific peak velocities is consistent with previous studies probing the effects of operant conditioning of eye movements.

4) The effect of training-stimulus durations in the temporal bisection procedure

Sho Araiba & Bruce L. Brown

The Graduate Center City University of New York, Queens College City University of New York (USA)

The present study investigates temporal discrimination in the temporal bisection procedure. Most animal studies find the bisection point (PSE) at the geometric mean of two training durations. Machado and Keen (2003) found that when the training durations were shifted from 3 vs. 9 s to 3 vs. 27 s, the mean departure time (corresponding to PSE) did not shift to the new geometric mean. The present study will manipulate training-stimulus durations in a test of a novel hypothesis that PSE is determined in part by a learned discrimination between training and test stimulus durations. Reference Machado, A. & Keen, R. (2003). Temporal discrimination in a long operant chamber. *Behavioural Processes*, 62, 157-1825)

5) Conjoint reinforcement of variation and repetition: Effects of repeated target acquisition and lag value

Andrew T. Fox & Mark P. Reilly

Central Michigan University (USA)

Four-response sequences of responding across left and right levers (L and R) were reinforced according to a conjunctive variable-interval lag x contingency; emitted sequences were reinforced with one food pellet on the average of 60 s as long as they differed from each of the previous x sequences. Once U-value (a variability summary statistic) was stable across sessions, a target sequence (e.g., LLRR) was chosen on the basis of frequency of emission during baseline to be reinforced continuously by three food pellets. The process was repeated so that each subject acquired two target sequences, one each from lenient (lag 1) and strict (lag 10) variability baselines. Target acquisition was more robust under the lag 1 baseline.

6) Reinforcement-delay signals as conditioned reinforcers in a serial discrimination reversal paradigm in pigeons

Bertram O. Ploog & Ben A. Williams

College of Staten Island -- City University of New York, University of California at San Diego (USA)

In two experiments, thirty-two pigeons learned a series of reversals of a simultaneous red-green visual discrimination with a reinforcement delay of 6 s. An 8- or 40-s intertrial interval (ITI) and different types of signals during the reinforcement delay were used (a novel signal or a reversal of the old S+/S- signals). Overall, the 8-s ITI resulted in better performance, and both signal manipulations resulted in temporarily lowered performance which ultimately recovered to previous levels. Furthermore, correlated with such a performance recovery, without scheduled response-reinforcer contingencies, pecks at the S+ delay signals emerged. Overall, these findings provided evidence for conditioned reinforcement properties of the S+ signal but were not consistent with a timing, an information, or a "signpost" hypothesis.

7) Delay and Probability Discounting among Payday Loan Borrowers and Controls

Steven Lawyer

Idaho State University (USA)

Individual differences in the rates of reward discounting are associated with a variety of impulsive choice patterns (e.g., substance abuse). The use of pay day loans fit well within the discounting paradigm, since individuals pay a substantial fee to obtain a short-term loan until the individual's next paycheck. In this study, adult participants reporting ($n = 15$) and denying ($n = 46$) a lifetime history of using payday loans completed delay and probability discounting tasks in relation to hypothetical money (\$10). Discounting for both groups was well-described by hyperbolic decay models, but pay day loan borrowers discounted the value of delayed rewards at a steeper rate than did non-borrowers. There was no difference in the rates of probability discounting.

8) Performance comparisons between single and multiple dimension categorization tasks in human subjects.

Mark Berg, Sean Lawlor, & Michelle Lohrey

The Richard Stockton College of New Jersey (USA)

Humans have a long track record of categorizing multiple dimensions. Maddox and his colleagues, (2005) have used Gabor patches in categorization tasks extensively. The stimuli can vary in terms of orientation and frequency, and are used in category learning tasks in which subjects must either integrate information from both dimensions to respond optimally or ignore one of the stimulus dimensions. The current study tested performance in both a multiple and single dimensional tasks and compared data. Our results replicated earlier findings but unlike previous studies we used a small number of subjects in a within-subjects design providing subjects with more exposure to the conditions than in previous experiments. Models of categorization were fit to individual subject data.

9) Evaluating the Bipolar Effect with a Concomitant CFT / VI Schedule

Renee Burt, Rusty Nall, & William Palya

Jacksonville State University (USA)

The purpose of the present research was to develop a preparation that could be used to examine the bipolar properties of behavior controlled by a clocked fixed-time (CFT) schedule. Since little or no responding occurs at the beginning of fixed-temporally based schedules, the examination of the "negative going" half of behavior from a bipolar perspective is problematic. Forty-four pigeons were exposed to a CFT schedule presented concomitantly with a variable-interval (VI) schedule. Responding during four different CFT durations was examined with each of five different VI durations. The VI schedule increased the response rate throughout the CFT schedule allowing the examination of responding during the negative (i.e., early) portions of the interval.

10) Effects of conditioned satiety on within-session changes in glucose-solution drinking behavior

Kenjiro Aoyama

Doshisha University (Japan)

This study tested the effects of conditioned satiety on within-session changes in drinking behavior. Rats (N=8) were trained to drink 30%-glucose solution in the 30-min sessions. One flavor (flavor H) was associated with 40%-glucose solution and another flavor (flavor L) was associated with 20%-glucose solution. During the test sessions, these two flavors were alternated using an ABBA design but concentration of glucose solution was always 30%. Conditioned satiety was observed, i.e., rats drank more 30%-glucose solution with flavor L than 30%-glucose solution with flavor H. However, within-session pattern of licking behavior was similar between the two conditions. These results suggest that conditioned satiety does not affect within-session changes in drinking behavior.

11) Effect of orexin-B-saporin induced lesions of the lateral hypothalamus on performance on a progressive-ratio schedule

Olarte Sanchez CM, Valencia Torres L, Body S, Cassaday HJ, Bradshaw CM, & Szabadi E

University of Nottingham (UK)

Orexinergic neurones of the lateral hypothalamic area (LHA) are believed to play a role in regulating incentive reinforcer value. We examined the effect of disrupting orexinergic mechanisms on progressive-ratio (PR) schedule performance. After training under the PR schedule, rats received bilateral injections of the selective neurotoxin orexin-B-saporin (OxSap) into the LHA or sham lesions. An equation derived from Killeen's (1994) model, Mathematical Principles of Reinforcement, was fitted to the response rate data in successive blocks of 10 sessions. The parameter expressing incentive value was not altered by the lesion. However, the parameter related to maximum response rate was significantly affected. It is suggested that the OxSap-induced disruption of PR performance was brought about by a change in non-motivational (motor) processes.

12) Contribution of training an incompatible behavior with eating food for self-controlled eating behavior with pigeons

Andrea Juarez, Raul Avila, & Juan C. Gonzalez

National Autonomous University of Mexico (Mexico)

The effects of training key-pecking as an incompatible behavior with eating food and of presenting or not a key on self-controlled eating behavior was studied in 12 food-deprived pigeons which were exposed to 3-s food-hopper presentations. A first food-hopper was always presented within a 64-s time cycle and a second one could be presented once the cycle elapsed, according to the following contingency. Trying to eat during the first food-hopper presentation interrupted it and cancelled the second one. Otherwise, eating during the second food-hopper presentation could occur. Self-controlled eating was facilitated by the response-key presentation and this effect was higher with previous key-pecking training than without it. The implications of this self-control eating procedure for self control are discussed.

13) Probability Discounting in Pigeons

Luis Oliveira, Leonard Green, & Joel Myerson
Washington University in St. Louis (USA)

Green, Myerson, and Calvert (2010) recently showed that pigeons' discounting of probabilistic reinforcers is well described by a hyperboloid function like that which describes the discounting of delayed reinforcers. However, different reinforcer probabilities corresponded to different VR values, and choice appeared to be controlled by delay to reinforcement. Accordingly, the current experiment used a concurrent-chain procedure with certain and probabilistic terminal links that equated the time from the choice response to the certain and probabilistic reinforcers. The hyperboloid function provided a very good fit to the data. Consistent with previous results on delay discounting in animals, but in contrast to those with humans, there was no effect of reinforcer amount on discounting rate (i.e., no magnitude effect).

14) Teaching self-control: The effects of behavioral history on delay discounting in rats

Sarah E. Edwards, Christine E. Hughes, & Raymond C. Pitts
The University of North Carolina Wilmington (USA)

Rats were exposed to a delay-fading procedure similar to the one described by Mazur and Logue (1978). Initially, they chose between larger and smaller reinforcers, both delayed by 6 s. For the fading group, the delay for the smaller reinforcer was decreased gradually to 0 s across sessions. For the control group, the delay to the smaller reinforcer was decreased abruptly. Following training, both groups showed a substantial preference for the larger, delayed reinforcer; there was no significant difference across groups. Delay-discount functions then were established in both groups. Initially, the functions for the experimental group were slightly shallower than the control group's. This difference disappeared with continued exposure to the procedure.

15) Three potential learning rules for conditioning active interresponse times to choice

Jenica R. T. Law, Paul A. Misak, & J. Mark Cleaveland
Vassar College (USA)

We used a computer program to model the conditioning of active interresponse times (IRTs) to stay/switch responses under concurrent VI VI schedules of reinforcement. Active IRTs—the time since the last response in a choice situation—have been shown to impact choice (Cleaveland, 2008). Our model explored three learning rules: leaky integrators, a variant of the Rescorla-Wagner model, and a comparison of reinforcement probabilities, and was applied across concurrent VI VI schedules utilizing a stochastic decision rule based on Luce (1977). When comparing models, we considered the overall proportion of responses to each schedule, and the proportions of reinforcement for stay/switch responses along with the switch probability at different active IRTs. Our results permit a bottom-up account of several current choice models.

16) Conditioned Stimulus Effects of Nicotine: The Role of Nicotine Dose during Extinction

Robert Polewan, & Rick Bevins
University of Nebraska (USA)

Excitatory conditioning with the interoceptive effects of nicotine as a conditioned stimulus (CS) likely contributes to chronic tobacco use and the tenacity of nicotine addiction. To understand the nature of the interoceptive stimulus effects of nicotine and related extinction processes, we examined the extent to which extinction learning with nicotine doses other than the training dose will transfer back to the trained nicotine CS. The two training doses examined were 0.2 and 0.4 mg/kg; extinction doses ranged from 0.05 to 0.6 mg/kg. Extent of transfer of extinction learning was only evidenced in the experiment in which rats received training with the higher nicotine dose. Understanding the processes mediating extinction learning with nicotine may reveal new strategies for treatment.

17) Extinction and re-extinction of a nicotine-evoked CR with bupropion

Sergios Charntikov, Nicole R. Wells, Kayla M. Fink, Christopher C. Ihle, & Rick A. Bevins
University of Nebraska-Lincoln (USA)

Although a large number of individuals attempt to quit smoking only few are able to succeed long term. Conditioning processes involving nicotine likely contribute to this addiction. The purpose of this study was to determine whether extinction of nicotine CS-evoked CR (0.4 mg/kg) with a ligand that shares stimulus effects (i.e., bupropion) differed from re-extinction with bupropion (20, 30 mg/kg). During the initial extinction phase both bupropion doses fully substituted for nicotine. During re-extinction, higher bupropion dose continued to fully substitute, yet the lower bupropion dose only partially substituted for nicotine. Generalization of this extinction history back to the nicotine CS also varied as a function of a groups' extinction learning history.

18) Interoceptive conditioning with the nicotine stimulus susceptible to revaluation.

Steven T. Pittenger, Lindsey C. Zeplin, & Rick A. Bevins
University of Nebraska-Lincoln (USA)

Contributing to the etiology of nicotine dependence is Pavlovian conditioning processes. In this study, nicotine was trained as a conditioned stimulus (CS) paired with sucrose in a discriminated goal-tracking task in rats. The sucrose unconditioned stimulus was then devalued in a separate context by pairing it with LiCl. The nicotine-evoked conditioned response (CR) was weakened when tested 24 h later in the chambers in which original training occurred. Following this testing, the conditioned taste aversion was extinguished for half the rats and the nicotine CS was retested. The nicotine-evoked CR remained diminished in this test. Nicotine-evoked conditioned responding was subject to revaluation suggesting that nicotine acted as an interoceptive contextual CS, forming a direct association with the sucrose.

19) The effect of changes in motivational state on timing.

Tiffany Galtress & Kimberly Kirkpatrick
Kansas State University (USA)

A change in motivational state by pre-feeding prior to a test session disrupts timing of a previously trained duration under food restriction (Roberts, 1981; Galtress and Kirkpatrick, 2009), yet the source of this disruption remains unclear. In the present experiment, rats were trained on a FI-60 s peak procedure. Half the rats were trained under food restriction and pre-fed prior to a subsequent test session, whereas the remaining rats were pre-fed prior to each training session and tested under food restriction. Both manipulations produced a peak at the usual time of reward during training and a rightward shift in the peak function on test. These results suggest that changes in motivational state disrupt attention to time the delay to reward.

20) Effects of a DRO contingency on resistance to extinction and reinstatement of alcohol self-administration

Adam D. Pyszczynski & Timothy A. Shahan
Utah State University (USA)

Behavioral momentum theory predicts resistance to change (RTC) and propensity to relapse are governed by the overall rate of reinforcement in a stimulus context. The present experiment examined the effects of food delivered contingent on periods free of alcohol-maintained responding on RTC and relapse of alcohol seeking. Rats lever-pressed in a multiple schedule of reinforcement with identical schedules of alcohol delivery. A DRO schedule also operated in one component providing food for withholding lever presses. After baseline, all reinforcers were withheld until responding fell below 10% baseline. Response-independent alcohol deliveries were then presented in the first two components of each session. Both RTC and reinstatement were greater in the component previously associated with DRO food despite lower baseline response rates.

21) An Investigation of Time Constraints on Delay Discounting Tasks and the Models that Fit

Richard Hennigan & Darlene E. Crone-Todd
Salem State University (USA)

Previous delayed discounting research reveals a systematic relationship between the magnitude and temporal proximity of monetary rewards, which is typically explained by hyperbolic discounting models. Using hypothetical rewards (e.g., \$100 and \$5000) on a delayed discounting task, the current research investigates the effects of adding varying time constraints (e.g., none, 7 min, and 14 min) to the task in order to introduce a controlled influence on impulsivity. Both hyperbolic and additive-utility models are used to investigate how the parameters of each model differ with varying time constraints. It is expected that the use of a time constraint will affect the discounting rate across the delay, and that the additive-utility model will better reveal variations in rate change.

22) Cluster Analysis of Compound Stimuli in a Connectionist Model

Angel Tovar & Alvaro Torres

Universidad Nacional Autónoma de México (Mexico)

We analyze the formation of two three-member classes of arbitrary stimuli with compound stimuli and a Yes/No response procedure. Four out of six humans showed a performance indicative of class formation. The experimental task was simulated in a Connectionist Model, five out of six runs of the model also showed the formation of the classes. We observe that before the activation of a response node, the input patterns are transformed into similar activation values for stimuli pairs that belong to the same stimulus class. By calculating the Euclidean distance between the activation values of the hidden layer of the network, we show how stimuli pairs that are associated with the Yes response also belong to other classes.

23) Trial-by-Trial Matching

Greg Jensen & Peter Balsam

Columbia University & Barnard College of Columbia University (USA)

Traditionally, Generalized Matching (Baum, 1974) has been used to model molar behavior. This approach, however, is limited to processes that are presumed to both to be constant across conditions and to have steady-state characteristics within a particular set of conditions. We present a method for obtaining estimates of sensitivity to reinforcement on a response-by-response basis, permitting non-steady-state phenomena, such as acquisition, to be examined. By combining elements of the barycentric matching model and change-point-based rate estimation, we apply this method to data collected from rats with four, six, and eight concurrently available operanda. We find, contrary to the implicit assumptions of Generalized Matching, that sensitivity can vary considerably depending on schedules of reinforcement and operandum layout.

24) Chronic stress induced by electric shocks reduces food and water intake and body weight in rats.

Marina González-Torres, Cristiano Dos Santos, & Carlos Flores

Universidad de Guadalajara (Mexico)

This experiment evaluated the effect of inescapable shocks on feeding behavior. One group of rats was exposed to electric shocks with the possibility to escape, and two other groups were exposed to inescapable shocks, one of them yoked to the first group and another with fixed shock duration; a control group remained in its home cages. Baseline sessions with no shock were interspersed with shock sessions in an ABABA design. Results suggest that chronic stress induced by electric shocks decrease food and water consumption and diminished the percentage of body weight gain.

25) A Computational Model of Selection by Consequences: Effects of the changeover delay (COD) on the impulsive behavior of a virtual organism.

Andrei Popa, Jack J McDowell
Emory University (USA)

Popa and McDowell (2010) showed that a particular mathematical feature (the Hamming distance) of McDowell's evolutionary model (McDowell, 2004) is computationally equivalent to the changeover delay (COD) used in experiments with live organisms. McDowell and Popa (2010) suggested that mutation, one of the Darwinian rules implemented in the model, is computationally equivalent to impulsivity. The present study clarified the way Hamming distances affect the adaptive behavior of the model, at various levels of mutation. Results were qualitatively and quantitatively congruent with those recently reported in the AD/HD literature: high mutation rates (high impulsivity) resulted in low exponents (a) and increased frequency of switching; the maladaptive effects were meliorated by increasing the COD value (Taylor et al., 2010).

26) Reduced sensitivity to variation in reward frequency in a transgenic mouse model of schizophrenia

Ryan D. Ward, Nicole M. Rudy, Julia B. Kahn, Kathleen M. Taylor, & Peter D. Balsam
Columbia University & Columbia University & Barnard College (USA)

The present experiment assessed sensitivity to variations in reward frequency in mice which model an aspect of the proposed pathophysiology of schizophrenia: increased activity of striatal dopamine D2 receptors (D2OE). Control and D2OE mice were exposed to concurrent RI schedules and the relative rate of rewards obtained from the two response options was varied across conditions. Generalized matching law analysis of the response data showed that D2OE mice were less sensitive to variations in reward frequency than controls. Together with other data from these mice, these results suggest that D2OE mice are impaired in their ability to calculate value or to use this information to effectively guide their behavior. These results are similar to recent results reported in schizophrenia patients.

27) Effects of Relative Reinforcement Rate on Operant ABC Renewal

Meredith S. Berry, Timothy A. Shahan, & Amy L. Odum
Utah State University (USA)

Behavior that is more richly reinforced is more resistant to extinction and prone to relapse. Little is known, however, about renewal of extinguished responding in operant paradigms. In the present experiment, we examined the effects of reinforcer rate on ABC renewal in a multiple schedule with pigeons. In the lean component, 0.5 reinforcers per min were available for key pecking; in the rich component, there were an additional 1.5 reinforcers per min available response independently. After baseline, extinction was implemented in the B context, followed by a switch to the C context. Behavior in the rich component was more resistant to extinction in B, and recovered to a greater degree in C, relative to behavior in the lean component.

28) Classical Conditioning of Up-regulation Function of TNF- α in Sprague-Dawley Rats

Ashley Brandebura & Rodney Clark
Allegheny College (USA)

Classical conditioning of the immune system via kappa opioid mechanisms was evaluated. Eighteen Sprague-Dawley rats served as subjects. Rats in the control condition received saccharin – water paired with saline injections (1ml/kg bwt.). In another condition rats were given saccharin – water and injected with the kappa antagonist, Nor-BNI (3.2 mg/kg). In the other condition rats were given saccharin – water paired with the kappa agonist U69, 593 (0.32 mg/kg). Levels of TNF- α present in rat blood serum were determined. Results indicated that the antagonist group (nor-BNI) showed elevated levels of TNF- α and the agonist group (U69, 593) showed decreases in TNF- α . Control levels of TNF- α lie between agonist and antagonist groups.

29) Classically Conditioning the Up-Regulation of TNF- α and IL-2 for Overall Immune System Enhancement in Sprague-Dawley Rats

Ashley Brandebura & Robin Ellege
Allegheny College (USA)

The purpose of this experiment was to analyze an alternative treatment for immune system disorders that can bypass activation of the “Negative Feedback Loop” of immunity. This alternative method uses “Classical Conditioning” to demonstrate that the effects of a drug can be conditioned, resulting in a similar but lessened physiological response to treatment. Eighteen Sprague-Dawley rats served as subjects. Saccharin water was paired with injections of saline, nor-BNI or U69,593. Groups were further subdivided into Classical Conditioning and Sustained Drug Treatment conditions. The level of TNF- α present in rat blood serum served as the independent variable. The results indicate that the lessened physiological effect demonstrated in the CC Antagonist group was beneficial to overall immune system function.

30) The differential extinction of avoidant lever-pressing in an animal model for OCD

Brittany Sider, Marika Faytell, & J. Mark Cleaveland
Vassar College (USA)

We examined the differential extinction of repetitive, avoidant lever pressing in CD-1. Four groups of mice were used in a 2 x 2 design, where reliability of an external safety signal during training and exposure of this signal during extinction trials were manipulated. Our hypothesis was that responses caused by certain types of aversive conditioning can become conditioned inhibitors, or safety signals. For environments in which a response is the best predictor of safety and given the transient stimulus properties of a response, we expect responses to become increasingly “compulsive” and more difficult to extinguish. Data is presented in terms of an animal model for obsessive-compulsive disorder (OCD) with particular attention to exposure/response prevention therapy.

31) The effect of stimulus probability and position on simultaneous temporal processing

Andrew Marshall, Mika L. M. MacInnis, David Freestone, & Russell M. Church
Kansas State University & Brown University (USA)

The goal of the experiment was to determine how rats use a stimulus varying in two attributes to adjust their behavior in a simultaneous temporal processing task. Within a fixed 120-s food-to-food interval, a shorter stimulus-to-food interval (e.g., 40, 80 s) was presented. The probability of stimulus presentation varied across phases (e.g., .33, .66). Modular theory was used to determine how effective each stimulus (i.e., previous food and stimulus) was at controlling anticipatory behavior. Stimuli presented closer to food availability exerted more control than those presented farther away. More frequent stimuli exerted more control than less frequent ones. Our results suggest that behavior is more effectively controlled by more reliable events.

32) Intermodal transference of duration: An extension of the temporal codification hypothesis

Marina Menez, Sarahi Gallardo, & Florente López
Universidad Nacional Autónoma de México (Mexico)

Intermodal transference of duration in Fixed Interval (FI) schedules (Roberts & Church, 1978) is a well established finding. Duration transference is considered a demonstration of the ability of organisms to abstract duration as an attribute of the stimulus (Church, 2002). In order to understand how this learning is attained, Wistar rats were subjected to a Fixed Time (FT) 30s schedule or a Random Time (RT) 30s schedule for 30 sessions. Stimulus duration was signaled by the houselight. Then, all subjects received a Fixed Interval (FI) 30s schedule, signaled by a tone for 30 more sessions. Results indicated FT exposure speed up acquisition of temporal learning and support an interpretation in terms of the temporal codification hypothesis (Savastano & Miller, 2002).

33) Interaction between delay and magnitude of reinforcement in rats

Vladimir Orduña, Guadalupe Cruz, & Arturo Bouzas
Universidad Nacional Autónoma de México (Mexico)

In the present experiment, we analyzed the interaction between delay to reinforcement and its magnitude, employing a two component concurrent-chains schedule, with rats as experimental subjects. In each component, dependent VI 30 s schedules were presented in the initial links in all 4 conditions; in the terminal links the following delays to reinforcement were presented (Fixed Time schedules for a group, Fixed Interval schedules for other): 2-28, 28-2, 6-24, 24-6 s in conditions 1-4, respectively. The difference between components was the magnitude of reinforcement: One 45 mg. pellet in component A, four in component B. For both groups, the sensitivity to delay, calculated according to the Generalized Matching Law, was higher in the component with the large reinforcer.

34) Assessing Two Control Procedures for Latent Inhibition

Cristina Dos Santos & José E. Burgos
University of Guadalajara (Mexico)

A conditioned freezing preparation with four groups of rats (C, L, T, N) was used to assess two control procedures for latent inhibition. C was preexposed to the context alone, L to a light, and T to a tone, all followed by light-shock pairings. N received light-shock pairings without any preexposure treatment. C showed significantly more conditioned freezing than L and N. This result confirms the context facilitation effect, which questions preexposure to the context as a control procedure. T showed significantly more conditioned freezing than the other groups. This result confirms a prediction by a neural-network model and questions preexposure to a different stimulus as a control procedure.

35) A comparison of response-bout analysis methods using BALB/c mice chronically exposed to methylmercury

Daniel J. Hoffman & M. Christopher Newland
Auburn University (USA)

Chronic methylmercury exposure produces motor and behavioral deficits. In the present experiment, BALB/c mice were exposed to 15 ppm MeHg via their daily drinking water for 18 weeks. Control and exposed animals were given weekly 3-hr free access to a running wheel. Inter-response time (IRT) distributions for each session were analyzed using two forms of response bout analysis: log-survivor analysis and log-frequency analysis. Both analyses suggested a statistically significant mercury by time interaction on within-bout response rate, a measure of mercury exposure.

36) Quantifying Reinforcer Efficacy with Demand Curves and Mathematical Principles of Reinforcement: Two Roads Leading to Rome or Two Ships Passing in the Night?

Vanessa Minervini, David R. Maguire, & Chad M. Galuska
University of Florida & College of Charleston (USA)

We examined changes in reinforcer efficacy as a function of session duration. Six Long Evans rats lever pressed under a 6-hr open economy for 1 and 2 pellets according to a fixed-ratio (FR) schedule. The ratio requirement for food increased across sessions, while a second lever always provided 8-s of access to water according to an FR-1 schedule. Consumption and response rate data were fitted to the economic demand equation (Hursh and Silberberg, 2008) and the mathematical principles of reinforcement (MPR) equation (Killeen, 1995), respectively, for each successive hour, providing an hour-by-hour index of subjective value (α) and incentive value (a) of the reinforcer. Both parameters—from distinct models—systematically increased as the session elapsed; thus, they were highly correlated.

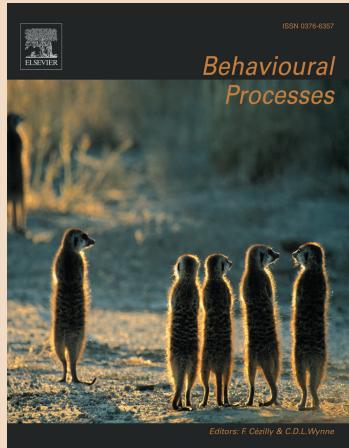
Society for Quantitative Analyses of Behaviour



Denver, CO, USA

26 - 28 May, 2011

www.elsevier.com/locate/behavproc



Find out more at:
www.elsevier.com/locate/behavproc

Behavioural Processes is dedicated to the publication of high-quality original research on animal behaviour from any theoretical perspective. It welcomes contributions that consider animal behaviour, from behavioural analytic, cognitive, ethological, ecological, evolutionary, neurological and physiological, points of view. This list is not intended to be exhaustive, and papers that integrate theory and methodology across disciplines are particularly welcome. The quality of research and focus on these aspects are the sole criteria for acceptance.

Papers reporting solely on human behaviour are not generally within the journal's purview but may be considered for publication if they relate closely to non-human research within the journal's remit.

Author Benefits Include:

- ✓ Electronic submission
- ✓ High online visibility through ScienceDirect
- ✓ Rapid online publication with Articles in Press
- ✓ Contents alerts distributed globally
- ✓ Personalised Citation Alerts on ScienceDirect
- ✓ World-wide marketing and exhibitions
- ✓ 30% discount on Elsevier books

online 
SUBMISSION

For more information, visit:
<http://ees.elsevier.com/bePROC>

View the latest behavioural ecology books at
www.elsevierdirect.com

Editors:
F. Cézilly
Equipe Ecologie Evolutive
UMR CNRS 5561
Biogeosciences
Email: behproc@u-bourgogne.fr
(*Papers on ethology and behavioural ecology*)

C.D.L. Wynne
Univ. Florida, Dept of Psychology
Email: behproc@grove.ufl.edu
(*Papers on behaviour analysis, comparative cognition and experimental psychology*)

Methodological and Conceptual Issues in Applied Behavior Analysis

from the

Journal of Applied Behavior Analysis

Reprint Volume 4
2nd Edition
1968-1999

The ad hoc editors have examined every article published in *JABA* over the past 31 years and have compiled an authoritative and up-to-date reference on applied research in the area of developmental disabilities. The volume has been organized so as to be an invaluable primary source of information for applied researchers, program and training directors, and teachers/therapists who work with handicapped individuals. Sixty-seven key articles are fully reprinted, covering the following topics:

- Nature of Applied Behavior Analysis
- Science, theory and teaching
- Measurement
- Interobserver agreement
- Treatment integrity
- Experimental design
- Data analysis
- Social validity
- Conceptual issues
- Research, training and professional practice
- Trends in applied behavior analysis

This 700 page volume also contains a full bibliographic listing of all articles published in *JABA* on the above topics.

Editors

BRIAN A. IWATA

Nancy A. Neef	David P. Wacker
F. Charles Mace	Timothy R. Vollmer

Price: \$30.00

Make check payable
to *Journal of Applied
Behavior Analysis*

Send orders to:

Kathy Hill, JABA
Department of Applied Behavioral Science
University of Kansas
Lawrence, Kansas 66045

Journal of the Experimental Analysis of Behavior

EDITOR

James E. Mazur

EXECUTIVE EDITOR

Victor G. Laties

ASSOCIATE EDITORS

Christine E. Hughes
Karen M. Lionello-DeNolf
Anthony P. McLean
Timothy A. Shahan

**EDITOR FOR
BEHAVIORAL
PHARMACOLOGY**

James H. Woods

**EDITOR FOR
BEHAVIORAL
NEUROSCIENCE**

Rick A. Bevins

**EDITOR FOR
TRANSLATIONAL
RESEARCH**

F. Charles Mace

REVIEW EDITOR

M. Jackson Marr

BOARD OF EDITORS

Carlos F. Aparicio
Matthew C. Bell
John C. Borrero
Mark E. Bouton
Philip N. Chase
Jesse Dallery
Michael Domjan
Simon O. Dymond
J. Gregor Fetterman
Lanny Fields
Charles P. France
Mark Galizio
Thomas J. Gould
Leonard Green
Stephen T. Higgins
Eric A. Jacobs
Kimberly Kirkpatrick
Wouter Koek
Elizabeth Kyonka
Jason Landon
Kennon A. Lattal
Armando Machado
Samuel McClure
Caio F. Miguel
Ralph R. Miller
Suzanne H. Mitchell
Michael A. Nader
Allen Neuringer
Nancy M. Petry
Carol Pilgrim
Raymond C. Pitts
Christopher A. Podlesnik
Howard Rachlin
Ruth Anne Rehfeldt
Richard R. Saunders
Peter J. Urcuoli
Manish Vaidyas
Timothy R. Vollmer
David Wacker
Ryan D. Ward
K. Geoffrey White
Dean C. Williams
Thomas R. Zentall

Website: seab.envmed.rochester.edu/jeab **E-mail:** jeab@indiana.edu
Consider a subscription to the journal for original research relevant to the behavior of individual organisms. Review articles and theoretical papers also considered for publication. Six issues published yearly by the Society for the Experimental Analysis of Behavior.

- JANUARY 2011 -

- **Joana Arantes and Armando Machado.** Errorless learning of a conditional temporal discrimination
- **Elenice S. Hanna, Marina Kohlsdorf, Regiane S. Quinteiro, Raquel Maria de Melo, Deisy das Graças de Souza, Julio C. de Rose and William J. McIlvane.** Recombinative reading derived from pseudoword instruction in a miniature linguistic system
- **James E. Mazur and Dawn R. Biondi.** Effects of time between trials on rats' and pigeons' choices with probabilistic delayed reinforcers
- **L. Valencia Torres, S. da Costa Araújo, C.M. Olarte Sanchez, S. Body, C.M. Bradshaw and E. Szabadi.** Transitional and steady-state choice behavior under an adjusting-delay schedule
- **Tammy Wade-Galuska, Chad M. Galuska, and Gail Winger.** Effects of daily morphine administration and deprivation on choice and demand for remifentanil and cocaine in rhesus monkeys

- Theoretical Article -

- **Timothy A. Shahan & Mary M. Sweeney.** A model of resurgence based on behavioral momentum theory

- Technical Article -

- **Hannah E. Salvin, Paul D. McGreevy, Perminder S. Sachdev, and Michael J. Valenzuela.** The Canine Sand Maze: An appetitive spatial memory paradigm sensitive to age-related change in dogs

- Book Review, Response, and Reply -

- **William M. Baum.** What is radical behaviorism? A review of Jay Moore's *Conceptual Foundations of Radical Behaviorism*
- **J. Moore.** A review of Baum's review of *Conceptual Foundations of Radical Behaviorism*
- **William M. Baum.** Evasion, private events, and pragmatism: A reply to Moore's response to my review of *Conceptual Foundations of Radical Behaviorism*

MARCH 2011

- **Céline Paeye & Laurent Madelain.** Reinforcing saccadic amplitude variability
- **Amy K. Eppolito, Charles P. France, and Lisa R. Gerak.** Effects of acute and chronic flunitrazepam on delay discounting in pigeons
- **Joel Myerson, Leonard Green, and Joshua Morris.** Modeling the effect of reward amount on probability discounting
- **Allen Karsina, Rachel H. Thompson, and Nicole M. Rodriguez.** Effects of a history of differential reinforcement on preference for choice
- **Dean C. Williams, Kathryn J. Saunders, and Michael Perone.** Extended pausing by human subjects on multiple fixed-ratio schedules with varied reinforcer magnitude and response requirements
- **Brian D. Kangas, Meredith S. Berry, and Marc N. Branch.** On the development and mechanics of delayed matching-to-sample performance
- **Amanda M. Mahoney, Caio F. Miguel, William H. Ahearn, and Julianne Bell.** The role of common motor responses in stimulus categorization by preschool children

-Book Review-

- **Marc N. Branch.** Drug addiction. Is it a disease or is it based on choice? A review of Gene Heyman's *Addiction: A disorder of choice*

-Historical Note-

- **Brian D. Kangas and Rachel N. Cassidy.** Requiem for my lovely

MANAGING EDITOR

Sharon Corcoran

BUSINESS MANAGER

Monica Bonner

EDITORIAL ASSISTANT

Dawn Biondi

Send Subscription Inquiries to: Monica Bonner, JEAB Business Manager

Department of Psychological and Brain Sciences

Indiana University

1101 E. Tenth Street

Bloomington, Indiana 47405-7007

*American Express, Visa, MasterCard and checks are accepted.
Visit us online and subscribe electronically.*

Notes

Notes

*f*QAB 2011 at a Glance



Thursday Evening May 26

Ballroom E, Hyatt Regency

5:00 – 8:00 Registration 1st Poster Session

Friday May 27

Ballroom D, Hyatt Regency

- 7:00 Registration, Coffee, Pastries
8:00 Alliston Reid (President's Intro)
- Special Section on Extinction
- 8:15 K. M. Lattal
8:50 Miller & Laborda
- 9:25 Coffee Break
- 10:00 Delamater
10:35 McNally
11:10 Bevins
- 12:00 Lunch Break
- 1:45 Bouton et al.
2:20 Baum
2:55 Nevin
- 3:30 Coffee Break
- 4:00 Sanabria & Cheung
4:35 Gottlieb
5:10 Gallistel et al.
- 6:00 Business Meeting
6:30 2nd Poster Session—until 9:00

Saturday Morning May 28

Ballroom D, Hyatt Regency

- 7:30 Registration, Coffee, Pastries
- 8:30 Kirkpatrick & Galtress
9:05 Boutros et al.
- 9:40 Coffee Break
- 10:00 Stephens
10:35 Panel Discussion
- 11:00 Closing Remarks

Saturday Afternoon May 28

Ballroom D, Hyatt Regency

***f*QAB Preeminent Tutorials**

From Basics to Contemporary Paradigms

- 1:00 Nevill M. Blampied
2:00 Kennon A. Lattal
3:00 Amy L. Odum
4:00 Mia Stephens