Society for the Quantitative Analyses of Behavior

40th Annual Meeting, May 25 - May 26, 2017

Colorado Convention Center, Denver, CO

SQAB

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, sqab.org

Executive Committee and Board Members

President
Lewis Bizo
University of New England
Armidale, Australia
Lbizo@une.edu.au

Program Chair/President-Elect
Chris Podlesnik
Florida Institute of Technology
Melbourne, FL, USA
cpodlesnik@fit.edu

Executive Coordinator
Derek Reed
University of Kansas
Lawrence, KS, USA
ddreed@ku.edu

Membership Coordinator
Shea Lemley
University of Kansas
Lawrence, KS, USA
shea.lemley@ku.edu

Secretary
Adam Fox
St. Lawrence University
Canton, NY, USA

Treasurer
Carla Lagorio
University of Wisconsin – Eau Claire
Eau Claire, WI, USA

Official SQAB Photographer
Victor Laties
University of Rochester
Rochester, NY, USA

Board Members
Jason Bourret
Western New England University
Springfield, MA, USA

Suzanne Mitchell
Oregon Health and Science University
Portland, OR, USA

Mark Reilly
Central Michigan University
Mount Pleasant, MI, USA

Federico Sanabria
Arizona State University
Tempe, AZ, USA

Student Representative
Karl Gunnarsson
Southern Illinois University
Carbondale, IL, USA

Tutorials/Media Coordinator
Todd McKerchar
Jacksonville State University
Jacksonville, AL, USA

Past Presidents
Tim Shahan
Alliston Reid
Randy Grace
Michael Commons
Billy Baum
Armando Machado
Peter Killeen
Tony Nevin
Richard Herrnstein

Welcome to SQAB 2017

---

11 am - 12:45 pm Registration, outside 501-504 Colorado Convention Center

12:45 pm **President's Introduction**
Lewis Bizo
University of New England (Australia)

SQAB thanks the Association for Behavior Analysis International (ABAI) for generous support that helped to make this meeting possible, and encourages SQAB participants to take advantage of the ABAI convention that begins immediately following the SQAB program. The ABAI Program includes many presentations on experimental and applied behavior science. A separate registration fee and badge are required to attend the ABAI meeting.

---

1 - 1:40 pm **To Free or Not to Free: Determinants of Social Release in Rats**

Timothy D. Hackenberg
Reed College (USA)

In the social release paradigm, animals are provided with opportunities to release a conspecific from some type of restraint. Several lines of research with different species have shown that animals will in fact respond in ways that free the restrained animal, but the mechanisms are not well understood. The present research explores the possibility that such behavior is maintained by social reinforcement, in the form of social interaction. In this talk, I will describe three different experiments with rats designed to explore some basic functions of social reinforcement. In the first, the relative efficacy of social and food reinforcement was assessed with PR schedules and under various motivational conditions. In the second experiment, demand for social reinforcement was studied by varying the fixed ratio (FR) price and reinforcer magnitude (duration of social interaction). In a third line of research, rats were given repeated choices between concurrent schedules of social and non-social reinforcement. The findings from all three experiments show that social interaction, as a form of social reinforcement, shares important functional properties with other reinforcers and with other species, and illustrate a promising set of methods for studying and quantifying social reinforcement.

1:40 - 2:20 pm **Interval Timing in Small Fish**

Kazuchika Manabe
Nihon University (Japan)

Small fish, such as zebrafish and guppies, have become a valuable animal model for various biomedical and behavioural studies. We investigated whether or not such small fish show interval-timing behaviour just as pigeons, rats and monkeys and other vertebrate model species do. In Experiment 1, we trained zebrafish to respond to a target under three fixed -interval reinforcement schedules (FI 20 s, FI 40 s and FI 60 s) and one variable interval schedule (VI 60 s). Post-reinforcement pause (PRP) and breakpoint of zebrafish in FI schedule increased as a function of the inter-reinforcement interval. In the VI schedule, we observed short PRP and steady state responses. In Experiment 2, zebrafish and guppies were trained under a peak procedure, in which 60-s probe trials were mixed with FI 20-s trials. There were substantial individual differences in performance under the peak procedure. Some zebrafish and guppies clearly showed a response distribution peaking around 20 s while the other subjects showed no clear peak response distribution. These results indicate that sensitivity to temporal cues of zebrafish and guppies vary among individuals. Individual differences in timing behaviour may deserve further investigation to determine the factors affecting sensitivity to temporal cues.

2:20 - 2:35 pm Break - Refreshments

2:35 - 3:15 pm **Category Learning and Dynamic Cue Use by Pigeons in a Midsession Reversal Task**

Rebecca M. Rayburn-Reeves [1], Muhammad A. Qadri [2], & Robert G. Cook [2]
[1]Armstrong State University (USA), [2]Tufts University (USA)

Recent research on midsession reversal learning has revealed that pigeons make systematic anticipatory and perseverative errors around the reversal location, suggesting they are using the time within sessions as a cue for which of two stimuli is likely correct on a given trial. The repetition of the same stimuli across trials, however, means their values are constantly changing and relative to the pigeon's perception of its location within the session. The current experiment tested midsession reversal learning of categories (flowers (S1) and cars (S2)), where every trial presented a unique stimulus pair from each category and, across sessions, these pairs were presented on the same trial (e.g., Trial 1: flower1, car1), allowing us to create stimuli with absolute values of reinforcement. Interestingly, pigeons showed similar errors around the reversal as has been previously found with two stimuli, suggesting that category learning emerges prior to item specific encoding and pigeons anticipate the category shift based on time. Probe tests revealed a strong reliance on the time-based cue, with some evidence that item-specific information is important closer to the reversal. These results have implications for the timing and order by which pigeons learn to use categorical and item-specific features in pictorial discriminations.

3:15 - 3:55 pm **Economic Maximization and the Matching Law are Tied Through the Law of Diminishing Returns**

Jan Kubanek
Stanford University (USA)

What principles govern decision-making of animals and humans has been a matter of dissension between economists and researchers in the life sciences. In economics, decision-makers are viewed as agents who maximize their overall reward income. This framework has been widely influential, but requires a complete knowledge of the reward contingencies associated with a given choice situation. Psychologists and biologists have observed that organisms and subjects often follow a much simpler strategy---allocate their behavior in proportion to relative reward---a strategy captured by the matching law. This talk will show that matching behavior can in fact be equally efficient as the much more complex economic maximization when the choice options provide saturating, diminishing returns. Given the prevalence of diminishing returns in ecology and economics, matching emerges as an efficient heuristic to optimal decision-making.

3:55 - 4:10 pm Break - Refreshments

4:10 - 4:50 pm **Implicit Relational Learning in a Multiple-Object Tracking Task**
Olga Lazareva, John McInnerney, Tiffany Williams, & Joyce Yuen
Drake University (USA)

We used multiple-object tracking task (MOT) to develop a procedure for examining whether contextual relational information presented in a background can facilitate MOT accuracy. College students were instructed to track four out of eight objects and report at the end of the trial whether a single cued object was among those they tracked (yes/no task). Unbeknownst to the participants, the location of the cued object at the end of the trial in one of the conditions predicted the correct choice (informative condition); in random condition, the location of the object was irrelevant. We found that participants in informative condition produced significantly more accurate responses than in random condition but were unaware of the predictive role of object location. Follow-up tests disclosed that the participants in informative condition did attempt to track the objects, even though their answer at the end of the trial was clearly influenced by the contextual information. In addition, contextual information was most valuable at the time of the final choice rather than during the trial, when the objects were still moving. Taken together, these results indicate the presence of implicit relational learning in a visually demanding task that requires sustained attention to the objects.

4:50 - 5:30 pm **Algorithmic Analyses of Stimulus-Stimulus Relations: Some Current Directions and Illustrative Findings**
William J. McIlvane, Christophe J. Gerard, & William V. Dube
E. K. Shriver Center, University of Massachusetts Medical School (USA)

A few noteworthy exceptions notwithstanding, quantitative analyses of stimulus-stimulus (relational) learning are most often simple descriptive measures of study outcomes. For example, studies of stimulus equivalence have made much progress using measures such as percent accurate, discrimination ratio, and response latency. Although procedures may have ad hoc variations, they remain fairly similar across studies. Comparison studies of training variables that lead to different outcomes are few. Yet to be developed are tools designed specifically for dynamic and/or parametric analyses of relational learning processes. We will focus on recent studies to (1) develop quality computer-based programmed instruction for supporting relational learning in children with intellectual disabilities and (2) specify formal algorithms that permit ongoing, dynamic assessment of learner performance and procedure changes to optimize instructional efficacy and efficiency. Our algorithms have a strong basis in evidence and in theories of stimulus control, and we think that they may have utility also for basic and translational research. We will present an overview of our program, details of algorithm designs, and summary results that illustrate their possible benefits. We will also present arguments that such algorithm development may encourage parametric research, help in integrating new research findings, and support in-depth quantitative analyses of stimulus control processes in relational learning.

---

7 - 9:30 pm **First Poster Session & Cash Bar, 505-507 Colorado Convention Center**

7:45 - 9 am Registration, Coffee, & Pastries, West Regency Ballroom A

---

9 - 9:40 am **Delay Discounting: Rat, Pigeon, Human – Does it Matter?**
Leonard Green & Joel Myerson
Washington University in St. Louis (USA)

Delay discounting refers to the decrease in subjective value of an outcome as the time to its receipt increases. Across species and situations, animals discount delayed rewards, and their discounting is well-described by a hyperboloid function. Despite the many similarities in discounting observed between human and nonhuman animals, at least three differences have been reported (i. e., differences in time scale; differences in the shape of the hyperboloid discounting function; and lack of a magnitude effect with animals), raising the possibility of fundamental species differences in intertemporal choice. The present talk will evaluate these differences. Despite these putative differences, the pervasiveness of discounting across species and situations suggests it is a fundamental process underlying decision making.

9:40 - 10:20 am **Time-Based Interventions to Promote Self-Control**
Kimberly Kirkpatrick
Kansas State University (USA)

Self-control can be tested within a delay discounting task in which rats are provided choices between a smaller-sooner and a larger-later reward, with choices of the smaller-sooner often indicating poor self-control. Individual differences in self-control are related to temporal discrimination processes with better temporal discrimination ability relating to better self-control. Several time-based interventions, relying on basic timing schedules of reinforcement, have been developed for use in rats and these concomitantly promote self-control while also improving timing processes. These interventions have been extended to several populations including female and middle-aged male rats, as well as different strains of rats. We have also tested several factors including the mean and variability of durations that comprise the interventions, yielding some insights into their potential mechanisms of their operation. Overall, the results suggest a promising pre-clinical animal model for application to moderating diseases and disorders related to poor self-control as well as assessing the neurobiology of plasticity in choice behavior.

10:20 - 10:40 pm Break - Refreshments

10:40 - 11:20 am **Implications of Cephalopod Biomechanics for Studies of Octopus Learning, Memory and Behavior**

Frank Grasso[1] & José E. Burgos[2]
[1]Brooklyn College (USA) & [2]University of Guadalajara (Mexico)

The advanced learning and cognitive abilities of coleoid cephalopods (Octopuses, Cuttlefishes, Squids) are well documented. Arguably as complex as mammals in brain organization and behavioral repertoire, cephalopods' distinct brain organization (diverged from vertebrates over 500 MYA) offers us lessons on the limits and extent of the convergent evolution of brain and behavior. As modern research protocols are applied to the study of adaptive behavior in cephalopods something that is often overlooked is the consequences of their hyper-redundant biomechanics for the design and interpretation of learning studies. Compared to vertebrate species which have skeletal systems, biomechanically hyper-redundant, soft-bodied cephalopods, have many orders of magnitude more mechanical solutions (topography) available to achieve a given action. These biomechanics concomitantly require fundamentally different neural motor-control systems compared to the corresponding vertebrate systems for which protocols for studying basic Pavlovian and operant conditioning phenomena (e.g., blocking, latent inhibition, conditioned inhibition, spontaneous recovery, autoshaping, choice, stimulus control, etc.) were developed. We will review the biomechanics of octopus object manipulation, the organization of the cephalopod brain and cephalopod learning and cognition studies. We will use these to discuss the theoretical implications of the cephalopod bauplan for the comparative study of the structure of embodied learning and memory systems.

11:20 - 12 pm **Drug-Sensitive Reward in Crayfish: Exploring the Neural Basis of Addiction with Automated Learning Paradigms**

Robert Huber & Moira J van Staaden
Bowling Green State University (USA)

Research in crustaceans provides valuable perspective for studying the neural implementation of conserved behavioral phenomena, including motivation, escape, aggression, and drug-sensitive reward. A modularly organized nervous systems and confirmed vulnerabilities to human drugs of abuse, situate crayfish as a valid model for the study of addiction. Using this system and computer paradigms for automated behavioral phenotyping, we have demonstrated psychostimulant properties, sensitization, withdrawal, reinstatement, and drug reward in conditioned place-preference scenarios. Here we detail techniques for operant, self-administration paradigms providing direct measures of drug reward, a characterization of dose response, and the time course of reward conditioning. In a spatially contingent task, entry into a quadrant with a particular substrate delivered either mild electric shock (punishment) or psychostimulant infusions (reward). Following a few instances of response delivery, crayfish quickly learned to avoid or seek out specific areas. Such results provide valuable insights into the principles governing conditioned learning and a robust behavioral template for exploring the neural changes underlying cue association. We introduce a computer framework for the automated control of learning paradigms. Based on routines contained within the JavaGrinders library (downloadable at iEthology.com), it integrates real-time video tracking with robotic interfaces, providing a robust mechanism for automatically triggering reward/punishment.

---

12 - 1:30 pm Lunch – SQAB Executive Committee Meeting

1:30 - 2:10 pm **A Functional Analysis of Choice Behavior: Linking Ecology, Foraging, and Learning**

Marco Vasconcelos
University of Aveiro (Portugal)

An experimental protocol originally employed by Zentall and collaborators has served to illustrate deviations from optimal choice. In the protocol, subjects choose between two delayed rewards with different reward probability. In the higher probability option the outcome is unknown through the delay, while in the other the outcome is signaled upon choice. Pigeons, starlings and rats favor the low probability, signaled option, thus forsaking available rewards. We have previously argued that this preference may be suboptimal only in the laboratory, where the information cannot be used. If foraging preferences are adapted to sequential rather than simultaneous choices and the information allows avoidance of delayed signaled reward omission then such bias maximizes feeding rate. I report a series of experiments with pigeons testing several predictions including that (a) the properties (such as probability and duration) of the stimulus signaling non-reinforcement are irrelevant vis-à-vis preference because animals disengage from it, and that (b) given the opportunity, animals will escape from this stimulus. The overall contention is that learning mechanisms can be used to develop better normative models and that blending classical optimal foraging and contemporary learning theories is a fruitful avenue to unravel the mechanisms underlying (sub-optimal) behavior.

2:10 – 2:50 pm **Reinforcement, Information and Choice**

Alex Kacelnik & Andrés Ojeda Laguna
University of Oxford (UK)

Natural selection drives the evolution of psychological mechanisms, so that behaviour maximizes fitness under probabilistically prevalent circumstances. Not surprisingly, everything else being equal, animals prefer high to low probabilities of reward, but when things are not equal, the same mechanisms may lead animals to show paradoxical preferences. The mechanisms may still be 'optimal' across the range of natural circumstances, but lead to suboptimal behaviour in specific conditions. Such protocols reveal the mechanisms controlling preferences and choices, and prompt evolutionarily-minded researchers to ask for the circumstances that shaped them, namely under what circumstances would such mechanisms be stochastically optimal. They do not lead us to conclude that animals have not evolved by the optimizing action of natural selection. In a protocol introduced by Zentall and collaborators, pigeons and starlings prefer options with lower reward probability but earlier availability of outcome information, systematically losing the majority of potential rewards but spending less time under uncertainty. We (1) present new results showing that contrary to previous reports the phenomenon occurs also in rats, (2) consider mechanistic interpretations such as uncertainty aversion, local contrast and Pavlovian conditioning, and (3) propose a functional interpretation relating sequential foraging decisions in the wild to the laboratory protocols.

2:50 - 3:10 pm Break - Refreshments

3:10 - 3:50 pm **Conversations With and Without Words: Memory, Mental Time Travel and The Moustachio Quartet**
Nicky Clayton & Clive Wilkins
University of Cambridge (UK)

Mental time travel allows for re-assessment of memory and the imagining of future scenarios—memories are not only about the past—they are also prospective. Episodic memory provides the template for future scenarios, and can be reassessed each time it is recalled, and in part is dependent on the sequence in which events unfold. In this lecture we explore the relationship between memory and experience, recognizing that memory is not only linguistic. We refer to 'The Moustachio Quartet', a series of novels, which highlight themes and ideas relevant to our argument. In this way, we integrate evidence from science and the arts to explore the subjective nature of memory and mental time travel, arguing that our capacity to juggle multiple perspectives evolved for the act of prospection, as an aid to move time forward to the advantage of our species. We question the notion that mental time travel is a uniquely human construct, recognizing that the most persuasive evidence for the independent evolution of mental time travel comes from our distantly related cousins, the corvids.

Student Presenter Series

3:50 – 3:57 pm **The Relation Between Timing, Delay Discounting, and Discriminating Contingencies in Rats**
Ann Galizio, Charles C. J. Frye, Jeremy M. Haynes, & Amy L. Odum
Utah State University (USA)

We examined the relation between timing, delay discounting, and discriminating contingencies in rats. In the timing task, one lever was active for the first half of each trial and the other lever was active for the second half. In the delay-discounting procedure, rats chose between smaller-sooner food rewards and larger-later food rewards. Finally, rats were trained on a contingency-discrimination procedure, in which the center lever led to a choice trial either response-dependently or independently. One side lever produced food if the trial was response dependent and the other side lever produced food if the trial was response independent. Attention/discrimination on the timing task was correlated with more impulsive choice on the delay-discounting task.

3:57 - 4:04 pm **Modulating Alcohol Demand via Purchase Task Vignette Modifications**
Brett W. Gelino, Derek D. Reed, Michael Amlung, & Gideon P. Naudé
University of Kansas (USA)

The Alcohol Purchase Task has demonstrated adequate psychometric performance and serves as a valuable tool for assessing and predicting pathological drinking in both general and clinical populations. Despite its range of application, little work has been done to assess the potential impact of a modified vignette on task responding. The current study introduces three modifications, with a general motif of varying driving responsibilities following the typically described night of drinking. Results suggest group differences with respect to alcohol demand (elasticity, intensity, and pmax) as well as demand curve model fits when presented with varying vignettes, the implications of which are discussed.

4:04 - 4:11 pm **Biasing Pigeons' Timing in a Bisection Task**
Renata P. B. N. Cambraia[1], Armando Machado[1], & Marco Vasconcelos[2]
[1]University of Minho (Portugal), [2]University of Aveiro (Portugal)

Temporal discrimination training can produce bias in responding, i.e. overestimation or underestimation of a stimulus duration. Our goal was to observe the effects of trial frequency (base-rate) and probabilities of reinforcement (payoff) in a novel bisection task. In a long operant chamber, pigeons learned to peck a side key related to a specific signal duration: left – 3 s (short), right – 12 s (long). Floor panels recorded birds' location throughout trials. Each subject experienced a higher base-rate or payoff for long, in Condition L, and for short, in Condition S. In Condition L, pigeons overestimated time compared to Condition S, showing lower indifference points and distinct movement patterns.

4:11 - 4:18 pm **Behavioral Variability and Development: A Human Study**
Mike Perfillon & Vinca Rivière
Université de Lille (France)

Behavioral variability plays a crucial role in development. In our study we compare the emission of variable and repeated behaviors in the acquisition of new responses. The experiment is divided in two phases in which subjects have to emit sequences of behavior on three keys on a computer to obtain points. The first phase is divided into three groups, variable, repeated and yoked group. In the second phase all groups have to learn a specific sequence based on their relative frequency in the previous phase. We compare the impact of the first phase on the acquisition of the specific sequence. Our main hypothesis is that the variable group learns quicker the specific sequence than the other groups.

4:18 - 4:25 pm **Diet-Induced Impulsivity: An Investigation of Bias and Sensitivity to Delay**
Catherine C. Steele, Jesseca R. A. Pirkle, Ian R. Davis, & Kimberly Kirkpatrick
Kansas State University (USA)

Two experiments investigate the effects of Western diets on impulsive choice. Rats were given either a high-fat, high-sugar, or chow diet, and then completed an impulsive choice task, where rats chose between a smaller-sooner and larger-later reward. In experiment 1, rats completed the task on and off their diet. In experiment 2, rats completed an impulsive choice and bisection task to determine how diet affected timing, a potential contributor to impulsive choice. The results indicated that high-fat and high-sugar diets induced a bias for immediate rewards and increased delay sensitivity that persisted following removal from the diets. The high-fat diet also produced deficits in timing precision. Therefore, the Western diet appears to induce deficits in impulsive choice and timing.

4:25 - 4:32 pm **Cues Associated with Alternative Reinforcement Can Reduce Resurgence of an Extinguished Instrumental Response**
Sydney Trask & Mark E. Bouton
The University of Vermont (USA)

In resurgence, an acquired target behavior (R1) is extinguished while an alternative behavior (R2) is reinforced. When R2 reinforcement is removed, R1 behavior returns or "resurges." The current experiments investigated the effects of retrieval cues associated with R1 extinction in weakening resurgence in rats. Experiment 1 established that a 2-second cue associated with alternative reinforcement can attenuate R1 resurgence during testing. Experiment 2 demonstrated that the cue must be associated with alternative reinforcement to weaken resurgence. In Experiment 3, the cue had to occur when R1 was extinguished to attenuate resurgence. These results suggest that a neutral cue can attenuate resurgence if it is first paired with alternative reinforcement and present during sessions in which R1 is extinguished.

4:35 - 4:40 pm

Joseph V. Brady Impactful Research Award
Presented by Amy Odum, JEAB Editor
Utah State University (USA)

Closing Remarks
Lewis Bizo
University of New England (Australia)

4:40 pm

Business Meeting
All SQAB members are welcome – 501-504 Colorado Convention Center

---

7 - 9:30 pm

Second Poster Session & Cash Bar, 505-507 Colorado Convention Center

---

SQAB

SQAB Invited Preeminent Tutorials: From Basics to Contemporary Paradigms

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

---

10 - 10:50 am **Domain Effects, Obesity, and Delay Discounting**

Erin B. Rasmussen
Idaho State University (USA)

Chair: Steven R. Lawyer
Idaho State University (USA)

Delay discounting refers to a preference for smaller, sooner over larger, delayed outcome. Domain effects refer to a tendency for some outcomes to be more strongly discounted than others. We will review research that reports domain effects across a variety of special populations, but focus on an outcome that is one of the most steeply discounted food. Our laboratory, which examines delay discounting with obese rats and humans has uncovered a consistent pattern of domain- specific discounting effects with food as the outcome. In other words, the largest differences in obese and healthy-weight subjects tend to be with food or food-related outcomes. This domain-specific finding also has been shown in response to the treatment of mindful eating. Implications for using multiple relevant outcomes in discounting studies will be discussed. This presentation will also serve as an introduction to a panel discussion on the application of behavioral economics to obesity.

---

11 - 11:50 am **Panel discussion on the application of behavioral economics to obesity**

Chair: M. Christopher Newland
Auburn University (USA)

Gregory J. Madden
Utah State University (USA)

Matthew P. Normand
University of the Pacific (USA)

Raymond Miltenberger
University of South Florida (USA)

---

3 - 3:50 pm **Applying Operant Demand Analyses to Issues of Societal Importance**

Derek D. Reed
The University of Kansas (USA)

Chair: Matthew W. Johnson
Johns Hopkins University School of Medicine (USA)

Behavioral economic demand analyses quantify the degree to which organisms defend consumption of reinforcers. Emanating from the experimental analysis of behavior, demand analyses have rendered an abundance of success in modeling consumption and choice in highly controlled nonhuman studies. Translational applications in the 1980s demonstrated the potentiality of demand analyses in understanding substance use in human subject. Accordingly, contemporary research in addiction sciences has seen a marked proliferation in applying demand analyses in both translational and clinical settings. This SQAB Tutorial highlights translations of findings from basic studies on reinforcer demand to various issues of societal important. The presentation begins with a primer on demand assessment and analysis. Discussion of demand metrics with immediate translation to applied behavior analysis is provided. Particular examples from behavioral health domains are provided in the areas of alcohol, cigarette, marijuana, and indoor tanning demand. The presentation concludes with a discussion of other areas of translation in mainstream applied behavior analysis, such as validating preference assessments, determining token delivery and exchange schedules, and classroom based reinforcement contingencies for work completion.

4 - 4:50 pm **Relapse**

Timothy A. Shahan
Utah State University (USA)

Chair: John (Tony) A. Nevin
University of New Hampshire (USA)

The recurrence of previously eliminated operant behavior (i.e., relapse) represents a challenge to the long-term success of a wide variety of behavioral interventions. This tutorial will provide a review of common relapse phenomena (e.g., reinstatement, renewal, resurgence) using examples from both basic research and applied settings. A major emphasis will be on providing user-friendly descriptions of existing theories of relapse, especially theories of resurgence. Theories discussed will be Behavioral Momentum Theory, Context Theory, and Choice Theory. The successes and failures of these theories will be addressed, as will areas in need of additional empirical and theoretical development. Finally, translational relevance will be discussed by considering how insights provided by the theories might be used to prevent or reduce relapse following common behavioral interventions (e.g., DRA). This presentation will also serve as an introduction to a panel discussion on the application of theories of relapse.

---

5 - 5:50 pm **Panel discussion on the application of behavioral economics to obesity**

Chair: M. Christopher Newland
Auburn University (USA)

David P. Wacker
University of Iowa (USA)

Wayne W. Fisher
University of Nebraska Medical Center (USA)

Mary M. Sweeney
Johns Hopkins School of Medicine (USA)

---

9 - 9:50 am

What's the Best Model for These Data? Information Theoretical Approaches to Inference as an Alternative to Hypothesis Testing

M. Christopher Newland[1] & Derek Pope[2]
[1]*Auburn University (USA),* [2]*Virginia Tech Carilion Institute (USA)*

Chair: Peter R. Killeen
Arizona State University (USA)

Null Hypothesis Statistical Testing (NHST) was developed to provide an objective way to quantify inference. The result is a ritualized technique that is frequently necessary for publication despite criticisms that it is minimally informative, misleading, and produces unreproducible results. NHST tests the probability of the data given a null hypothesis that is rarely of interest and is often implausible. The result is a torturous statement of whether the data are likely to have occurred. An alternative approach, called Information Theoretic (IT) based inference, does not carry many of these problems because it returns a different probability. IT approaches ask the question of interest in model building: Of a set of models, which ones are best? And by how much? By building upon Akaike Information Criteria, IT inference returns the probability of the models considered given the data, numbers that are readily interpretable. Unlike NHST, the approach actually encourages the testing of many models in order to increase the chances of including good ones. Corrections for multiple comparisons are neither necessary nor appropriate. The tutorial will identify criticisms of NHST, offer a (relatively) nontechnical background for IT approaches, and provide examples of IT-based inference using spreadsheets.

SQAB Invited Preeminent Tutorials are recorded and made available on iTunes and YouTube: youtube.com/c/SocietyfortheQuantitativeAnalysesofBehavior

---

7 - 9:30 pm **First Poster Session & Cash Bar**

Pigeons' Preference Between Mixed- and Multiple-Schedule Stimuli on FR Schedules
Jeremy S. Langford, Raymond C. Pitts, Christine E. Hughes (University of North Carolina, Wilmington)

Bout Engagement in Differential Reinforcement of Low Rate Schedules
Matthew Eckard (West Virginia University), Elizabeth G. E. Kyonka (University of New England)

Effects of Lag Schedules on Behavioral Variability: Targeting Different Portions of Response Sequences
N. H. Van Zandt, Casey M. Irwin, Kelly L. Roughgarden, Adam H. Doughty (University of Charleston)

No Preference for Variability Among Humans in a Variable-Delay Procedure
Amanda K. Miles (Jacksonville State University), Todd L. McKerchar (Jacksonville State University), James E. Mazur (Southern Connecticut State University)

Toward a Contemporary Quantitative Model of Punishment
Steven Riley, Bryan Klapes, Jack McDowell (Emory University)

The Nature of Reinforcement Is More Important Than the Number of Dimensions
Daniel Bell-Garrison, Matthew L. Eckard (West Virginia University), Elizabeth G. E. Kyonka (University of New England)

Shared Attention and Sensitivity in a Three-Alternative Choice Task
Andres Garcia-Penagos, Garriy Shteynberg (University of Tennessee)

The Effect of Signaling Reinforcement in Capuchin Monkeys: Extension of the Gambling Paradigm
Travis R. Smith, Michael J. Beran (Georgia State University)

Comparing the Quality of Hyperbolic Delay Discounting Models Across Various Amounts of Differing Outcomes
Jonathan E. Friedel (National Institute for Occupational Safety and Health), William B. DeHart, Charles C. J. Frye, Anne Galizio, Jeremy Haynes, Amy L. Odum (Utah State University)

Polydipsia and Delay Discounting in Two Rodent Models of ADHD
Carlos F. Aparicio, Paul J. Hennigan, Ashley N. Keeler (Salem State University)

SHR and Lewis Rats: Sign Tracking Behavior or Impulsive Action?
Paul J. Hennigan, Laurel J. Mulligan, Carlos F. Aparicio (Salem State University)

Discounting in the Pigeon: Water Discounting
Dylan M. Rutter, Mathew R. Wolf, Daigo Blanco-Murakoshi (James Madison University)

Discounting in the Pigeon: Conditioned Reinforcer
Matthew R. Wolf, Dylan M. Rutter, Daigo Blanco-Murakoshi (James Madison Univerity)

Academic Effort Discounting as a Measure of Indolence in College Students
Destinee J. Todd, Sherry L. Serdikoff (Savannah State University)

Effects of Exposure to a Cafeteria Diet in Adolescent and Adult Rats on Delay Discounting
Stephen H. Robertson, Andra R. Cates, Dante J. Kyne-Rucker, Bailey E. Perschon, & Erin. B. Rasmussen (Idaho State University)

Developmental Effects of Diet-Induced Obesity on Delay Discounting, Stable Performance, and Lever Pressing
Bailey E. Perschon, Dante J. Kyne-Rucker, Stephen H. Roberston, Erin. B. Rasmussen (Idaho State University)

A New Self-Control Choice Paradigm Including "Loss"
Aya Katayama, Daisuke Saeki (Osaka City University)

Latency to Respond is Related to k values in Delay Discounting for Money
Andra R. Cates, Erin B. Rasmussen, (Idaho State University), Kelsie L. Hendrickson (University of Texas at San Antonio)

Sensitivity to Treatment Predicts Delay Discounting Rates in Obese Individuals
Yaeeun Lee, Luis R. Rodriguez, Erin B. Rasmussen (Idaho State University), Kelsie L. Hendrickson (University of Texas at San Antonio)

Fading in and Fading out of Time: Interventions to Promote Self-Control
Cassi M. Binkley, Sarah L. Stuebing (Kansas State University), Jennifer R. Peterson (University of Alaska, Fairbanks), Brynn T. Critcher, Ian R. Davis, Pallie Koehn, Kimberly Kirkpatrick (Kansas State University)

Generalizability of a Fixed-Interval Intervention on Impulsive Choice in Rats
Carrie Bailey (Kansas State University), Andrew T. Marshall (University of California, Irvine), Jennifer R. Peterson (University of Alaska, Fairbanks), Aaron Schnegelsiepen, Sarah L. Stuebing, Kimberly Kirkpatrick (Kansas State University)

Melioration, Maximization and Self-Control
Vasiliy Safin, Howard Rachlin (Stony Brook University)

The Effect of Environmental Enrichment on Delay Discounting of Sucrose Rewards in Long-Evans Rats
Melanie L. Orr, Arianne C. Ramos, Karla R. Rizzi, Margaret P. Martinetti (The College of New Jersey)

Assessing Rates of Nonsystematic Data Across Discounting Tasks
Thomas Argyle, Jillian M. Rung, Gregory J. Madden (Utah State University)

Examining the Generality of the Hidden Zero Effect Across Five Delay Discounting Assessments
Gideon P. Naudé, Derek D. Reed, Brent A. Kaplan (University of Kansas), Todd L. McKerchar (Jacksonville State University).

Can Rats Perform The Marshmallow Test?
Erika M. Winnie, Raymond C. Pitts, Christine E. Hughes (University of North Carolina Wilmington)

An Application of Behavioral Momentum Equations to the Game of Basketball
Delaney W. Arbore (Allegheny College), Rodney D. Clark (Allegheny College)

Behavioral Momentum in Hierarchical and Non-Hierarchical Organizations
Sarthak Giri (Dare Association), Saranya Ramakrishnan (Harvard T.H. Chan School of Public Health), Kyra Gan (Smith College)

Four Forces that Prevent Change in Organizations: How to Become an Innovative Organization?
Michael Lamport Commons (Harvard Medical School)

Fourier Analysis Metaphor for the Context of EAB
Amanda K. Miles, Alannah N. Knight, William L. Palya (Jacksonville State University)

Delivery of Conditioned Reinforcers Suppresses Resurgence
Andrew R. Craig, Kaitlyn O. Browning, Timothy A. Shahan (Utah State University)

Reducing Resurgence of Destructive Behavior following Functional Communication Training Using Behavioral Momentum Theory
Wayne W. Fisher, Brian G. Greer, Ashley M. Fuhrman, Valdeep Saini, Christina A. Simmons, Billie J. Retzlaff (University of Nebraska Medical Center)

The Effects of Treatment Duration on Resurgence of Cocaine Seeking
Rusty W. Nall, Andrew R. Craig, Kaitlyn O. Browning, Timothy A. Shahan (Utah State University)

ABA Renewal Using Social Contextual Stimuli
Kaitlyn O. Browning, Timothy A. Shahan (Utah State University)

Molecular Analyses of Cue-Motivated Behaviors in Pavlovian-to-Instrumental Transfer
Andrew T. Marshall, Sean B. Ostlund (University of California, Irvine)

Examining the Use of a Visual Likelihood Measure to Determine Indifference Points in a Delayed Discounting Task
Darlene Crone-Todd, Katie Prue, and Katie Dollard (Salem State University)

7 - 9:30 pm **Second Poster Session & Cash Bar**

Using Difference Equations to Explain the Value, Discounting and Risk
Michael Lamport Commons (Harvard Medical School), Xiaojie Johan Liu (Boston University), Nicholas Hewlett Keen Commons-Miller (Tufts University), Sagun P Giri (Penn State University), Robin Francis Gane-McCalla (Dare Association), Timothy Barry-Heffernan (Harvard University), Leonard Sidney Miller (University of California, Berkeley), Alexander Pekker (Cambridge Associates), Andrew Michael Richardson (Dare Association), Michael Woodford (Columbia University)

The Natural Mathematics of Behaviour Analysis
Don Li (University of Auckland)

Raspberry Pi and SoftEther VPN for the Remote Control of Contingencies
Toshikazu Kuroda (Aichi Bunkyo University)

The Misbehavior of the RANDD Function in Med-PC® IV
Eric J. French, Mark P. Reilly (Central Michigan University)

Quantitative Analyses of Tool-Use Behavior in Rats
Akane Nagano, Kenjiro Aoyama (Doshisha University)

Target Odor Detection in Mice: The Benefit of Training with Multiple Background Odors
Carter W. Daniels, Federico Sanabria, Brian H. Smith (Arizona State University)

The Effects of Dietary Exposure on Hedonic (Liking) Responses in Rats
Jesseca R. A. Pirkle, Catherine C. Steele, Kimberly Kirkpatrick (Kansas State University)

Testing Substitution of nAChR Agonists and Antagonists in the Drug Discriminated Goal-Tracking Task
Brady M. Thompson, David A. Kwan, Scott T. Barrett, Jennifer E. Murray, Rick A. Bevins (University of Nebraska-Lincoln)

Acquisition of Schedule-Controlled Responding under the Valproic Acid (VPA) Rat Model of Autism
Ariel L. York, Alexis Sotelo, Rodney D. Clark (Allegheny College)

Modulating Alcohol Demand via Purchase Task Vignette Modifications
Brett W. Gelino, Derek D. Reed, Michael Amlung, Gideon P. Naudé (University of Kansas)

Nicotinic Alterations in the Microstructure of Response Rate
Korinna Romero, Carter W. Daniels, Federico Sanabria (Arizona State University)

Self-Administration of Nicotine Transiently Enhances Sign-Tracking in Rats
Paula F. Overby, Carter W. Daniels, Armani del Franco, Julianna Goenaga, Greg L. Powell, Cassandra D. Gipson-Reichardt, Federico Sanabria (Arizona State University)

Demand Modeling the Effects of Nicotine, Bupropion, Varenicline and Sazetidine-A on Ethanol Reinforcement Value
S. T. Barrett, B. M. Thompson, C. E. Larsen, J. R. Emory, R. A. Bevins (University of Nebraska-Lincoln)

KU-32 Prevents 5-Fluorouracil Induced Cognitive Impairment
Oliver L'Esperance, Michael J. Sofis, David P. Jarmolowicz, Sam V. Kaplan, Rachel C. Gehringer, Shea M. Lemley, Brian S. J. Blagg, Michael A. Johnson (University of Kansas)

Effects of Nicotine and Nicotine with MAOI on Alcohol Valuation
Jeremy M. Haynes, Charles C. J. Frye, Ann Galizio, Amy L. Odum (Utah State University)

Happy Hour Drink Specials in the Alcohol Purchase Task
Brent A. Kaplan (Virginia Tech Carilion Research Institute), Derek D. Reed (University of Kansas)

Δ9-Tetrahydrocannabinol Effects on Schedule-Induced Drinking in Adult Rats
Esmeralda Fuentes, Gabriela Eugenia López-Tolsa, Ricardo Pellón, Miguel Miguéns (Universidad Nacional de Educación a Distancia)

Associative Learning in Dementia: Implications for the Role of Verbal Strategies in Associative Learning
Charlotte Renaux, Vinca Rivière, Paul Craddock (Université de Lille), Ralph R. Miller (State University of New York at Binghamton)

Discriminative Control of Saccadic Reaction Times in a Latency-Contingent Visual Search Task
Cécile Vullings, Laurent Madelain (Université de Lille)

Timing in Variable Interval Schedules
Mehdi Bugallo (University of Minho), Marco Vasconcelos (University of Aveiro), Armando Machado (University of Minho)

Response Withholding Interferes with Concurrent Interval Timing
Ryan J. Becker, Carter W. Daniels, Federico Sanabria (Arizona State University)

Human Selective Attention in a Peak-Interval Procedure
Shrinidhi Subramaniam (Johns Hopkins University School of Medicine), Elizabeth G. E. Kyonka (University of New England)

Exploring the Role of Temporal Information in Suboptimal Choice
Paul J. Cunningham, Timothy A. Shahan (Utah State University)

Deactivation of the Dorsal Hippocampus Impairs Acquisition More than Maintenance of Interval Timing
McAllister J. Stephens, Carter W. Daniels, J. Bryce Ortiz, Korinna Romero, Paula F. Overby, Cheryl D. Conrad, Federico Sanabria (Arizona State University)

Mechanisms of Delay Exposure Training: The Role of Timing
Jillian M. Rung, Gregory J. Madden (Utah State University)

A Preparation to Study Humans' Allocation of Time in a Similar-to Foraging Task
Laurent Avila-Chauvet, Oscar Garcia-Leal (University of Guadalajara)

Biasing Pigeons' Timing in a Bisection Task
Renata P. B. N. Cambraia, Armando Machado (University of Minho), Marco Vasconcelos (University of Aveiro)

Temporal Control: Effects of the Distribution of Reinforcers
Sarah Cowie, Michael Davison, Douglas Elliffe (The University of Auckland)

The Timing Property of Adjunctive Behaviours Depends on Inter-Reinforcement Interval Length
Gabriela E. López-Tolsa, Ricardo Pellón (Universidad Nacional de Educación a Distancia)

Discrimination of Our Own Reaction Time
Valentina Vencato (Université de Lille)

The Relation Between Timing, Delay Discounting, and Discriminating Contingencies in Rats
Ann Galizio, Charles C. J. Frye, Jeremy M. Haynes, Amy L. Odum (Utah State University)

Diet-Induced Impulsivity: An Investigation of Bias and Sensitivity to Delay
Catherine C. Steele, Jesseca R. A. Pirkle, Ian R. Davis, Kimberly Kirkpatrick (Kansas State University)

Sensitivity to Pre- and Post-Reinforcer Delays in Pigeons
Yumi Hata, Daisuke Saeki (Osaka City University)

Undiscounted Costs and Socially-Discounted Benefits of Cooperating as Predictors of Cooperation in Prisoner's Dilemma Games
Aldo C. Toledo & Raul Avila (National Autonomous University of Mexico)

The Number of Nondiscriminative Stimuli Does Not Alter Suboptimal Preferences
Alejandro Macías, Valeria V. González, Armando Machado (University of Minho), Marco Vasconcelos (University of Aveiro)

Can We Use Latencies to Predict Suboptimal Choice?
Valeria V. González, Alejandro Macías, Armando Machado (University of Minho), Marco Vasconcelos (University of Aveiro)

Probabilities of Reinforcement Bias Performance in the Midsession Reversal Task
Cristina Dos Santos, Catarina Soares, Armando Machado (University of Minho), Marco Vasconcelos (University of Aveiro)

Effects of Relative Reinforcer Rates on Divided Attention when Stimuli Conflict
Stephanie Gomes-Ng, Douglas Elliffe, Sarah Cowie (The University of Auckland)

Are You Looking at the Relevant Characteristic? Using Errorless Learning during Discrimination Training
Margot Bertolino, Vinca Rivière (Université de Lille)

Modification in Saccadic Amplitude Using a Visual Discriminative Task as a Reinforcer
Sohir Rahmouni (Université de Lille), Anna Montagnini (Aix Marseille Université), Laurent Madelain (Université de Lille)

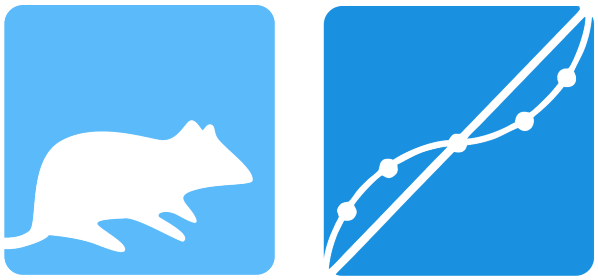
Behavioral Variability and Development: A Human Study
Mike Perfillon, Vinca Rivière (Université de Lille)

Cues Associated with Alternative Reinforcement Can Reduce Resurgence of an Extinguished Instrumental Response
Sydney Trask, Mark E. Bouton (The University of Vermont)

Volume 141, XXXX 2017

ISSN 0376-6357
BPRODA 141 1–XX (2017)

Behavioural Processes



SQAB

Editors: Johan J. Bolhuis & O. Lazareva

Special issue:

SQAB 2016: Persistence and Relapse

Guest Editors: Christopher A. Podlesnik and Federico Sanabria

Journal of the
Experimental Analysis of Behavior

May, 2017
Volume 107, Issue 3

SAVE THE DATE

Announcing the 34th Annual Meeting of the

Southeastern Association for Behavior Analysis

October 19-21, 2017 ◆ Hilton Garden Inn Savannah Midtown ◆ Savannah, Ga

We are pleased to offer BACB Continuing Education Units at this year's SEABA conference. Please visit www.seabaonline.org for membership, registration, and hotel information

SQAB 2017 at a Glance

Thursday, May 25

501-504 Colorado Convention Center

11:00 *Registration*

12:45 **Lewis Bizo**

President's Introduction

Quantitative and Comparative Analyses of Behavior

1:00 **Timothy Hackenberg**

1:40 **Kazuchika Manabe**

2:20 *Break – Refreshments*

2:35 **Rebecca M. Rayburn-Reeves**

3:15 **Jan Kubanek**

3:55 *Break – Refreshments*

4:10 **Olga Lazareva**

4:50 **William J. McIlvane**

7:00 ***1st Poster Session & Cash Bar***

Friday, May 26

501-504 Colorado Convention Center

7:45 *Registration, Coffee, & Pastries*

9:00 **Leonard Green**

9:40 **Kimberly Kirkpatrick**

10:20 *Break – Refreshments*

10:40 **Frank Grasso**

11:20 **Robert Huber**

12:00 *Lunch, Executive Committee Meeting*

1:30 **Marco Vasconcelos**

2:10 **Alex Kacelnik**

2:50 *Break – Refreshments*

3:10 **Nicky Clayton & Clive Wilkins**

3:50 **Student Presenter Series**

7:00 ***2nd Poster Session & Cash Bar***

SQAB Invited Preeminent Tutorials

Saturday, May 27

Centennial Ballroom D, Hyatt Regency

10:00 **Erin B. Rasmussen**

11:00 ***Panel Discussion***

3:00 **Derek D. Reed**

4:00 **Timothy A. Shahan**

5:00 ***Panel Discussion***

Sunday, May 28

9:00 **M. Christopher Newland**