SEP

SOCIETY OF EXPERIMENTAL PSYCHOLOGISTS

106th Annual Meeting
April 30-May 2, 2009
Boulder, Colorado

Center for Research on Training

University of Colorado, Boulder

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106th Annual Meeting
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This year's meeting is sponsored by the Center for Research on Training, the Department of Psychology and Neuroscience, the Institute of Cognitive Science, the Provost, the Graduate School, and the College of Arts and Sciences, all of the University of Colorado, Boulder.

All events will be at the Boulder Marriott Hotel.
All talks will take place in the Montrachet Ballroom, 1st Floor.

CONDENSED AGENDA

Thursday, April 30

6:00-9:00   **Reception (Cariboo Event Room, 4th Floor)**

Friday, May 1

8:00-9:00   **Breakfast (Montrachet Ballroom, 1st Floor)**

9:00-9:40   **Welcome**

John Stevenson, Associate Dean, Graduate School
Lewis Harvey, Chair, Department of Psychology
Alice Healy, Director, Center for Research on Training

Individual Differences

9:40-10:00   Hal Pashler, *Puzzlingly High Correlations in fMRI Research*

10:00-10:20   Earl Hunt, *Applying Math Modeling to a Half Century of Intelligence*

10:20-10:40   **Break with Food**

Learning

10:40-11:00	Alice Healy, *Data Entry: A Window to Principles of Training*
11:00-11:20	Michael Turvey, *Primary and Latent Aftereffects in Prism Adaptation of Throwing*
11:20-11:40	Carolyn Rovee-Collier, *Sensory Preconditioning in Infants: Temporal Constraints*
11:40-12:00	Tony Greenwald, *Unconscious Classical Conditioning?*
12:00-1:00	**Lunch (Bugaboo Event Room, 3rd Floor)**
1:00-1:20	**Break**

Judgment and Decision Making

1:20-1:40	Raymond Nickerson, *Producing Randomness*
1:40-2:00	Peter Killeen, *The Mother of All Discount Functions*
2:00-2:20	Thomas Wallsten, *A Stochastic Detection and Retrieval Model and its Application to Judgments of Learning*
2:20-2:40	Richard Shiffrin, *Estimation of Causal Functions*
2:40-3:00	**Break with Food**

Memory

3:00-3:20	Nelson Cowan, *Working Memory Capacity Redux*
3:20-3:40	Douglas Hintzman, *Repetition and Reminding*
3:40-4:00	Bennet Murdock, *Update on the TODAM Serial-Order Model*
4:00-5:00	**Group Photo**

Dinner and Evening on Your Own

Saturday, May 2

8:00-9:00   **Breakfast (Montrachet Ballroom, 1ˢᵗ Floor)**

Animal Behavior

9:00-9:20   John Staddon, *Successive Induction*

9:20-9:40   Donald Blough, *Reaction-time and the Relation Between Incentive and Choice*

9:40-10:00   Thomas Zentall, *"Cognitive Dissonance" in Animals?: Implications for Cognitive Dissonance Theory*

10:00-10:20   Herbert Terrace, *Output Chunking*

10:20-10:40   **Break with Food**

Language

10:40-11:00   Thomas Landauer, *Word Maturity, A Metric for Meaning*

11:00-11:20   Stephen Link, *The Edge of Meaning*

11:20-11:40   David Huber, *Behavioral and Electrophysiological Studies of Semantic Satiation*

11:40-12:00   **Break**

12:00-1:00   **Lunch (Bugaboo Event Room, 3ʳᵈ Floor)**

1:00-1:20   **Break**

Perception

1:20-1:40   James Townsend, *Assessing Architecture, Capacity, and Decisional Stopping Rule in Audiovisual Speech Perception*

1:40-2:00   Mary Peterson, *Competition and Suppression in Figure-Ground Perception*

2:00-2:20   Marlene Behrmann, *Facing Facts about Face Recognition*

2:20-2:40   Geoffrey Boynton, *Effects of Attention in the Human Visual System*

2:40-3:00   **Break with Food**

Neuroimaging

3:00-3:20   Steven Yantis, *Decoding Cognitive Control*

3:20-3:40   Lynn Nadel, *Hippocampus, Context and Memory*

3:40-4:00   Daniel Schacter, *Episodic Simulation of Future Events and the Medial Temporal Lobe*

4:00-5:00   **Business Meeting**

6:30-10:00   **Banquet - Reception, Dinner, Awards (Bugaboo Event Room, 3ʳᵈ Floor)**

FULL AGENDA WITH ABSTRACTS

Thursday, April 30

6:00-9:00 **Reception (Cariboo Event Room, 4th Floor)**

Friday, May 1

8:00-9:00 **Breakfast (Montrachet Ballroom, 1st Floor)**

9:00-9:40 **Welcome**

John Stevenson, Associate Dean, Graduate School
Lewis Harvey, Chair, Department of Psychology
Alice Healy, Director, Center for Research on Training

Individual Differences

9:40-10:00 Hal Pashler, *Puzzlingly High Correlations in fMRI Research*

Many recent studies using fMRI to study individual differences have reported extremely high (e.g., >.8) correlations between behavioral and self-report measures, on the one hand, and measures of brain activation, on the other. We suggest that these correlations often exceed what is statistically reasonable given the (rather limited) reliability of both fMRI and behavioral measures. Method sections in the fMRI literature are generally too brief and opaque to provide much information about how these correlations were obtained. To learn more, we surveyed authors of over fifty articles that reported correlations involving social/personality measures. More than half acknowledged using a strategy that computes separate correlations for individual voxels, and then reports means (or peaks) of just the subset of voxels exceeding chosen thresholds. We argue that this non-independent analysis can inflate correlations while yielding reassuring-looking scattergrams. The analysis method was used to obtain most of the correlations in our survey sample that seemed implausibly high. In addition, we argue that other analysis problems likely created entirely spurious correlations in some cases. We outline how the data from studies of this kind can be reanalyzed with unbiased methods to provide more accurate estimates of the correlations in question, and suggest that the problem probably extends well beyond social/personality neuroscience.

10:00-10:20 Earl Hunt, *Applying Math Modeling to a Half Century of Intelligence*

There is strikingly strong evidence that intelligence test scores have increased over the last 50-100 years. But has this change been uniform across the range, or concentrated in a particular range (e.g. low scorers)? The question is hard to answer because tests are ordinal measures of intelligence, in the conceptual sense. I will use mathematical modeling to show that the change has been selective. The modeling forces us to think about what we mean by "intelligence" and "intelligence tests."

10:20-10:40 **Break with Food**

Learning

10:40-11:00   Alice Healy, *Data Entry: A Window to Principles of Training*

Studies reviewed are aimed to reveal principles of training, which lead to an understanding of what factors influence the efficiency, durability, and flexibility of training. The studies involve investigations of a simple data entry task. The principles illustrated include principles derived from studies of word list learning–levels of processing and phonological processing–as well as newly formulated principles–cognitive antidote and mental practice. By the depth of processing principle, increasing the depth of processing stimuli during training improves the skill involved in responding to those stimuli after a long delay interval. By the phonological processing principle, disrupting phonological processing of stimuli hinders the skill involved in responding to those stimuli but only when working memory is used to store the stimuli. By the cognitive antidote principle, adding cognitive complications to an otherwise routine task mitigates the adverse effects of prolonged work. By the mental practice principle, mental practice can retard forgetting and promote transfer of training to a larger extent than can physical practice, which may suffers from motoric interference.

11:00-11:20   Michael Turvey, *Primary and Latent Aftereffects in Prism Adaptation of Throwing*

The effect of prism adaptation on movement is typically reduced when the movement at test (with prisms removed) is different from the movement at training. Some adaptation is latent, however, and only revealed through further testing in which movement at training is fully reinstated. In an experiment on throwing to a horizontal target with left shifting prisms and manipulation of the arm's moment of inertia, the latent aftereffect (a) depended on the similarity of training and test moments of inertia, and (b) combined with the primary aftereffect to yield a condition-independent sum. Links between prism adaptation and principles governing long-term priming (implicit memory) will be identified and an account in terms of nonlinear attractor dynamics will be summarized.

11:20-11:40   Carolyn Rovee-Collier, *Sensory Preconditioning in Infants: Temporal Constraints*

In sensory preconditioning (SPC) with adults, Sx and Sy are typically pre-exposed sequentially. Using a deferred imitation task with 6- to 18-month-old infants, we found that the effective timing regimen shifted from simultaneous to sequential pre-exposure between 6 and 12 months of age, but the simultaneous regimen was again effective at 18 months. SPC was affected by the number of trials only at transition periods and never by looking time or motor/verbal skill. This developmental pattern parallels Spear's findings with rat pups. We suspect that it reflects a shift from acquiring contiguous ("what goes with what") to anticipatory ("what comes after what") stimulus-stimulus relationships that accompanies independent locomotion in human infants.

11:40-12:00   Tony Greenwald, *Unconscious Classical Conditioning?*

This research adapted a procedure that reliably produces associative priming by visually masked (to the point of invisibility) brief letter strings. In Phase 1 (acquisition?), meaningless pre-masked 75-ms consonant strings (CSs?) were consistently paired for a few hundred trials (in about 10 minutes) with immediately following male or female names (USs?) that subjects rapidly classified by pressing a key with left or right index finger. In Phase 2 (extinction?), the masked strings came to facilitate classification of their previously paired gender categories. The question: Is this classical conditioning or something else? I describe some experiments that attempt to answer this question.

12:00-1:00   **Lunch (Bugaboo Event Room, 3rd Floor)**

1:00-1:20   **Break**

Judgment and Decision Making

1:20-1:40   Raymond Nickerson, *Producing Randomness*

Can people produce binary sequences (imaginary coin tosses) that are indistinguishable from sequences produced by coin tossing. I note research findings that have been interpreted as evidence that the answer is no, challenge the acceptability of this answer on methodological grounds, propose a better method for asking the question experimentally, and present results obtained with this method that differ from those more typically obtained. I propose a way of quantifying the degree to which a binary sequence is representative of one expected to be produced by a random process. Finally, I ask a non-rhetorical question: When, if ever, is it rational to judge, on the basis of its representativeness, whether a sequence was produced by a random process?

1:40-2:00   Peter Killeen, *The Mother of All Discount Functions*

Goods that are remote in temporal, spatial or social distance, or in likelihood, exert less control over our emotions and behavior than those more proximate. By developing discount functions from marginal utilities, this paper provides a framework that resolves several of the anomalies of inter-temporal choice. The model reduces to standard treatments, such as exponential, hyperbolic and hyperboloid, returns conjointly measured determinations of utility functions and temporal distance functions, and is extensible to other dimensions of distance.

2:00-2:20   Thomas Wallsten, *A Stochastic Detection and Retrieval Model and its Application to Judgments of Learning*

We present a new model, which we call the stochastic detection and retrieval model (SDRM). The SDRM is in the spirit of, but different from, signal detection theory and can be applied to a variety of memory and meta-cognitive paradigms. Applying the model to the judgment of learning (JOL) paradigm yields explanations of the delayed-JOL (delayed JOLs are more accurate than immediate ones) and the testing-JOL (JOLs are more accurate given prior test experience than without it) effects.

2:20-2:40   Richard Shiffrin, *Estimation of Causal Functions*

We present noisy two-dimensional data to Ss who give their best guess concerning the underlying causal function that produced the data. Do humans produce functions that balance good fit and complexity in the way that Bayesian statistical methods suggest? We fit each noisy data set with a hierarchical Bayesian model that allows for different degree polynomials, and we similarly fit the Ss best guess. The two are compared. Generally Ss balance fit and complexity like the best statistical methods, but there are interesting individual differences.

2:40-3:00   **Break with Food**

Memory

3:00-3:20   Nelson Cowan, *Working Memory Capacity Redux*

In my first SEP talk I summarize some of the work I have been doing to nail down the notion that there is a core portion of working memory that (1) requires attention for maintenance, (2) initially represents each attended stimulus regardless of its input modality, (3) typically is limited to 3 or 4 chunks in normal young adults, (4) has a more severe limit in childhood, (5) has a more severe limit also in aging adults, and (6) is important for complex cognitive processing. The assumptions are old but the methods and results are new.

3:20-3:40   Douglas Hintzman, *Repetition and Reminding*

Memory theorists have assumed that repetition produces its effects by increasing either the strength of a single memory trace or the number of essentially identical traces. I argue instead that repetition of an item affects memory in a way that is qualitatively different from the effect of the item's initial presentation. This hypothesis, which I call recursive reminding, helps to explain several otherwise-puzzling findings from memory-judgment tasks, including judgments of spacing, judgments of frequency, and judgments of recency. Extending this view, a fundamental purpose of episodic memory may be to "perceive" patterns of recurrence that define the spatio-temporal structure of the environment.

3:40-4:00   Bennet Murdock, *Update on the TODAM Serial-Order Model*

The TODAM serial-order model is a distributed memory model for serial-order effects in short-term memory using the convolution/correlation formalism of Borsellino & Pogio. This second revision allows a deeper insight into the workings of the model and fits reasonably well some previously recalcitrant data.

4:00-5:00   **Group Photo**

Dinner and Evening on Your Own

Saturday, May 2

8:00-9:00   **Breakfast (Montrachet Ballroom, 1st Floor)**

Animal Behavior

9:00-9:20   John Staddon, *Successive Induction*

Activating one reflex often facilitates another, antagonistic one (successive induction). The phenomenon was codified by Charles Sherrington more than 100 years ago and has been demonstrated in a wide range of species, from aphids to grasshoppers to dogs and humans. We show a particularly orderly example in zebrafish (Danio rerio) larvae. The data are well described by a simple dynamic model.

9:20-9:40   Donald Blough, *Reaction-time and the Relation Between Incentive and Choice*

Two pigeon experiments offered a choice, peck left for blue and peck right for green. Response bias was varied two ways, either by changing the relative number of "blue," and "green," trials ("stimulus imbalance") or by rewarding correct pecks for one color more often than for the other ("reward imbalance"). Both imbalances yielded substantial response biases as measured by the percentage of each response. However, reward imbalance shifted mean RT whereas stimulus imbalance had little effect on RT. The data suggested that the choice between the two responses was controlled by an instrumental stimulus-response-outcome conjunction, whereas RT was governed by a Pavlovian stimulus-outcome conjunction. RTs might be said to reflect the incentive value of the stimuli that controlled choice.

9:40-10:00   Thomas Zentall, *"Cognitive Dissonance" in Animals?: Implications for Cognitive Dissonance Theory*

Cognitive dissonance is produced when there is a discrepancy between one's beliefs and one's behavior. Justification of effort is a form of cognitive dissonance reduction in which the value of a reward is augmented by the effort required to obtain it. Pigeons were trained such that on half of the trials, they pecked only once to obtain a red light associated with food but on the remaining trials they had to peck many times to obtain a green light associated with the same food. On test trials they preferred the green light over the red light. Although consistent with cognitive dissonance reduction, we interpret these results in terms of contrast between the effort and the reward that follows.

10:00-10:20   Herbert Terrace, *Output Chunking*

Chunking is an ad hoc concept whose function is to overcome the limited capacity of working memory. Psychologists know a chunk when they see one have yet to give an a priori definition. An analysis of inter-response times on lists of numerical and arbitrary items, executed by human and by non-human primates showed that on most trials, subjects paused at some point as they executed the list. In no instance, were subjects differentially rewarded for pausing at any point of the sequence. This suggests that pauses were used to define chunk boundaries in the sense that subjects planned to execute a few items at a time and that they used pauses to load into working memory the next group of list items they had to execute.

10:20-10:40 Break with Food

<u>**Language**</u>

10:40-11:00   Thomas Landauer, *Word Maturity, A Metric for Meaning*

The goal of this research is to increase the value of individual learners' vocabularies by assessing and teaching the words that the student does not know, needs most, and is ready to learn. An LSA-based computational language model tracks the degree to which a simulated learner's representation of the meaning of each word in a language approaches adult status as the cumulative size of the language corpus it learns from increases. The resulting "word maturity" metric is coupled with an adaptive assessment that determines both the average level of a human student word, and an estimate of the probability of that student knowing any other selected word. This capability is used to automatically select target words, sentence contexts and distracters for Cloze tests.

11:00-11:20   Stephen Link, *The Edge of Meaning*

In an important series of psychophysical investigations Cartright (1941) defined and illustrated the Range of Similarity. In an application to the meaning of sentences he extended this idea to linguistics. He was uncertain about the interpretation of the results. However, I will show that his choice and response time results are entirely consistent with the random walk theory of discriminative judgment (Link, 1975; Link, 1992, etc).

11:20-11:40   David Huber, *Behavioral and Electrophysiological Studies of Semantic Satiation*

A series of experiments tested the claim that semantic satiation is neither a loss of meaning nor a loss of perception for the word form, but is instead a loss of association between the word form and its meaning. To control for fatigue between repeated and non-repeated, all experiments used a speeded matching task that contained a randomly ordered mix of repeating and non-repeating cue words. When the task was category matching and the cue was the category label, there was a slowing for the repeating category. When the repeating category was indicated by continually new exemplars, there was only facilitation. When the matching task was for the word form, there was only facilitation. As predicted by assuming that detection of novel semantics identifies mismatches, MEG revealed that this satiation corresponds to decreased M170 and M400 responses to a repeated cue but increased M400 responses to a matching target.

11:40-12:00   **Break**

12:00-1:00   **Lunch (Bugaboo Event Room, 3rd Floor)**

1:00-1:20   **Break**

Perception

1:20-1:40   James Townsend, *Assessing Architecture, Capacity, and Decisional Stopping Rule in Audiovisual Speech Perception*

Little is known concerning the dynamics of the combined auditory and visual perception of lip motion and voice during word perception. This study uses our theory-driven response-time methodology (systems factorial technology) to uncover the architecture (serial vs. parallel), workload capacity (how does increase of workload affect efficiency), decision stopping rule and indirectly, channel interactions. It was discovered that processing of the separate modalities was parallel, and the most efficient stopping rule was employed by all observers. However, the system was extremely limited in capacity suggesting either severe attentional limitations or striking inter-modality interference.

1:40-2:00   Mary Peterson, *Competition and Suppression in Figure-Ground Perception*

Traditionally it was assumed that figure-ground segregation occurred before object memories were accessed. We found evidence to the contrary and proposed that, following edge extraction, shape candidates on opposite sides are identified in a fast first pass of processing; the shape candidates then engage in inhibitory competition; the winning candidate is perceived as figure; and the losing candidate is suppressed. We recently reported evidence that the response to a shape suggested on the groundside of an edge is suppressed. I'll review those experiments and present two recent experiments showing that the location of the losing candidate is suppressed via coarse feedback.

2:00-2:20   Marlene Behrmann, *Facing Facts about Face Recognition*

The functional organization of the occipito-temporal visual pathway remains highly controversial. Data from three neuropsychological populations (acquired prosopagnosia, congenital prosopagnosia, and autism), who evince a disproportionate impairment in face processing, are presented, although the impairment implicates other object classes, too, when task demands are equated. These individuals also reveal difficulties in deriving holistic and configural relationships between elemental visual components. Imaging (structural, functional, DTI) studies map out an underlying neural circuit, including core regions such as the fusiform gyrus, as well as more distal regions, such as anterior temporal lobe, whose integrity is critical for computing the fine-grained configural information. A disruption in the integrity of this circuit may account for the perceptual deficits in these impaired individuals.

2:20-2:40   Geoffrey Boynton, *Effects of Attention in the Human Visual System*

I will discuss a series of functional MRI and behavioral experiments that show how the brain's representation of an unattended visual stimulus is affected by what is being attended to elsewhere.

2:40-3:00   **Break with Food**

Neuroimaging

3:00-3:20   Steven Yantis, *Decoding Cognitive Control*

Simple cognitive tasks require an appropriate sequencing of mental operations, including for example (a) perceptually selecting relevant sensory input; (b) identifying, categorizing, or encoding the selected input; (c) activating a stimulus-response mapping rule; and (d) executing the required response. Some of these can be selected and configured in advance, while others are selected and executed as the task unfolds; the reconfiguration of tasks sets requires voluntary acts of cognitive control. We have investigated the neural basis of cognitive control using fMRI during tasks that require shifts of attention in multiple domains, as well shifts between working memory representations, between categorization rules, and between response sets. We have used multi-voxel pattern analysis to decode acts of control in posterior parietal and other brain regions. These observations reveal aspects of a general-purpose suite of cognitive control mechanisms for selecting and reconfiguring cognitive task sets.

3:20-3:40   Lynn Nadel, *Hippocampus, Context and Memory*

Recent evidence suggests that reactivating a memory opens it up to modification and reconsolidation. I will describe a series of behavioral studies exploring reconsolidation in human episodic memory, and a few fMRI studies exploring possible brain correlates of this process.

3:40-4:00   Daniel Schacter, *Episodic Simulation of Future Events and the Medial Temporal Lobe*

Recent studies have shown that imagining or simulating future events involves much of the same neural and cognitive machinery as does remembering past events. One striking finding is that the hippocampus and related medial temporal lobe structures, long known to play an important role in memory, also appear to be involved in constructing episodic simulations of possible future events. This paper will consider recent data from neuroimaging studies that bear on this issue and discuss alternative theoretical interpretations of the findings.

4:00-5:00   **Business Meeting**

6:30-10:00   **Banquet - Reception, Dinner, Awards (Bugaboo Event Room, 3rd Floor)**

OTHER SEP MEMBERS ATTENDING

Robert Bjork
Lyle Bourne
George Collier
Walter Kintsch
Steven Maier
Janet Metcalfe
Greg Lockhead
Donald Riley
Bill Uttal

LOCAL NON-MEMBERS ATTENDING

Lindsay Anderson
Marie Banich
Carolyn Buck-Gengler
Donna Caccamise
Susan Chipman
Tim Curran
Lewis Harvey
Matt Jones
Shaw Ketels
Albert Kim
James Kole
Keith Lohse
Akira Miyake
Michael Mozer
Richard Olson
William Raymond
Vivian Schneider
John Stevenson
Leaf Van Boven
Tor Wager
Dusty Young
Jun Zhang