The 116th Annual Meeting of the

Society for Experimental Psychology

SEP

May 6 – 8, 2023

Loews Hotel

1200 Market Street
Philadelphia, PA

Penn
University of Pennsylvania

Temple University

SEP 2023 AGENDA

Saturday, May 6

5:30 - 7:30	Reception (The Terrace, 33rd Floor)

Sunday, May 7

All of Sunday's sessions are located in the Howe Room (33rd Floor).

7:30 - 8:00	Registration
8:00 - 8:30	Breakfast & Introduction
8:30 - 8:50	**David Brainard,** The single cone optoretinogram: Functional characterization of individual cone photoreceptors in the living human eye
8:50 - 9:10	**Ingrid Olson,** The cerebellum and neuropsychiatric disorders
9:10 - 9:30	**Ian Dobbins,** Communicating the veracity of memories
9:30 - 9:50	**Marisa Carrasco,** To look or not to look: Dissociating presaccadic and covert spatial attention
9:50 - 10:10	Break
10:10 - 10:30	**Martin Banks,** Binocular vision is adapted to the statistics of the natural environment
10:30 - 10:50	**Tania Lombrozo,** Explaining explanation: A functional approach to explanatory preferences
10:50 - 11:10	**Paul Rozin,** Fads in life and in psychology
11:10 - 11:30	Break
11:30 - 11:50	**Sam Gershman,** Physical abstraction
11:50 - 12:10	**Ralph Miller,** Generalizing findings in cognitive psychology to situations beyond those examined
12:10 - 12:30	**Stephen Link,** Directly measured stimulus differences
12:30 - 12:50	**Marlene Behrmann,** Brain–behavior organization: A few thoughts
12:50 - 2:00	Lunch
2:00 - 2:20	**Tony Greenwald,** Implicit bias science and anti–discrimination law
2:20 - 2:40	**Nora Newcombe,** Neighborhoods, directions, and distances: Segmentation effects in a real–world city
2:40 - 3:00	**Ken Norman,** Blocked training facilitates learning of multiple schemas
3:00 - 3:20	**Sabine Kastner,** Attentional control in the developing brain

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Sunday continued

3:20 - 3:40	Break
3:40 - 4:00	**Jack Gallant,** The distributed conceptual network in the human brain
4:00 - 4:20	**Michael Kubovy,** The viewer and the homunculus in the perception of perspectival pictures
4:20 - 4:40	**Laurence Maloney,** Dissecting Bayes: Using influence measures to test normative use of probability density information derived from a sample
4:40 - 5:00	**Martha Farah,** What's a nice cognitive neuroscientist like you doing with a topic like socioeconomic status?
5:00 - 5:30	Group Photo

Monday, May 8

All of Monday's sessions are located in the Howe Room (33rd Floor).

8:00 - 8:30	Breakfast
8:30 - 8:50	**Scott Kelso,** Agency in the midst of action and inaction
8:50 - 9:10	**Alice Healy,** Reconstructing temporal and spatial order
9:10 - 9:30	**Herbert Terrace,** Protolanguage: The transition from animal communication to words
9:30 - 9:50	**Thomas Zentall,** Justification of effort by humans and pigeons: Cognitive dissonance or contrast?
9:50 - 10:15	Break
10:15 - 10:35	**Robert Goldstone,** The division of linguistic labour for offloading conceptual understanding
10:35 - 10:55	**Phil Kellman,** Abstraction and constant curvature coding in the visual perception of shape
10:55 - 11:15	**Nelson Cowan,** Developmental stability and change in allocating attention
11:15 - 11:35	Break
11:35 - 11:55	**Richard Shiffrin,** Lord's paradox: Scientific vs statistical inference
11:55 - 12:15	**Barbara Knowlton,** Enhancement of memory selectivity by transcranial direct current stimulation
12:15 - 12:35	**Peter Killeen,** Discounting your portfolio of desires
12:35 - 2:00	Lunch
2:00 - 2:20	**Steven Sloman,** Those who oppose the scientific consensus think they know more

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Monday continued

2:20 - 2:40	**Mike Kahana,** The Penn Electrophysiology of Encoding and Retrieval Study
2:40 - 3:00	**Randy Gallistel,** The low down on associative learning
3:00 - 3:20	Break
3:20 - 3:40	**William Warren,** Can you follow your friends? Ensemble perception vs. selective attention in human crowds
3:40 - 4:00	**Moshe Bar,** The surprising link between thought progression and mood
4:00 - 4:20	**Tom Griffiths,** Three data–driven updates on classic results in cognitive psychology
4:20 - 4:40	**Eileen Kowler,** Smooth pursuit eye movements predict future motion
4:40 - 5:00	Business Meeting
7:00	Banquet

The Banquet will be held at Barbuzzo.
110 S. 13th Street
Philadelphia, PA 19107

ABSTRACTS

Abstracts are in alphabetical order by speaker's last name.

Martin Banks, Binocular vision is adapted to the statistics of the natural environment

In binocular vision, a fundamental problem is how to match up image points in the left eye with the appropriate points in the right eye. We know that the visual system focuses the search range on a small set of binocular disparities. We asked how well that search range (and other properties of binocular vision) are tuned to natural scenes. We developed a mobile eye-and-scene tracker that measures gaze direction and 3D scene structure as people engage in everyday tasks. From the tracker we determined the statistics of binocular disparities. We found that the distribution of naturally occurring disparities is well matched to the search range the visual system uses in matching left- and right-eye image features. We also found that the disparity preferences of cortical neurons in primates are consistent with the natural distribution. In addition, we examined whether vergence eye movements are biased toward naturally occurring disparities and found that they are. This oculomotor bias is useful for aligning the eyes at the most likely distance of the next fixation target, thereby avoiding the need to make a corrective vergence movement. Finally, we examined how disparity and fixation statistics vary between everyday viewing in the natural environment and viewing video games in an HMD. The statistics are quite different in the two environments.

Moshe Bar, The surprising link between thought progression and mood

For decades, depression has been thought of as a result of chemical imbalance in the brain. Neurotransmitters such as serotonin and dopamine change in concentration and subsequently deteriorate mood. Indeed, medications to regulate these concentrations, primarily SSRIs, have shown significant improvement in the life of many suffering from depression, anxiety and other mood disorders. However, the effect of depression is evident in all levels of brain functioning, from molecules to cognition. Mood disorders such as depression and anxiety are typically characterized by a thought pattern that is 'stuck': ruminative, narrow and slow. In an attempt to alleviate depression symptoms, we show that countering these elements can significantly improve mood. Specifically, we show paradigms that by making thought patterns broader, more associative and advance more rapidly improve mood in healthy individuals as well in patients. We call our overarching approach FTP (Facilitating Thought Progression). This approach is easily implemented, and one such gamified implementation will be presented. Changing the way thought flows can directly alleviate symptoms of mood disorders. Beyond effects on mood, other interesting symptoms such as anhedonia will be discussed and accounted for within the context of FTP.

Marlene Behrmann, Brain–behavior organization: A few thoughts

In this talk, I will describe my current studies which are designed to elucidate how complex behavior emerges from the brain. I will take as my focus the neural mechanisms that subserve complex visual pattern recognition, and will draw on evidence from studies of the visual system in health and disease (normal adults and children, individuals with focal neuropsychological deficits, and individuals with hemispherectomy or lobectomy) adopting multiple methodologies (psychophysics, neuroimaging, stereoencephalography). I will propose that visual recognition emerges from the interactive engagement of a network of regions, which is distributed within and across both hemispheres, and which evince graded functional specialization. Data will be used to test predictions such as specific collaborative and competitive synergies of hemispheric bias that play out over the course of development, the nature of representations across the two hemispheres and the extent to which a single hemisphere, either left or right, might suffice for recognition. Last, I will lay out open questions which will, undoubtedly, occupy the field well into the future.

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David Brainard, The single cone optoretinogram: Functional characterization of individual cone photoreceptors in the living human eye

Spatial and color vision are initiated when light is absorbed by cone photoreceptors. The packing arrangement of the retinal cone mosaic shapes and limits all subsequent perceptual representations. Understanding how visual processing combines information across cones to make inferences about the spatio-spectral structure of the visual input is facilitated by knowledge of the packing arrangement and chromatic topography of the cones in individual eyes. In this talk, I will review recent work that measures functional responses of individual cones to visual stimuli in the living human eye. We hope this technique will eventually support identifying the position and type of each cone in an individual's retina. The work also has important translational applications for understanding the progression and treatment of retinal disease at the scale of individual cells.

Marisa Carrasco, To look or not to look: Dissociating presaccadic and covert spatial attention

Attention is a central neural process that enables selective and efficient processing of visual information. Individuals can attend to specific visual information either overtly, by making an eye movement to an object of interest, or covertly, without moving their eyes. We have reviewed behavioral, neuropsychological, neurophysiological, and computational evidence of presaccadic attentional modulations that occur while preparing saccadic eye movements and highlighted their differences from those of covert spatial endogenous (voluntary) and exogenous (involuntary) attention (Li, Hanning & Carrasco, TINS, 2021). Here, I will present recent transcranial magnetic stimulation (TMS) studies revealing the dissociable roles of early visual cortex (V1/V2) and human frontal eye fields (rFEF+) in exogenous and endogenous covert attention and in presaccadic attention. By providing causal evidence of the differential roles of these occipital and frontal brain regions these studies further dissociate presaccadic and covert spatial attention.

Nelson Cowan, Developmental stability and change in allocating attention

Does the allocation of attention affect working memory capacity, or vice versa? I examine progress from several recent studies of child development using probe recognition of colors from a small array. In one study, children 7 years and older and adults were to remember the colors of one shape (e.g., circles) at a higher priority than colors of another shape (e.g., triangles). When the working memory load was low, 7-year-old children allocated attention as efficiently as adults, but that was not the case when the working memory load was higher. That is, working memory storage limits affected the efficiency of attention. In another study, the participants were to remember a variable number of colored spots while carrying out an easy or difficult speeded task. In this case, 7-year-olds tended to forget the colors after the speeded task was carried out, whereas older children and adults retained more colors at the expense of speed in the other task. That is, unlike the first-mentioned study, the efficiency of attention affected working memory storage limits. The conclusion is that there is a cascade of processing between stimulus and response in which working memory and the allocation of attention have effects on one another in turn, with both kinds of changes important in cognitive development.

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Ian Dobbins, Communicating the veracity of memories

Researchers typically ask observers to convey the veracity of their memories using numeric confidence ratings (e.g., 1-low, 2-medium, 3-high) and such scales demonstrate a moderate correspondence to memory accuracy. However, outside the lab individuals instead typically use natural language to convey beliefs about the content and veracity of memories. I will review recent research using such natural language memory justifications, in conjunction with basic machine learning techniques, that suggests they are sensitive to individual differences in recognition skill, track the degree of recollective experience supporting memory, and yield recognition memory language classifiers that demonstrate far transfer of learning. This approach highlights a growing area of social metamemory research that focuses on the processes by which the veracity of memories is communicated and evaluated.

Martha Farah, What's a nice cognitive neuroscientist like you doing with a topic like socioeconomic status?

I will try to answer this question, reflecting on the progress (modest) and the potential (substantial, maybe even stupendous) of neuroscience approaches to the problem of low SES.

Jack Gallant, The distributed conceptual network in the human brain

Human behavior is based on a complex interaction between perception, stored knowledge, and continuous evaluation of the world relative to plans and goals. Even seemingly simple tasks such as watching a movie or listening to a story involve a range of different perceptual and cognitive processes whose underlying circuitry is broadly distributed across the brain. One important aspect of this system—the representation of conceptual knowledge in the brain—has been an intense topic of research in cognitive neuroscience for the past 40 years. A recent line of neuroimaging research from my lab has produced highly detailed, high-dimensional functional maps of modal and amodal (or multimodal) semantic representations in individual participants. Based on these findings, we propose a new Distributed Conceptual Network (DCN) theory that encompasses previous theories and accounts for recent data. The DCN theory holds that conceptual representations in the human brain are distributed across multiple modal sensory networks and (at least) one distributed amodal (or multimodal) conceptual network. Information from the modal sensory networks interfaces with the amodal network through a set of parallel semantically-selective channels. The amodal network is also influenced by information stored in long-term memory, which enters the network via the ATL. Finally, executive functions such as selective attention modulate conceptual representations depending on current behavioral goals and plans. We propose that the distributed conceptual system may be the scaffold for working memory, and that it subserves many diverse cognitive functions.

Randy Gallistel, The low down on associative learning

It is a truth [almost] universally acknowledged, that i) associative learning is caused by the updating of associative bonds (aka state values); ii) the updating is caused by prediction errors; and iii) the learning rate is a free parameter, which can be fiddled to make one's model fit the data. All three 'truths" are false. This was revealed by Gibbon and Balsam's (1981) meta-analysis of trials to acquisition in pigeon autoshaping. An updated version of their plot (Slide 1) reveals that: i) associative learning is driven by the perception of the information-theoretically definable temporal contingency between two events; ii) the learning rate is a function of the informativeness of the temporal relation, which is the ratio of the conditional rate to the basal (unconditional) rate of reinforcement; iii) the log of this ratio measures the contingency; and iv) a simple one-parameter regression equation gives the rate of learning as a function of the informativeness. This has proved to be an astonishingly general truth. Neuroscientists will never discover the neurobiological basis of memory until they grasp it.

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Sam Gershman, Physical abstraction

One theory of intuitive physics holds that people employ a range of efficient but inflexible heuristics. A rival theory holds that people make use of a relatively realistic Newtonian simulator, which is inefficient but flexible. I will describe recent work suggesting that mental abstraction is an important component of intuitive physics, providing a bridge between efficient heuristics and flexible simulation.

Robert Goldstone, The division of linguistic labour for offloading conceptual understanding

We interpret the division of linguistic labour (DLL), initially theorized by philosophers, as an extended mind strategy of offloading conceptual understanding onto other people. We empirically explore DLL with an experimental paradigm wherein participants had to categorize two pairs of highly confusable dog breeds after receiving categorization training on just one pair of breeds. In the treatment group, participants were grouped in dyads and were allowed to interact with each other by means of the labels of these four dog breeds. In their queries to trained 'experts', novices frequently used labels to refer to breeds that they could not identify themselves. Experts were highly responsive to their paired novices' queries, and the rates of querying for the two members within a dyad were positively correlated. Independent categorization failure and offloading categorization success lead to subsequent increases in querying by novices, indicating adaptive use of offloading. Self-reports of breed knowledge were higher for experts within a dyad compared to isolated experts.

Tony Greenwald, Implicit bias science and anti–discrimination law

Systemic biases result from organizationally scripted procedures that produce discriminatory impact without human decision-making. They are not psychological processes. Implicit biases, which operate from a base of associative knowledge built up since childhood, produce discriminatory behavior by people who often are unaware of doing anything problematic. Systemic and implicit biases are plausibly responsible for much more economic and health adversity than results from intentional discrimination. The consequences of both biases challenge a system of anti-discrimination law that has not yet adapted to their conceptual understanding.

Tom Griffiths, Three data–driven updates on classic results in cognitive psychology

Three of my favorite classic results in cognitive psychology are Roger Shepard's Universal Law of Generalization, his multidimensional scaling analysis of the perception of musical pitch, and Herbert Simon's work on planning in chess. However, these results were all based on relatively small samples. Using modern methods for recruiting online participants and analyzing large behavioral datasets we have the opportunity to dig deeper. In this talk I will present brief updates on all three phenomena, showing that the Universal Law applies to complex stimuli such as images, that the representation of pitch is both simpler and more complex than Shepard suggested, and that analysis of a massive dataset of online chess games reveals players make good decisions about when to plan (and hence make good use of bounded cognitive resources).

Alice Healy, Reconstructing temporal and spatial order

We used an order reconstruction task to investigate the dynamics and strategies underlying recall of serial order. We orthogonally varied temporal and spatial positions and found large performance differences between recalling temporal and spatial information despite use of similar strategies.

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Mike Kahana, The Penn Electrophysiology of Encoding and Retrieval Study

For more than a century, experimental psychology has advanced through a model of small science. Surveying some of the field's best journals reveals that, inclusive of all experiments, an average publication reported just 100-200 hours of experimental data, and that this number has barely changed in the last two decades. With the notable exception of Ebbinghaus (1885), one can find very few published studies of memory comprising more than 500 hours of experimental data. Today I will describe the Penn Electrophysiology of Encoding and Retrieval Study (PEERS), which was my attempt at doing big science in the realm of memory research. PEERS aimed to characterize the behavioral and electrophysiological (EEG) correlates of memory encoding and retrieval in highly practiced individuals. Across five PEERS experiments, 300+ subjects contributed approx. 10,000 hours of experimental data. I will tell the story of PEERS: it's genesis, evolution, major findings, and the lessons it taught me about taking a big science approach to the study of memory and the human brain.bjects contributed more than 7,000 ~90 minute memory testing sessions with recorded EEG data.

Sabine Kastner, Attentional control in the developing brain

In the adult brain, biases in the allocation of spatial attention can be measured using a line bisection task and are directly relatable to neural attention signals in the frontoparietal attention network. Behavioral studies on the development of spatial biases have yielded a host of inconsistent results, likely due to variance in sample size, definition of experimental groups, and motor confounds introduced by using a paper and pencil version of a line bisection task. Here, we used a perceptual, computerized version of this task and examined the development of spatial biases in 459 children from grades 1–8 and 61 college freshmen. We found that children in early elementary grades exerted a significant leftward bias that gradually diminished with advancing grade level. We further show that among children in early elementary school grades, the degree of leftward spatial bias predicted better performance on a rapid automatized naming test, a predictor of reading ability. Significant leftward biases in early elementary school grades may be due to reading experience, thereby reflecting an interaction of the attention network with the evolving reading network.

Phil Kellman, Abstraction and constant curvature coding in the visual perception of shape

One of the deepest complexities of visual perception is that it involves a transition to symbolic descriptions of the environment from initially sub-symbolic inputs. How are stable, abstract representations of objects, arrangements, and events in the world obtained from transient, fluctuating activations of neural detectors sensitive to contrast in local retinal regions? In this talk, I will present experimental and modeling results that suggest an answer in perception and representation of contour shape. Evidence suggests that we encode contour shape in terms of segments of constant curvature and that these initial symbolic descriptions may be based on the outputs of specific neural mechanisms that extract constant curvature via sets of linked orientation-sensitive units at different turning angles and scales. I will describe results of a computational model that fits human contour perception and sketch a neural version of the model. Finally, I will highlight abstract representations of shape as a key to understanding differences between human perception and deep learning systems that perform successful object classification.

Scott Kelso, Agency in the midst of action and inaction

Dynamical analysis of 2-3 month old infants in the baby~mobile paradigm reveals that agency emerges as a phase transition in a coupled dynamical system that spans the infant and the environment. Patterns of fluctuations prior to and following transitions reveal processes of exploration, discovery and control. Human infants realize they are agents through the joint process of stillness and actions that cause the world to change. These findings present a challenge to previous thinking and current modeling.

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Peter Killeen, Discounting your portfolio of desires

A good whose receipt is delayed—say $1000 in one year—has a diminished present value—around $800—a relative discount of 800/1000 = 80%. This is delay discounting. The economists' exponential discount function fails to describe relative discounts when delays are systematically varied. Other functions (e.g., "hyperboloid") fit the data but are unmotivated by theory—they are curve fits, and do not predict reliable effects, such as the "magnitude effect", wherein larger amounts (e.g., $10,000) are discounted more slowly than smaller ones (e.g, $1,000). The "Additive Utility Theory" (AUT) takes utility to be concave functions of amount and delay, with the current utility their sum: U($800) = U($1000) – kU(12 mo.). AUT describes the data and predicts the magnitude effect en passant: Normalize to compute the relative utility: $\frac{U(\$800)}{U(\$1000)} = \frac{k}{\text{discount rate}}$. It is important to recognize that the discount rate k is divided by the utility of the amount: Goods with larger utilities are therefore discounted more slowly.

The pragmatic utility of $1000 depends what you can spend it on. Optimal consumers distribute the $1000 over a diversity of goods each at the steepest part of their utility functions (not on 50 pizzas, but one pizza, a beer, and rooms in a fine resort like Loews). This diversity increases the utility of the package of goods the $1000 is spent on, and thus decreases the apparent rate of discounting. Money, the most liquid of goods, is discounted more slowly than less liquid commodities (e.g. pizzas), because it can exploit the utilities of the diverse goods it buys at the optimal parts of their utility functions. Even though the real temporal discount rate (k) remains invariant over different commodities and amounts, the apparent discount rate (viz., k/U(1000)) varies both with amount and the diversity that amount affords. When the allocation of the $1000 is restricted to a smaller portfolio of goods, utility decreases due to decreasing marginal utility of the few available items (consider the utility of 10 pizzas; of 25, …), and consequently the discount functions steepen; when the portfolio of desired goods is enlarged, discount rates decrease. This theory predicts what hundreds of studies have found: Addicts, depressives, impoverished, and anyone else with a diminished portfolio of desires have steeper discount functions--they are stuck with the diminished marginal utilities of a few items. Manipulations such as episodic future thinking that increase the portfolio of desired goods, accordingly flatten the discount functions.

Barbara Knowlton, Enhancement of memory selectivity by transcranial direct current stimulation

People are able to prioritize valuable information in memory. This may occur through strategically selective encoding of high-value information, or through automatic strengthening of information associated with value. In our previous work, we have shown that high-definition transcranial direct current stimulation (HD-tDCS) to the left ventrolateral prefrontal cortex (VLPFC) enhances selectivity for high value words in a value-directed remembering procedure. We are currently attempting to identify whether VLPFC stimulation specifically benefits deep semantic encoding of high value words or is generally involved in enhancing value effects on memory. We used an item-based directed forgetting paradigm in which subjects would be motivated to differentially encode high value words, while any effects of value in to-be-forgotten words could be attributed to automatic strengthening of memory by value. Our results suggest that left VLPFC stimulation enhances the ability to engage deep semantic processing for high value items. These results support the idea that strategic and automatic encoding based on item value depend on distinct neural circuits.

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Eileen Kowler, Smooth pursuit eye movements predict future motion

Smooth pursuit eye movements are used to follow smoothly moving targets, preventing the high retinal velocities that impair vision. Initiating smooth pursuit requires no overt effort or planning other than paying attention to the moving target. It is not possible to voluntarily initiate pursuit without a suitable motion signal, nor is it possible to deliberately pursue along a trajectory that differs from that of the chosen moving target. Nevertheless, despite the constraints imposed by the immediate motion, pursuit is able to predict the future motion of targets. This talk will review some of the evidence for the predictive abilities of smooth pursuit, and present new results on pursuit of random dot kinematograms. A Bayesian model using reliability-based weighting of previous target motions (priors) and immediate sensory motion (likelihood) accounted for many, but not all, aspects of pursuit of clear and noisy random dot kinematograms with different levels of predictability. Bayesian approaches may solve the long-standing problem of how pursuit combines immediate sensory motion, past history, and perceptual cues disclosing future target motion to configure an effective response.

Michael Kubovy, The viewer and the homunculus in the perception of perspectival pictures

I present a new theory of the perception of perspective, in which I distinguish between a viewer (in real space) and a homunculus (in the represented space). I illustrate with two examples in which artists created a conflict between the center of interest of the scene, and the implicit direction of the homunculus's gaze. This illustrates the indispensability of phenomenology and suggests a limit to the reach of experimental methods.

Stephen Link, Directly measured stimulus differences

Directly measured stimulus differences (DMSD) Link (2022) is a new application of comparative judgment theory that requires an observer to both choose between two stimuli and create a measure of the size of the difference between the two stimuli. Link's theory of choice shows how a small number of these paired comparisons may be used to predict an entire paired comparison matrix using the directly measured differences between two stimuli. Saves time and money!

Tania Lombrozo, Explaining explanation: A functional approach to explanatory preferences

Humans are explanation-seeking creatures. But we are also highly selective in the explanations that we seek and in the explanations we find satisfying. In this talk I'll take a functional approach to understanding the structure and phenomenology of explanation, exploring the hypothesis that explanations have the properties they do in part because of the role they play in supporting learning. In the first part of the talk, I'll offer an overview of research suggesting that a preference for explanations that are broad (in the sense that they account for more observations) and simple (in the sense that they posit fewer causes or rules) can support the discovery of broad and simple patterns. In the second part of the talk, I'll take a closer look at recent results suggesting that explanatory satisfaction – the positive phenomenology associated with a good explanation – is related to perceptions of learning. These results suggest that people may prefer broad and simple explanations because seeking such explanations promote discovery, and that the sense of explanatory satisfaction tracks perceptions of learning because favoring such explanations promotes learning. In other words, our explanation-seeking tendencies may be part of what explains humans' remarkable success as learners.

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Laurence Maloney, Dissecting Bayes: Using influence measures to test normative use of probability density information derived from a sample

Bayesian decision theory (BDT) is frequently used to model normative performance in perceptual, motor, and cognitive decision tasks where the outcome of each trial is a reward or penalty that depends on the subject's actions. The resulting normative models specify how decision makers should encode and use information about uncertainty and value – step by step – in order to maximize their expected reward. When prior, likelihood, and posterior are probabilities, the Bayesian computation requires only simple arithmetic operations: addition, etc. We focus on visual cognitive tasks where Bayesian computations are carried out not on probabilities but on (1) probability density functions and (2) these probability density functions are derived from samples. We break the BDT model into a series of computations and test human ability to carry out each of these computations in isolation. We test three necessary properties of normative use of pdf information derived from a sample – accuracy, additivity and influence. Influence measures allows us to assess how much weight each point in the sample is assigned in making decisions and allows us to compare normative use (weighting) of samples to actual, point by point. We find that human decision makers violate accuracy and additivity systematically but that the cost of failure in accuracy or additivity would be minor in common decision tasks. However, a comparison of measured influence for each sample point with normative influence measures demonstrates that the individual's use of sample information is markedly different from the predictions of BDT. We demonstrate that the normative BDT model takes into account the geometric symmetries of the pdf while the human decision maker does not. A heuristic model basing decisions on a single extreme sample point provided a better account for participants' data than the normative BDT model.

Ralph Miller, Generalizing findings in cognitive psychology to situations beyond those examined

COVID stopped in-person data collection in our laboratory and drove us to develop ways of collecting data over the internet. Figuring out how to do this and obtain credible data took almost half a year. But done, we are now able to triple our rate of completing experiments. Previously, we had found effects with our preparation, examined minor variants of the procedure to identify likely underlying mechanisms, and speculated about how our account might generalize to appreciably different preparations. Thanks to COVID, we now have the resources to empirically examine the generalization of our findings to other situations. Painfully, we find that all too often, what we originally saw was specific to the particular preparation that we had used. Examples of this will be presented with respect to associative interference. I will close by discussing what this may imply for models of associative interference and modeling in cognitive science more generally.

Nora Newcombe, Neighborhoods, directions, and distances: Segmentation effects in a real–world city

People often segment spaces into hierarchically structured subspaces. Judgments about inter-point distance and direction are more accurate within than between segments. However, especially in large-scale complex spaces, segmentation may be necessary for flexible navigation. In this study, we looked at spatial segmentation in a real-life city. We asked citizens of Istanbul, a transcontinental city spread over Europe and Asia with natural waterways that divide it into multiple neighborhoods, to indicate how they segment their city and to perform spatial judgments between well-known landmarks. We examined segmentation effects for divisions they endorsed, and for those others use but they do not report using. Additionally, we examined the impact of gender, age, time spent in the city, and frequency of using connecting routes and bridges. We replicated basic segmentation effects for the primary division, used by all, between the European and Asian sides. For the European side, which has a geographic boundary (The Golden Horn), segmentation impaired the accuracy of spatial representation of participants. For the Asian side, where there is a potential division that is more notional, we found different effects. Individual's age, sex, time spent in the city, and frequency of using connecting routes also influenced spatial judgments. These results suggest that (i) spatial segmentation effects exist in the real-world, (ii) segmentation in a city-scale environment is differently affected by physical and conceptual boundaries, and (iii) sex, age, and navigation experiences are associated with the cognitive representation of a city.

ABSTRACTS

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Ken Norman, Blocked training facilitates learning of multiple schemas

We all possess a mental library of schemas that specify how different types of events unfold. How are these schemas acquired? A key challenge is that learning a new schema can catastrophically interfere with (i.e., overwrite) old knowledge. One solution to this dilemma is to use interleaved training to learn a single representation that accommodates all schemas. However, another class of models posits that catastrophic interference can be avoided by splitting off new representations when large prediction errors occur. A key differentiating prediction is that, according to splitting models, catastrophic interference can be prevented even under blocked training curricula. We conducted a series of semi-naturalistic experiments and simulations with Bayesian and neural network models to compare the predictions made by the ``splitting" versus ``non-splitting" hypotheses of schema learning. We found better performance in blocked compared to interleaved curricula, and explain these results using a Bayesian model that incorporates representational splitting in response to large prediction errors. In a follow-up experiment, we validated the model prediction that inserting blocked training early in learning leads to better learning performance than inserting blocked training later in the learning process. Our results suggest different learning environments (i.e., curricula) play an important role in shaping schema composition.

Ingrid Olson, The cerebellum and neuropsychiatric disorders

The cerebellum contains five times as many neurons as the cerebrum yet we know almost nothing about its non-motor functions. In this talk I will introduce the audience to research suggesting that portions of the cerebellum play key roles in modulating social cognition, mood, and perception and that the disruption of specific cerebellar regions is associated with a range of neuropsychiatric symptoms found in autism spectrum disorder, depression, and psychosis.

Paul Rozin, Fads in life and in psychology

I will considers fads ("overattention" to a particular problem , activity or domain) as a basic feature of human social life. Like "stereotypes", fads have a negative aura, but they have a positive side. I will illustrate some fads in diets and science history, and then turn to our academic world, considering the extreme focus on homeostasis in understanding human food intake, the behaviorist movement, and currently the great emphasis on neuro-explanation. I hope to stimulate a rich and informed discussion.

Richard Shiffrin, Lord's paradox: Scientific vs statistical inference

In 1967 Frederic Lord published a two page paper analyzing changes in weight by women and men from the start to the end of a semester. He asked what inferences should be drawn from the data shown. A scientist would surely conclude that the individuals in both groups were fluctuating in weight but not gaining or losing. Yet an analysis of covariance (ANCOVA) produced an inference that both men and women were gaining, with the men gaining more. Lord presented this as an example showing that inappropriate use of ANCOVA leads to absurd conclusions, yet statisticians and causal modelers have been re-examining this paradox ever since, sometimes concluding that one cannot reach a valid conclusion, sometimes concluding that the correct conclusion is more weight gain for the initially heavier group. This is an example showing that what seems to be good abstract theory, in this case statistical and causal theory, can lead to interpretations different than those reached by scientists. I use this example to highlight the importance of drawing inference on the basis of models that could produce the observed data that are plausible, simple and coherent. Not one of the many authors since 1969 drawing statistical inferences (absurd ones in my view and Lord's view) have produced a model capable of producing the data Lord displayed. At heart the differences at stake are those between deduction and induction/abduction.

ABSTRACTS

Abstracts are in alphabetical order by speaker's last name.

Steven Sloman, Those who oppose the scientific consensus think they know more

Five studies examine the interrelationships between opposition to expert consensus on controversial scientific issues, how much people actually know about these issues,
and how much they think they know. Across seven critical issues that enjoy substantial scientific consensus, as well as attitudes toward COVID-19 vaccines and mitigation measures like mask wearing and social distancing, results indicate that those with the highest levels of opposition have the lowest levels of objective knowledge but the highest levels of subjective knowledge.

Herbert Terrace, Protolanguage: The transition from animal communication to words

There is general agreement that words (spoken, gestural or both) evolved before grammar and that words were invented by Homo erectus, an ancestor who evolved about two million years ago (Arbib, Bickerton, Tomasello, Corballis, Everett and Scott-Phillips). There is also agreement that Home erectus was "word-ready", but none of these researchers have specified what it that means. I suggest that "word-ready" means that our ancestors benefited from non-verbal social processes on which words depends. Those include hyper-cooperation, intersubjectivity and joint attention. As suggested by Bickerton, Homo erectus communicated with protolanguage, languages that consist of unordered and uninflected words and no grammar. Because utterances in protolanguage are limited to one word, some linguists have likened them to utterances used in pidgin languages and to utterances used in ape language experiments. I will show why both interpretations are wrong. I will also question accounts of protolanguage that utterances in protolanguage consisted of phrases that are later broken down into individual words. Do the utterances of protolanguage have lexical status? Although it is tempting to categorize the words of protolanguage as nouns, verbs, adjectives, and so on, such categorization is meaningless until the vocabulary of protolanguage is sufficiently large to require a grammar.

There is general agreement that words (spoken, gestural or both) evolved before grammar and that words were invented by Homo erectus, an ancestor who evolved about two million years ago (Arbib, Bickerton, Tomasello, Corballis, Everett and Scott-Phillips). There is also agreement that Home erectus was "word-ready", that is capable of learning words without regard to the non-verbal social processes on which words depends. We now know that those social processes, which are uniquely human, include hyper-cooperation, intersubjectivity and joint attention.

As suggested by Bickerton, Homo erectus communicated with protolanguage, languages that consist of unordered and uninflected words and no grammar. Because utterances in protolanguage are limited to one word, some linguists liken them to the utterances used in pidgin languages and to the utterances used in ape language experiments. I will show why both interpretations are wrong. I will also question accounts of protolanguage that utterances in protolanguage consisted of phrases that are later broken down into individual words. Do the utterances of protolanguage have lexical status? Although it is tempting to categorize the words of protolanguage as nouns, verbs, adjectives, and so on, such categorization is meaningless until the vocabulary of protolanguage is sufficiently large to require a grammar.

ABSTRACTS

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William Warren, Can you follow your friends? Ensemble perception vs. selective attention in human crowds

All models of 'flocking' in human and animal groups assume ensemble averaging of one's neighbors. Indeed, experiments on people walking in virtual crowds show that ensemble averaging is very robust. So why aren't we flocking all the time? It seems as though we can follow our friends in a crowd and ignore everyone else. To study the role of attention in crowds we adapted the Multiple Object Tracking paradigm to VR: participants were asked to attend to and track a subset of target neighbors, who could turn 20° right or left during a trial. In Experiment 1, we found that attention to a subset of neighbors did not spontaneously influence following behavior, consistent with ensemble averaging. Experiment 2 found a partial influence of task-relevant attention on behavior, when participants were explicitly instructed to follow the targets. In Experiment 3 we trained participants to recognize target "friends", and observed a partial influence of familiarity. Experiment 4 finally obtained complete target capture, when participants were explicitly instructed to follow their friends. We conclude that crowd behavior is normally characterized by ensemble perception, but it can be overridden by the combination of task-relevant attention and familiarity; the latter may be due to the salience of social groups.

Thomas Zentall, Justification of effort by humans and pigeons: Cognitive dissonance or contrast?

Justification of effort by humans is a form of reducing cognitive dissonance by enhancing the value of rewards when they are more difficult to obtain. Presumably, assigning greater value to rewards provides justification for the greater effort needed to obtain them. We have found similar effects in pigeons, animals not typically thought to need to justify their behavior to themselves or others. We propose a simpler mechanism — the contrast between the end of the effort and the reinforcer (or signal for the reinforcer) that follows. If it is contrast, any relatively aversive event should be able to serve to enhance the value of the reward that follows. In support of this model, we have found this effect in pigeons when the prior event consists of (a) more rather than less effort (pecking), (b) a long rather than a short delay, and (c) the absence of food rather than food. We have also found that a pigeon's preference for food at one location can shift toward a different location if acquiring food at the new location requires that the pigeon work harder to obtain the food. Contrast may also play a role in other social psychological phenomena that have been interpreted in terms of cognitive dissonance.

SEP

Society of Experimental Psychologists

About SEP

The Society of Experimentalists (SEP) was founded by Edward Bradford Titchener in 1904.Titchener's design for his "Experimentalists" was that it be an ongoing workshop, with "members visiting labs, studying apparatus, and hearing and commenting on reports of ongoing research."

The Society has continued to meet annually in the years since, typically in the spring, except for the war year 1918, and the COVID pandemic years 2020 -2021. Upon Titchener's death in 1927 the club was reorganized into The Society of Experimental Psychologists. Meetings are scheduled and organized by a member, who serves on the Executive Committee of the Society for that year. The meetings are open to all members of the Society, and to students and faculty from the host university as invited by the organizer.

The meetings are plenary and involve papers from various members of the society. The society currently admits at least 6 new members annually from among the leading experimentalists in North America. It has a current membership of 281 individuals, about 5 – 10% of the practicing experimental psychologists. The mission of the society is "To advance psychology by arranging informal conferences on experimental psychology."

This year's meeting is supported by the Department of Psychology, the School of Arts and Sciences, and the office of theVice Provost for Research at the University of Pennsylvania, and the Department of Psychology at Temple University.

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