Sixteenth Annual

Cognitive Science Association for Interdisciplinary Learning

Hood River, Oregon

July 24 to July 28, 2010

Sixteenth Annual
Cognitive Science Association for Interdisciplinary Learning
July 24 to July 28, 2010
Hood River Hotel
Hood River Oregon

See Breakfast Posters at End of Schedule

Saturday, July 24

4:45 PM **Reception**

5:00 PM **Welcome And Introductory Remarks**

Presentations – 10 minutes

5:10-5:20 John A. Dewey, Thomas H. Carr, and Maria E. Brundage
Processing Navon Letters At The Local Or Global Level Interacts With The Phenomenology And Task Performance Of Drawings Produced With The Left Or Right Hand

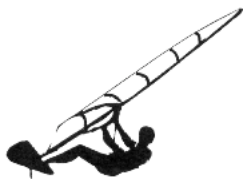
5:20-5:30 Francesca C. Fortenbaugh, Bill Prinzmetal, and Lynn C. Robertson
Cue Position Can Distort Object Space

Talks – 30 minutes

5:35-6:05 PM Keisuke Fukuda and Edward K. Vogel
Individual Difference Approach To Investigate The Modal Model Of Visual Memory

6:15-6:45 PM Hal Pashler, Sean Kang, and Michael Mozer
Effects Of Testing On Memory

6:55-7:25 PM Arthur P. Shimamura
CoBRA: A New Theory of Episodic Retrieval



7:35 PM **Adjourn For Evening**

Sunday, July 25

8:30 AM **Breakfast - Posters**

9:00-9:30 AM David Whitney and Jason Fischer
Crowding Is Not Like A Blender: Object-Level Visual Information Gets Through The Bottleneck Of Crowding

9:40-10:10 AM Meghan Sumner
The Benefit Of Phonetic Variation In The Perception Of Accented Speech

10:20-10:50 AM Molly J. Henry and J. Devin McAuley
Interactions between Pitch and Time Processing: Application of Special Relativity Theory to Auditory Perception

11:00 AM **Break until 5:00 PM**

4:45 PM **Appetizers**

Presentations – 10 minutes

5:00-5:10 Jonathan G Hakun and Robert J Elbin III
Working Memory In Athletes With A History Of Multiple Concussions

5:10-5:20 Andrew W. McCollough, Brittany J. Dungan, and Edward Vogel
Categorical Grouping Visual Working Memory

5:20-5:30 Roy Luria and Edward Vogel
Filtering Efficiency In Working Memory During Visual Search

Talks – 30 minutes

5:35-6:05 PM David E. Anderson and Edward Awh
Working Memory Resolution Plateaus When A Fixed Item Limit Is Exceeded: Discrete Resource Models Prevail

6:15-6:45 PM Edward Ester, Keisuke Fukuda, Edward Vogel, and Edward Awh
Evidence For A Discrete Resource Limit In Visual Selection

6:55-7:25 PM Hiroyuki Tsubomi, Keisuke Fukuda, and Edward K. Vogel
Similar Capacity Limits For Both Present And Absent Information

7:35 PM **Adjourn For Evening**

Monday, July 26

8:30 AM **Breakfast - Posters**

9:00-9:30 AM Frédéric Gosselin, Martin Arguin, and Caroline Blais
Processing Visual Information Through Time

9:40-10:10 AM Andrew Yonelinas and Mariam Aly
Memory, Perception, And Everything In Between

10:20-10:50 AM Joseph L Austerweil and Thomas L Griffiths
Feature Learning Using Statistics

11:00 AM **Break until 5:00 PM**

4:45 PM **Appetizers**

Presentations – 10 minutes

5:00-5:10 Amanda L. Gilchrist and Nelson Cowan
Capacity Limits In The Focus Of Attention: Limited To 1 When All Is Said And Done?

5:10-5:20 Alan W. Wedd, Molly J. Henry, and J. Devin McAuley
Regulatory Fit And Auditory Category Learning

5:20-5:30 Neil B. Albert, Carly Kontra, Shu-Ju Yang, and Sian L. Beilock
Using Science To Develop Science Labs: There's More Than Meets The Eye To "Seeing" Vs. "Doing"

Talks – 30 minutes

5:35-6:05 Alec Scharff, John Palmer, and Cathleen M. Moore
Object Perception Under Divided Attention: Fixed-Capacity Categorization Of Natural Objects

6:15-6:45 Jeff Moher and Howard Egeth, Johns Hopkins University
The Role Of Explicit Ignoring In Visual Search

6:55-7:25 PM Keith A. Schneider
Subcortical Mechanisms Of Feature-Based Attention

7:35 PM **Adjourn For Evening**

Tuesday, July 27

8:30 AM **Breakfast - Posters**

9:00-9:30 AM John McDonald
Tracking Stimulus Processing In Visual Search

9:40-10:10 AM Mariko Moher, Arin S. Tuerk, and Lisa Feigenson
Chunking Increases Working Memory Capacity In 7-Month-Old Infants

10:20-10:50 AM Pierre Jolicoeur, Christine Lefebvre, Stephan Grimault, Synthia Guimond Ulysse Fortier-Gauthier, François Vachon, Patrick Bermudez. Nicolas Robitaille, and Roberto Dell'Acqua,
Neuropsychophysical Principles Of Visual, Acoustic, And Tactile Short-Term Memory

11:00 AM **Break until 5:00 PM**

No appetizers on Banquet Night

Presentations – 10 minutes

5:00-5:10 PM Jesse Jon Bengson and George R. Mangun
Spatial And Feature Based Attention Probably Do Not Share A General "Resource"

5:10-5:15 Eve A. Isham, William P. Banks, Arne D. Ekstrom, and Jessica A. Stern
Winning Is Earlier, Losing Is Later: A Temporal Illusion

Talks – 30 minutes

5:20-5:50 PM Trafton Drew, Todd Horowitz, Jeremy Wolfe, and Edward K. Vogel
Temporal Dynamics Of Interhemispheric Transfer Of Moving Object Information

6:00-6:30 PM Karen B. Schloss, Rosa M. Poggesi, Eli D. Strauss and Stephen E. Palmer
Implications Of The Ecological Valence Theory For Color Preferences

6:40-7:10 PM Stephen E. Palmer, Karen B. Schloss, and Kazuhiko Yokosawa
Individual And Cultural Differences In Human Color Preference

7:20 PM **Adjourn**

Banquet At Cornerstone Cuisine 7:30

Wednesday, July 28

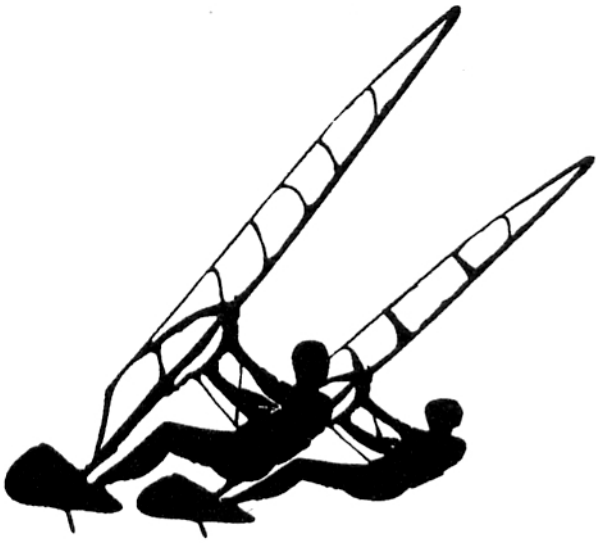
8:00 AM **Breakfast – Posters (Note earlier time)**

8:30-9:00 AM Tali Leibovich, Liana Diesendruck, Orly Rubinsten and Avishai Henik
The Importance of Being Relevant

9:10-9:40 AM Starla M. Weaver and Catherine M. Arrington
Expanding Task Switching: Moving Beyond The Keypress Response

9:50-10:20 AM Yael Salzer, Daniela Aisenber, Tal Oron Gilad, and Avishai Henik
In Touch With The Simon Effect

10:30 AM **Have a safe trip home.**



Roll on, Columbia
Woody Guthrie

Roll on, Columbia, roll on,
Roll on, Columbia, roll on,
Your power is turning our darkness to dawn.
So roll on, Columbia, roll on.

Other great rivers lend power to you,
Yakima, Snake, and the Klickitat too,
Sandy Willamette and the Hood River too,
So roll on, Columbia, roll on.

And on up the river is Grand Coulee Dam,
The biggest thing built by the hand of a man,
To run the great factories and water the land,
So, roll on, Columbia, roll on.

Tom Jefferson's vision would not let him rest,
An empire he saw in the Pacific Northwest,
Sent Lewis and Clark and they did the rest.
So, roll on, Columbia, roll on.

Breakfast Posters

Noam Weinbach and Avishai Henik, Ben-Gurion University of the Negev

Does Alertness Play With Executive Function? Yes...No...Maybe So!

It has been suggested that the human attentional system is subdivided into three systems of attention: orienting, alertness and executive functions. Each system has its unique anatomical structure and function. Recent evidence suggests that there is interaction and integration among the systems. Specifically, phasic alertness has been found to modulate executive control. When introducing an alerting signal prior to a flanker target, the congruency effect has been found to be larger than in a no warning condition. This interaction has been interpreted as a negative effect of alertness on executive function. Our goal was to investigate the mechanism and nature of the interaction between these two systems. Our study demonstrates that when using a Stroop target, there is no interaction between alertness and executive control, while there are main effects for each system individually. These findings suggest that phasic alertness affects only certain task-dependent aspects of executive functions.

Arne D. Ekstrom, Eve A. Isham, Milagros Copara, Alice Chiang, and Dheiran Patel
University of California, Davis

Independent And Conjunctive Processing Of Spatial And Temporal Information In Episodic Memory

Spatial and temporal context represent key components of episodic memory (Tulving, 1993) yet how we process and represent this information remains unclear. To understand the extent to which we process spatial and temporal episodic information independently and/or conjunctively, participants performed a virtual-reality driving task in which they learned about the locations of stores within a city and the order of stores they experienced while driving. One group of participants actively drove to stores with a joystick while another group of participants watched the navigating episode on a separate computer monitor. Critically, we found that both active and passive participants showed twice the likelihood of retrieving spatial and temporal information together (P_{both} = .40) than either one alone (P_{alone} = .21), $t(1,33)=5.1$, $p < .001$). Our data suggest spatial and temporal information may be bound into a single episode in memory, possibly using common pathways in the brain.

Ali Jannati and Jennifer C. Whitman, University of British Columbia
Jessica J. Green, Duke University
Phillip E. Gander, NBRUH, Nottingham, UK
John J. McDonald, Simon Fraser University, Canada

Cross-Modal Expectancy Deviation Elicits A Mismatch ERP Negativity

The mismatch negativity (MMN) is an event-related potential (ERP) elicited by infrequent auditory deviants embedded in an otherwise repetitive sequence of sounds. According to the prevailing theory, the MMN arises from a comparison between the deviant sound and the memory trace of previous sounds. The present work examined the possibility of eliciting MMN-like activity by violation of a cross-modal expectancy established by visual input. We used a four-stimulus oddball paradigm in which visual standards were onomatopoeic words (e.g., WOOF) that were interspersed with infrequent visual targets (e.g., MEOW). Infrequent auditory deviants that were either congruent or incongruent with the visual standard (e.g., a dog bark or a "boing" sound) were also presented. ERPs elicited by congruent sounds were more negative than ERPs to incongruent sounds over the fronto-central scalp, beginning 100 ms after stimulus onset. These results demonstrate that cross-modal expectancy deviation elicits an MMN (-like) ERP component.

Sarah Tappon, Arun Garg, Damien Fair, and Alexander Stevens
Oregon Health & Science University

Individual Visual Short-Term Memory Capacity Varies Functional Connectivity Measured With Resting State Fmri

Although visual short-term memory (VSTM) capacity is often conceptualized as a stable measure sensitive to individual differences, within-subject VSTM also varies across time, likely as a function of variation in underlying neural systems. These tasks are known to recruit a network of brain regions spanning the parietal, frontal and occipital lobes. We used resting-state fMRI to determine whether variability in VSTM capacity can be predicted by fluctuations in resting connectivity in those networks, or by measures of coherence throughout the brain. Participants completed two experimental sessions three weeks apart, each consisting of a resting-state fMRI scan and a VSTM task administered outside the scanner. Measures of connection strengths between relevant brain areas as well as measures of global graph-theoretic network properties indicated a stable relationship between connectivity and capacity across the group. Additionally, individual variability in capacity was associated with changes in network properties between sessions.

David W. Bressler and Michael A. Silver, University of California, Berkeley

Behavioral Performance On A Target Detection Task Is Correlated With The Amount Of Attentional Suppression Of Slow Endogenous Fluctuations In fMRI Signals

In this study we show that allocating visual spatial attention to a periodic rotating wedge checkerboard stimulus improves the reliability of fMRI responses through both an increase in signal strength and a decrease in endogenous fluctuations in fMRI signals. Relative to an attentionally-demanding control task at the central fixation point, performing a target detection task within the wedge stimulus increased the amplitude of fMRI responses at the temporal frequency corresponding to the stimulus cycle (0.03 Hz) in a large number of topographically-organized occipital and posterior parietal cortical areas. Attending to the wedge also reduced the amplitude of fluctuations in fMRI signals at slow (< 0.1 Hz) frequencies not corresponding to the stimulus cycle. Surprisingly, performance on the wedge target detection task was not correlated with the degree of attentional enhancement of fMRI responses to the wedge. Instead, behavior was highly correlated with attentional suppression of endogenous fluctuations at non-stimulus frequencies.

Abstracts Saturday

John A. Dewey, Thomas H. Carr, and Maria E. Brundage, Michigan State University

Processing Navon Letters At The Local Or Global Level Interacts With The Phenomenology And Task Performance Of Drawings Produced With The Left Or Right Hand

The control of visual processing can affect other modalities. For example, previous work has found that performance on tasks as diverse as face recognition and wine tasting are relatively impaired after processing the small (local) letters of Navon stimuli, compared to the large (global) letters. These effects may be attributed to a shift in visual processing style. Here, we studied if processing Navon stimuli at the local or global level before performing a manual drawing task influenced the phenomenology of the task and/or quality of the drawings. 16 right-handed participants were primed by performing a local or global Navon task, then had 30 seconds to copy photographs of a variety of scenes displayed on a computer with either the left or right hand. First, we found that the subjective difficulty of drawings in the local priming condition was higher than the global priming condition, but only for left hand drawings. Second, an independent group of participants judged how accurately the drawings resembled the original photographs, and the right hand drawings were ranked higher in the local priming condition compared to global priming. Our results demonstrate the influence of visual processing style on an ecologically valid task, and show that these effects may interact with hemispheric differences.

Francesca C. Fortenbaugh, Bill Prinzmetal and Lynn C. Robertson
University of California, Berkeley

Cue Position Can Distort Object Space

Brief visual cues are often used to induce involuntary shifts of attention to locations away from the center of gaze. However, it is not well understood what effect the placement of cues may have on the perceived structure of other objects in a display. The present study addressed this question by presenting cues that were either within or outside the contour of a subsequently presented oval and measuring how cue placement altered the oval's perceived shape. On every trial two white dots were briefly presented as cues at equal eccentricities along the horizontal or vertical meridian. A blue oval was then presented for 100ms. The ovals were centered at fixation and had horizontal radii of 5°, 11°, or 14°. The height of the ovals was +0%, ±5%, ±10% the horizontal radius. Participants responded whether the oval was wider or taller than a perfect circle. The cues were paired with ovals such that cue positions (inside/outside contour; horizontally/vertically aligned) were uninformative of which dimension of the oval was elongated. Results show a significant Cue Alignment x Cue Configuration x Oval Height interaction. When the cues were located within the oval contour the percentage of taller responses increased for vertically aligned cues and decreased for horizontally aligned cues relative to when the cues were placed outside the oval contour. However, this pattern of responses was only seen for the ovals closest to perfect circles. This double dissociation suggests that the relative position of cues can systematically alter the perceived structure of objects.

Keisuke Fukuda and Edward K. Vogel, University of Oregon

Individual Difference Approach To Investigate The Modal Model Of Visual Memory

The modal model of memory argues that short-term memory (STM) serves as the gateway to form long term memory (LTM) representations. One common way to interpret this model has been to assume STM as the "incubator" for a representation to rest in until it becomes a LTM representation. However contradictory to the model, researchers have found that longer retention of STM representation does not lead to better LTM representation (e.g. Craik & Watkins, 1973). In this current study, we took a different perspective to test the modal model. That is, the STM serves as the "gate" that filters the information to be encoded into LTM. We tested this hypothesis using individual difference approach and found behavioral and electorphysiological evidence for very tight link between STM and LTM. Namely, high STM-capacity individuals stored more LTM representations (rs = .58~.78).

Hal Pashler and Sean Kang, University of California, San Diego
Michael Mozer, University of Colorado

Effects Of Testing On Memory

Testing (sometimes called "retrieval practice") is often said to strengthen memory more effectively than rereading or other non-retrieval-based types of encoding. We present new experiments that explore several neglected aspects of this effect that seem crucial for its practical application. Questions include: Is rereading an inferior mode of review as compared to testing even when the reviews are delayed? How does testing affect people's ability to correct and modify knowledge representations? What forms of testing promote learning of foreign language vocabulary?

Arthur P. Shimamura, UC Berkeley

CoBRA: A New Theory of Episodic Retrieval

What did you eat for dinner two nights ago? Our ability to remember such events depends on the successful "re-collection" of source information, such as the time, place, people, thoughts, and feelings associated with the event. Recent neuroimaging findings suggest that ventral regions of the posterior parietal cortex (vPPC) are particularly active when successful recollection of source information is accomplished. A new theory of episodic retrieval, "Cortical Binding of Relational Activity (CoBRA)," is proposed in which vPPC activity helps to bind source information into ensembles of episodic features. This process works in conjunction with other known mechanisms, such as those pertaining to prefrontal and medial temporal lobe functions. Evidence for CoBRA and how it contributes to episodic retrieval will be discussed.

Abstracts Sunday

David Whitney and Jason Fischer, UC Berkeley

Crowding Is Not Like A Blender: Object-Level Visual Information Gets Through The Bottleneck Of Crowding

Natural visual scenes are cluttered. In such scenes, objects in the periphery can be crowded – blocked from recognition and awareness – simply because of the dense array of clutter. Outside the fovea, crowding constitutes the fundamental limitation on object recognition, and may arise from the limited resolution of the neural mechanisms that select and bind visual features into coherent objects. Thus, it is widely believed that a crowded object is reduced to a collection of dismantled features with no surviving holistic properties. Here, we show that this is not so: an entire face can survive crowding and contribute its holistic attributes to subsequent texture processing, despite being blocked from recognition. Our results show that crowding does not strip away the "objectness" of an object. We propose a new model of visual crowding, the hierarchical sparse selection model, in which object processing proceeds unencumbered by the perceptual experience of crowding.

Meghan Sumner, Stanford University

The Benefit Of Phonetic Variation In The Perception Of Accented Speech

Research in speech perception and L2 learning has shown that exposure to multiple speakers is generally beneficial (Barcroft & Sommers, 2005; Bradlow & Bent, 2008). Exactly what is driving these effects remains unclear. One potential explanation is simply that exposure to a wider range of variation offers more subtle steps between phonetic variants that are different from the L1 of the listener. If this is true, it is not the number of speakers that cause these effects, but the collective range of variation produced by those speakers. In this talk, I examine the role of within-speaker cue variability in speech perception. The results show that under certain, but not all, conditions, word recognition is both faster and more accurate when listeners are exposed to more variation than when they are exposed to less. I suggest that listeners use variation in adjusting to accented speech within-speaker via a similarity mechanism.

Molly J. Henry, Michigan State University, Bowling Green State University
J. Devin McAuley, Michigan State University

Interactions between Pitch and Time Processing: Application of Special Relativity Theory to Auditory Perception

A central question in auditory perception research concerns the relative independence of pitch and time. We considered the possibility that time dilation and length contraction predicted by special relativity also apply in some form to auditory perception. Listeners heard standard-comparison pairs of tone glides and judged either the duration or pitch change of the comparison relative to the standard. Constant-velocity standard glides (1000 Hz / s) established an 'at rest' reference frame with comparison glides presented at three velocities (500, 1000, 1500 Hz / s). Consistent with time dilation, judged durations of fast and slow velocity comparison glides were over- and underestimated, respectively. Conversely, consistent with length contraction, judgments about pitch change showed the opposite pattern. A model based on time-dilation and length-contraction equations of special relativity provided a good fit to the duration judgment data, but not to the pitch change data. Implications of these findings are discussed.

Jonathan G Hakun and Robert J Elbin III, Michigan State University Kenesiology

Working Memory In Athletes With A History Of Multiple Concussions

Athletes with a history of multiple concussions have been found to be at a greater risk for future concussion and exhibit more prolonged recovery time following the injury. However, the long-term effects of multiple concussions are unknown. The integration of neurocognitive testing in concussion management has proven valuable in assessing cognitive recovery of memory, response-control, and visual tracking impairments in the days following concussion. Studies using neurocognitive tests to assess residual impairment in athletes with a history of multiple concussions have produced conflicting results and motivated the utilization of more sensitive paradigms. Working memory performance was assessed through N-Back in 14 asymptomatic athletes with a history of 2 or more concussions and 14 pair-matched controls while undergoing fMRI. FMRI results suggest that common regions of activation were observed between groups with comparable engagement of activation scaling with working memory load, but behavioral results indicated lower accuracy rates for the patient group. Taken together, the results suggest that while brain function during performance of a high-load working memory task remains intact after recovery, accuracy performance implies an impairment in cognitive function unaccounted for by brain activation and offers a promising avenue for future directions.

Andrew W. McCollough, Brittany J. Dungan, and Edward K. Vogel
University of Oregon

Categorical Grouping Visual Working Memory

We examined the relationship between working memory capacity and categorization in a dot pattern distorted prototype task (Posner, Goldsmith, and Welton, 1967). In Experiment 1 subjects first classified exemplars from 2 categories and then were tested in a category change detection task. Subjects were presented with an exemplar from one category followed by an exemplar from either the same or different category. Working memory capacity was estimated using a color change detection task (Luck & Vogel, 1997). Capacity was positively correlated with categorization accuracy and with change detection accuracy for novel but not learned categories, suggesting that learned categories require less online memory resources than novel categories.

Roy Luria and Edward Vogel, University of Oregon

Filtering Efficiency In Working Memory During Visual Search

What determines efficient filtering of irrelevant items in visual working memory (WM)? In 3 experiments we investigated the search difficulty and individual differences in WM capacity as determinants of filtering efficiency, using both behavioral and electrophysiological markers. Participants performed a visual search task that contained a target, neutral distractors and a flanker distractor. The results indicated that individual differences in WM capacity and search difficulty independently influenced the filtering of irrelevant information in visual WM. Namely, filtering the flanker was efficient only in the difficult visual search condition, but individual differences in WM capacity correlated with filtering efficiency in both easy and difficult search conditions. Furthermore, the results identified the target search process as responsible for the inefficient filtering. Interestingly, facilitating the search process by presenting a spatial cue made filtering more efficient in general, but high WM capacity individuals still benefited to a larger extent relative to low WM individuals.

David E. Anderson and Ed Awh, University of Oregon

Working Memory Resolution Plateaus When A Fixed Item Limit Is Exceeded: Discrete Resource Models Prevail

Discrete resource models posit that storage in working memory cannot exceed a fixed item limit, whereas flexible resource models suggest that resources can be distributed across much larger numbers of items. Given that mnemonic resolution declines as the number of stored items increases, discrete resource models predict that resolution reaches a stable lower bound when the number of items to be stored exceeds capacity, because unstored items should not affect resolution. By contrast, flexible resource models predict a continuous decline in resolution across a much larger range of set sizes. Here we estimated resolution across different set sizes and found a clear asymptote in aggregate data. Moreover, individual slot estimates strongly predicted the set size at which resolution reached asymptote, such that individuals with more slots reached asymptote at later set sizes. These findings argue for a fixed item limit in visual working memory.

Edward Ester, Keisuke Fukuda, Edward Vogel, and Edward Awh
University of Oregon

Evidence For A Discrete Resource Limit In Visual Selection

Recent studies suggest that visual working memory (VWM) is best described by a discrete resource model that enables the storage of a limited number of items with fixed precision. Here, we asked whether performance on a visual selection task could be described by a similar model. Observers were cued to monitor a variable number of locations in a masked visual display and discriminate the orientation of a single target. Task performance was well described by a discrete resource model, and capacity estimates in this task were strongly predictive of capacity in a memory-limited task using the same stimuli. Finally, a cue evoked ERP component (N2pc) was strongly predictive of selection capacity estimates, suggesting that task performance was limited by the selection of multiple positions rather than subsequent encoding or storage. These findings suggest that visual selection and VWM storage depend on a common system that enables the selection or storage of a discrete set of positions.

Hiroyuki Tsubomi, Keisuke Fukuda, and Edward K. Vogel, University of Oregon

Similar Capacity Limits For Both Present And Absent Information

In most visual working memory (WM) paradigms, participants must remember a briefly-presented set of items across a blank retention period of one or more seconds. A common finding is that most subjects can accurately maintain about three items simultaneously. In this study, we examined whether these capacity limits are exclusively for maintaining information about items that are no longer present, or if similar limitations are observed for items that are continuously visible. To do this, we presented participants with displays of simple objects and asked them to remember the colors of each item until the presentation of a test probe that appeared at the position of one of the items. The memory array was presented for either 100ms, 500ms, or 1000ms, which resulted in blank retention intervals of 900ms, 500ms, or 0ms. Surprisingly, we found both behavioral and electrophysiological evidence that the capacity limitations and neural mechanisms supporting performance were equivalent for displays in which the items were either not present during the retention interval or were continuously visible to the subject. These results suggest that capacity limits for simultaneously representing multiple items are not exclusive to WM maintenance of information that is no longer there, but also extend to perceptually present items.

Abstracts Monday

Frédéric Gosselin, Martin Arguin, and Caroline Blais, Université de Montréal

Processing Visual Information Through Time

Recent investigations have proposed that visual information may be sampled in a discrete manner (e.g., Purves, Paydarfar & Andrews, 1996; VanRullen, Reddy, & Koch, 2005; 2006; VanRullen, 2006; 2007; but see Kline, Holcombe & Eagleman, 2004, 2006; Kline, & Eagleman, 2008). The properties of this allegedly discrete sampling – the frequency at which it operates, and how it phases with the environment – are still largely unknown. Obviously related, but rarely explicitely linked to it, is the integration of visual information through time (the so-called "temporal transfer function"). For example, is the information available in early processing assigned a greater weight than that available at the end of processing as proposed by Ludwig, Gilchrist, McSorley and Baddeley (2005), or is it given the same weight as proposed by Glünder (1983)? We attempted to clarify the nature of visual information sampling and integration through time using a temporal classification approach.

Andrew Yonelinas and Mariam Aly, University of California, Davis

Memory, Perception, And Everything In Between

We explore the possibility that the same measurement methods and the same theoretical divisions that have proven useful in studies of long-term recognition memory (i.e., using the analysis of receiver operating characteristics to examine recollection and familiarity) might also be useful in tasks such as perceptual change-detection and visual short-term memory. Preliminary results indicate that the same general theoretical framework might be useful in integrating phenomenon across these different research domains.

Joseph L Austerweil and Thomas L Griffiths, University of California, Berkeley

Feature Learning Using Statistics

A fundamental problem faced by cognitive systems is the formation of basic units used to represent observed objects that support future decisions. We show that human feature learning can be thought as rational inference by an ideal observer model using statistical cues. We then explore the predictions of this ideal observer model. In particular, we investigate whether or not people are sensitive to how parts co-vary over objects they observe. In a series of three behavioral experiments (two using visual stimuli, one using conceptual stimuli), we demonstrate that people infer different features to represent the same four objects depending on the distribution of parts over the objects they observe. We also show that classic psychological models from the categorization literature (prototype and exemplar models) and standard dimensionality reduction techniques (principal component analysis and independent component analysis) are insufficient to explain our results.

Amanda L. Gilchrist and Nelson Cowan, University of Missouri

Capacity Limits In The Focus Of Attention: Limited To 1 When All Is Said And Done?

According to our current theoretical view of working memory, up to 4 items can be stored simultaneously within the focus of attention, a proposed faculty where items are readily accessible and available in conscious awareness. A contesting view suggests that this region may only store one chunk. This view was advanced in a recent study on object switch costs showing that instances of two items in the focus of attention occurred only because those items were bound together to form a single chunk (Oberauer & Bialkova, 2009). That study, however, used a method that encouraged chunking. We were interested in whether multiple items could be retained in the focus of attention when chunking was discouraged. We modified the procedure so that two different types of associations in working memory were relevant at once (color-letter and shape-digit), and found evidence of two separate items held concurrently in the focus of attention.

Alan W. Wedd, Michigan State University
Molly J. Henry, Bowling Green State University
J. Devin McAuley, Michigan State University

Regulatory Fit And Auditory Category Learning

Regulatory focus theory proposes that individuals show different sensitivities to gains (promotion focus) and losses (prevention focus) in the environment. Regulatory focus interacts with environmental reward structure to create a regulatory fit (i.e., a match between regulatory focus and reward structure) or a regulatory mismatch. Individuals in a regulatory fit have been shown to learn a rule-based visual classification task more quickly than individuals in a regulatory mismatch. In the present study, promotion and prevention-primed participants performed an auditory category learning task with either gains or losses feedback structure. On each trial, participants heard a tone that varied in frequency and duration and assigned it to one of two categories that were defined by a disjunctive rule. Promotion-focused participants learned the disjunctive rule more quickly with a gains reward structure than with a losses reward structure. In contrast, performance of prevention-focused participants was not affected by reward structure.

Neil B. Albert, Carly Kontra, Shu-Ju Yang, and Sian L. Beilock, University of Chicago

Using Science To Develop Science Labs: There's More Than Meets The Eye To "Seeing" Vs. "Doing"

Experiential learning theory has gained great popularity in the educational community since it was first championed by John Dewey nearly a century ago. More recently models of experiential learning have been popularized by Kolb (1984) and Jarvis (1993). The focus of all these theories is on how experiences can drive knowledge, though studies of the mechanisms that can support learning have been almost completely ignored. Here, we return to this fundamental question and propose a theory of embodied learning. Furthermore, we use this framework to drive an initial experiment that compares the utility of visual and sensorimotor information in developing knowledge about angular momentum in physical systems. This experiment provided a clear indication that sensorimotor information facilitated learning quantitative relationships in physical systems. Furthermore, there was some indication that observation facilitated learning about qualitative relationships in physical systems. These results provide evidence that greater interest in the mechanisms that support learning, and their study in applied contexts, is a critical issue for the science community.

Alec Scharff and John Palmer, University of Washington
Cathleen M. Moore, University of Iowa

Object Perception Under Divided Attention: Fixed-Capacity Categorization Of Natural Objects

Can we identify multiple objects simultaneously? Or, alternatively, do we identify objects one at a time, as if reading words? These opposing ideas reflect two popular hypotheses about capacity limitation in object perception. Here, we use a variant of the simultaneous-sequential paradigm to measure the capacity of object perception under divided attention. Our findings reject the unlimited-capacity hypothesis and support a fixed capacity limit on categorizing natural objects. This extreme capacity limitation is consistent with a serial model of object perception, but does not rule out the possibility of fixed-capacity, parallel processing.

Jeff Moher and Howard Egeth, Johns Hopkins University

The Role Of Explicit Ignoring In Visual Search

Participants are slower to find a target during visual search when the color of that target was previously the color of a nontarget item. In a series of experiments, we explored whether this implicit devaluing of features can be done explicitly. We asked participants to indicate which of two possible target letters was present in a heterogeneously colored display. On some trials, cues instructed participants to ignore a particular color. The letter in the upcoming display appearing in this color was never the target. Still, participants were slower to respond and made more errors when they were cued than when they were not, suggesting that explicit ignoring of features may not be possible. Instead, efforts to ignore features during visual search may ironically lead participants to attend to the very features they are trying to ignore. The close interactions between working memory and attention may play a key role in this failure of ignoring.

Keith A. Schneider, University of Missouri, Columbia

Subcortical Mechanisms Of Feature-Based Attention

Feature-based attention enhances the responses of cortical neurons tuned to the attended feature, but it is not known whether the control mechanisms of feature-based attention also utilize subcortical neurons with limited feature selectivity. We therefore functionally imaged the human subcortical visual nuclei while subjects detected changes in separate fields of moving or colored dots. We found that when the fields were disjoint, spatially attending to one field enhanced hemodynamic responses in the superior colliculus (SC), lateral geniculate nucleus (LGN) and two retinotopic pulvinar nuclei. When the two dot fields were spatially coincident, feature-based attention to the moving versus colored dots enhanced the responses of the pulvinar nuclei and LGN, which was dominated by its magnocellular layers, and suppressed activity in voxels in the parvocellular layers; the SC was inconsistently modulated among subjects. We conclude that feature-based attention operates throughout the visual system by promoting neurons that encode the attended feature.

Abstracts Tuesday

John McDonald, Simon Fraser University

Tracking Stimulus Processing In Visual Search

To date, most electrophysiological studies of visual search have focused on the N2pc component, which is typically observed over the posterior scalp 200-300 ms after the onset of a bilateral search array. The N2pc has been used to track deployments of attention in space, but because the N2pc reflects just one of several stages of processing, additional research is needed to track selective target processing from stimulus onset to response. Here, I will show that stimulus selection leads to a sequence of three lateralized selection negativities, including the N2pc (200-300 ms), an anterior contralateral negativity (ACN, 300-500 ms), and a sustained posterior contralateral negativity (SPCN, > 500 ms). The timing of this sequence is dependent on display parameters, such as the presence or absence of distractor items, as well as task parameters, such as the inclusion of irrelevant displays that require no search (no-go trials).

Mariko Moher, Johns Hopkins University
Arin S. Tuerk, Harvard University
Lisa Feigenson, Johns Hopkins University

Chunking Increases Working Memory Capacity In 7-Month-Old Infants

While studies show that 14-month-old infants chunk items in working memory (WM) to expand memory capacity (Feigenson & Halberda, 2004, 2008), it remains unclear whether younger infants, whose capacity has not yet asymptoted to adult-like levels, can also chunk. In 7 looking time experiments we tested 7-month-old infants, who cannot represent 3 homogeneous objects in one array. We manipulated spatial grouping cues (1 or 2 hiding locations) and featural grouping cues (similarity between the objects themselves, or between the screens demarcating hiding locations). Presented with all 3 cues, infants increased WM capacity to represent 3 items, but only when all cues were redundant. Furthermore, neither spatial nor featural cues alone proved sufficient to increase capacity. Although these studies demonstrate that young infants can use spatial and featural information to chunk objects before WM capacity has matured, infants may not successfully bind these features to the objects themselves.

Pierre Jolicoeur and Christine Lefebvre, Université de Montréal
Stephan Grimault, Université de Montréal and CNRS (France)
Synthia Guimond and Ulysse Fortier-Gauthier, Université de Montréal
François Vachon, Université de Montréal and Université Laval
Patrick Bermudez and Nicolas Robitaille, Université de Montréal
Roberto Dell'Acqua, University of Padova

Neuropsychophysical Principles Of Visual, Acoustic, And Tactile Short-Term Memory

All we apprehend through our senses and experience unfolds in time. Even apparently instantaneous stimuli must be maintained in some form whilst they are processed and made available to other cognitive stations. Short-term memory (STM) processes are thus crucial for many facets of cognitive experience. STM primarily refers to the memory retention of information over a matter of seconds for the purpose of further processing. It therefore acts as the interface between perception, action, and long-term memory. Despite the ubiquity of acoustic STM (ASTM) in everyday cognitive experience (we would, for instance, be unable to comprehend and respond to spoken language or discern our favourite melodies without it), it has not received nearly as much research attention as visual STM (VSTM). Less still has been dedicated to tactile STM (TSTM). In general, our knowledge of these crucial mechanisms remains sparse and much work remains to be done to achieve a comprehensive understanding of their neural substrates and constituent processes (e.g., encoding, maintenance, retrieval, and manipulation). In this talk we first turn to the description of key research principles conducive to the study of the "neuropsychophysics" of sensory STM systems. This will be followed by a brief recapitulation of what is known to date concerning STM in these three modalities. We will conclude with recent applications of brain indices of sensory STM to broader issues in cognitive processing.

Jesse Jon Bengson and George R. Mangun, University of California, Davis

Spatial And Feature Based Attention Probably Do Not Share A General "Resource"

Different neural systems may operate with reference to spatial and feature attention (Ungerleider & Haxby, 1994). However, despite such distinctions some theories suggest that attention and WM broadly rely on a common mechanism irrespective of modality or differences in spatial and feature dimensions (Saults & Cowan, 2007; Cowan, 2005). However, visual search studies have shown that spatial attention is unrelated to individual variation in WMC (Kane, et.al, 2006) and that loading WM does not interfere with search slopes (Woodman, et. al, 2001) suggesting that spatial attention and WM may be distinct. Furthermore, studies of attention and perceptual load have focused primarily on spatial attention (Lavie, 1995; Handy & Mangun, 2001), with only one known study examining the relationship between feature-based attention and perceptual load (Barnhardt, 2007). Here we provide evidence for unique feature and spatial attention systems bifurcated according to a where and what domain by demonstrating that each is uniquely affected by Perceptual Load or Working Memory Capacity.

Eve A. Isham, Claremont Graduate University, University of California, Davis
William P. Banks, Pomona College
Arne D. Ekstrom, Claremont Graduate University, University of California, Davis
Jessica A. Stern, Pomona College

Winning Is Earlier, Losing Is Later: A Temporal Illusion

Perceived time of actions is influenced by events surrounding the actions. Here we report a novel temporal illusion. In two experiments, the participants performed a simple keypress in a competiton-like environment in which they competed against a confederate. Each player pressed her own button in response to a visual cue. The participants were told that if they were faster than the competitor, they would elicit a winning tone (or a "you win" phase in Exp2). If the competitor was faster, s/he would elicit a different tone (or a "you lose" phase), indicating that the participants had lost. Deceptively, the outcome was randomly selected by the computer and was not consistent with the actual outcome. The perceived time of the presumed winning keypress was judged to be earlier than that of the presumed losing keypress. This temporal illusion suggests that the perceived time of action is retrospectively inferred rather than directly experienced.

Trafton Drew, Todd Horowitz, and Jeremy Wolfe, Harvard Medical School
Edward K. Vogel, Univeristy of Oregon

Temporal Dynamics Of Interhemispheric Transfer Of Moving Object Information

Information in one visual hemifield is predominantly processed by the contralateral cerebral hemisphere. However, objects in the world do not confine themselves to one half of the visual field. How is control handed between hemispheres when an object crosses from one hemifield to the other? We measured ERPs while observers tracked objects that crossed the midline. When stimuli are lateralized, there is a sustained contralateral negativity that indexes tracking activity (Drew & Vogel, 2008). Here, after a target crossed the vertical midline (and a non-target crossed in the opposite direction), the initial strong contralateral negativity flipped to an ipsilateral negativity. This ipsilateral activity increased prior to midline crossing, while contralateral activity did not decrease until after crossing, suggesting that both hemispheres were tracking the object during the transfer. When motion was less predictable, this overlap decreased, suggesting that the temporal dynamics of interhemispheric cooperation are flexible.

Karen B. Schloss, Rosa M. Poggesi, Eli D. Strauss and Stephen E. Palmer
University of California, Berkeley

Implications Of The Ecological Valence Theory For Color Preferences

Palmer and Schloss (2010) proposed an Ecological Valence Theory (EVT) of color preferences, which states that color preferences are determined by individuals' emotional experiences with objects characteristically associated with those colors. An implication of this theory is that preference for a given color increases with increased positive feelings for an associate of that color and decreases with increased negative feelings for an associate of that color. We provide compelling evidence in favor of this theory by showing that (a) color preferences can be influenced in the laboratory by presenting participants with either positive or negatively charged objects of specific colors (Experiment 1) and (b) undergraduates at Berkeley and Stanford prefer their own school's colors over their rival's colors, which is modulated by degree of school spirit (Experiment 2). Both of these experiments provide evidence that color preferences are caused by peoples' affective response to correspondingly colored objects or entities.

Stephen E. Palmer and Karen B. Schloss, University of California, Berkeley
Kazuhiko Yokosawa, University of Tokyo

Individual And Cultural Differences In Human Color Preference

Palmer and Schloss (2010) proposed an Ecological Valence Theory (EVT) of color preferences, which states that color preferences are determined by individuals' emotional experiences with objects characteristically associated with those colors. They showed 80% of the variance in average color preferences could be explained by the weighted affective valence estimate (WAVE) of the colors, which was computed for each color by calculating the average valence of all the objects associated with that color, weighted by how well the objects matched the color. One prediction of the EVT is that the relation between color preferences and WAVEs obtained from the same group or individual should be stronger than the relation between two different groups or individuals. We tested this prediction cross-culturally by comparing preferences and WAVEs obtained from American and Japanese participants as well as at the level of individual participants. Results showed that the WAVE obtained from one culture (or individual) does indeed predict color preferences from that cultural (or individual) better than it predicts the color preferences of another culture (or individual).

Abstracts Wednesday

Tali Leibovich and Liana Diesendruck, Ben-Gurion University of the Negev
Orly Rubinsten, University of Haifa
Avishai Henik, Ben-Gurion University of the Negev

The Importance of Being Relevant

In comparative judgment of physical sizes or numerical values, reaction time (RT) is positively correlated with ratio (i.e., smaller stimulus divided by larger stimulus). Namely, RT increases with difficulty in discrimination. What happens in a selective attention situation, when one has to pay attention to one dimension (e.g., physical size) and ignore the other (e.g., numerical value)? Participants were presented with pairs of digits that differed in both physical sizes and numerical values (e.g., 2 4), and were asked to decide which digit was larger numerically or physically in separate experiments. Pairs were either congruent (e.g., 2 4), incongruent (e.g., 2 4), or neutral (e.g., 2 2 for physical judgments, or 2 4 for numerical judgments). RT changed linearly with ratio when no irrelevant dimension was present and, according to preliminary results, may change exponentially when an irrelevant dimension is present. These results put some interesting constraints on Weber law.

Starla M. Weaver and Catherine M. Arrington, Lehigh University

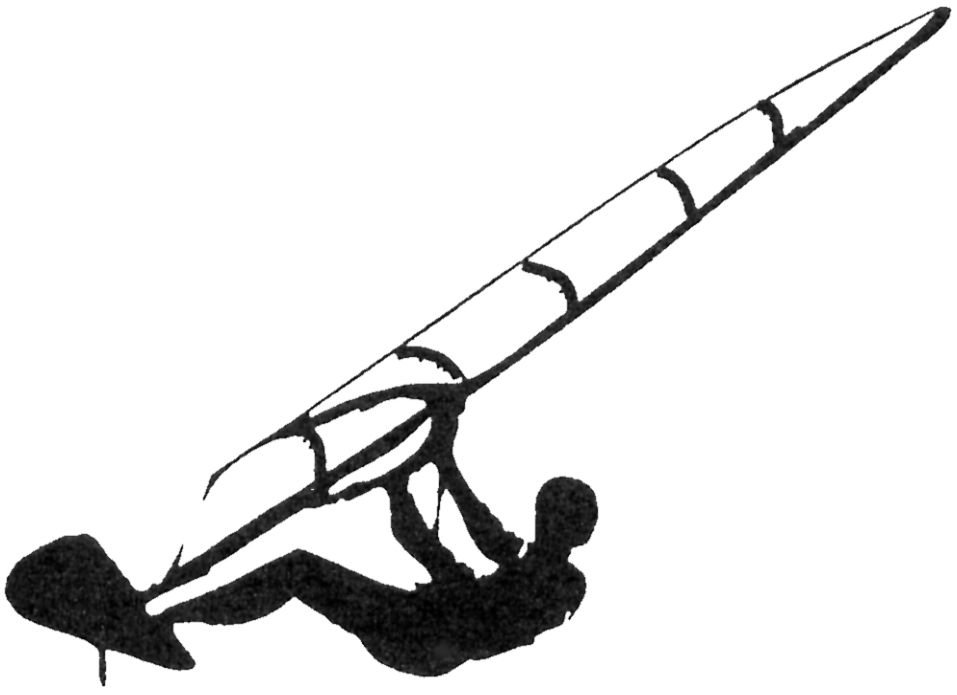
Expanding Task Switching: Moving Beyond The Keypress Response

Standard methods of investigating cognitive control in multitasking environments use simple classification tasks with key press responses which allow for response time and accuracy measures. In the current investigation we used hand movement trajectories to allow for the online monitoring of control processes during task selection and performance. Subjects performed two simple categorization tasks by making mouse movements to onscreen response category labels. Continuous recordings of x and y coordinates were acquired. Two experiments using the explicit task cuing paradigm explored cue processing, target processing and the effect of stimulus congruency on performance. A final experiment using the voluntary task switching paradigm examined task selection processes. Onset of movement measures suggest task selection processes may vary depending on the timing parameters of the trial. This novel application of mouse trajectory mapping methodology to task switching studies provides valuable information about online control of tasks selection and confirms previous interpretations of the basic control mechanisms underlying multitasking behavior.

Yael Salzer, Daniela Aisenber, Tal Oron Gilad, and Avishai Henik
Ben-Gurion University of the Negev

In Touch With The Simon Effect

The Simon effect, the reaction time gap between congruent and incongruent stimuli, has been extensively studied in the auditory and visual modalities, but not in the tactile modality. We created a tactile Simon task and examined both general and tactile-specific aspects of cognitive control in three experiments. Similar to the visual and auditory versions of the task, there was a) a significant Simon effect, and b) a sequential analysis revealed a significant effect only after congruent trials. Moreover, adding neutral trials enabled to reveal that a) the effect was composed of both facilitation and interference, and b) the addition of a neutral augmented the Simon effect. These results suggest that control mechanisms are general, yet there is a need to take into consideration characteristics of specific modalities.



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Internet

The Hood River Hotel has free wireless internet in the lobby, and several businesses have free wireless internet, so the area around the hotel is pretty well covered with free wireless internet.

Useful web pages:

Conference Home Page:	http://www.ohsu.edu/csail/	
Hood River Hotel:	http://www.hoodriverhotel.com/	
Gorge Activities:	http://www.ohsu.edu/csail/billpages/	(Bill's picks)
	http://bingenschool.com.links.htm	(Almost everything)
	http://www.mind.net/dlmark/gorge.htm	(More sights to see)

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The first CSAIL

From the journal of William Clark *October 29th Tuesday 1805*

The Countrey on each side begin to be thicker timbered with Pine and low white Oake; verry rockey and broken. passed three large rocks in The river the middle rock is large long and has Several Squar vaults on it. we call this rockey Island the Sepulchar— The last river we passed we Shall Call the *Cataract* River from the number of falls which the Indians say is on it— passed 2 Lodges of Indians a Short distance below the Sepulchar Island on the Stard. Side river wide, at 4 mile passed 2 houses on the Stard. Side, Six miles lower passed 4 houses above the mouth of a Small river 40 yards wide on the Lard. Side a thick timbered bottom above & back of those houses; those are the first houses which we have Seen on the South Side of the Columbia River, (and the axess to those dificuelt) for fear of the approach of their common enemies the Snake Indians, passed 14 houses on the Std. Side Scattered on the bank— from the mouth of this little river which we shall Call Labeasche River (Now called **Hood River**)
http://lewisandclarkjournals.unl.edu/index.html

Page fillers