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THE UNIVERSITY OF ARIZONA COLLEGE OF SCIENCE

Cognitive Science

2016 Keynote Address



Dr. Mary A. PetersonUniversity of Arizona

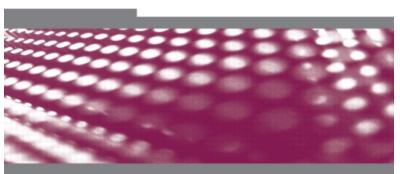
Cognitive Science Program and Department of Psychology

From A Serendipitous Finding To A New Understanding Of Object Detection

Visual perception was long understood as a serial, feedforward process in which, at a very early stage of processing, borders between regions in the visual input were assigned as bounding contours to the region on one side; this constituted object detection (aka figure assignment). The other region, lacking a shaping contour, was perceived as a locally shapeless ground to the object. It was assumed that object memories and semantics were accessed only after object detection occurred and only with respect to figures/objects, not grounds. Both physiological and computational arguments supported this feedforward view. A puzzling result obtained serendipitously more than 25 years ago suggested that this traditional view was incorrect. Pursuing the implications of that finding yielded evidence that a host of priors (including shape memories and semantics as well as classic configural properties) are activated for objects that might be perceived on both sides of borders in the visual field, and that the best fitting interpretation for the input is determined via inhibitory competition. Ultimately, these data favor a dynamical interactive view of object detection rather than a strictly feedforward view.



Visual Cognition





Department of Psychology Cognitive Neuroscience Program www.psychology.columbian.gwu.edu

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OPAM 2016 Talk Schedule Independence Ballroom

7:00/7:30		Registration Opens
7:45		Opening Remarks
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8:00	Ben-Yosef, Yachin, & Ullman	Recognizing and Interpreting Social Interactions in Local Image Regions
8:15	Hagen & Tanaka	Examining the Neural Representation of Object Expertise by the Means of Fast Periodic Visual Simulations
8:30	Harris, Dux, & Mattingley	Stimulus Awareness in an Inattentional Blindness Paradigm is Associated with Beta Phase Alignment and Increased Low Frequency Connectivity Throughout the Brain
8:45	Shafto & Tarr	Face-Selectivity Precedes Selectivity for Curvilinear Shapes
		Attention 1
9:15	Wood & Simons	Isolating the Roles of Similarity to Attended and Ignored Items in Inattentional Blindness
9:30	Walenchok, Houpt, Godwin, Hout, & Goldinger	Is this Object "Gray" or is this Object "Not Blue"?: Confirmatory and Disconfirmatory Strategies Influence Object Identification in Visual Search
9:45	Fernandes & Castelhano	Getting the Gist: The Focus of Attention Within the First Glance of a Scene
10:00	Firestone & Scholl	Seeing Stability:
20100		Perception and Attention Extract Features of Intuitive Physics
		Memory
10:30	Moen, Pinto, Papesh, & Beck	Directed Forgetting in Visual Working Memory: Detoured Not Lost
10:45	Gunseli, Foster, Sutterer, Vogel & Awh	Alpha-Band Activity Tracks Updates to the Content of Spatial Working Memory
11:00	Suchow, Fougnie, & Alvarez	Looking Inwards and Back: Realtime Monitoring of Visual Working Memories
11:15	Sali & Egner	Characterizing the Relationship Between Item Updating and Set Shift Processing in Working Memory
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2:30	Nah, Malcolm, Sheremata, & Shomstein	Task-Irrelevant Semantic Relationships of Real-World Objects Bias Visual Attention
2:45	Meyerhoff, Schwan, & Huff	Oculomotor Capture Mediates the Attentional Bias Toward Temporarily Close Objects
3:00	Rosenberg, Hsu, Scheinost, Finn Constable, & Chun	·
3:15	Haggit & Houpt	An Investigation of Visual Priming Mechanisms in Visual Search
Keynote Address		
3:45	Mary A. Peterson	From A Serendipitous Finding To A New Understanding Of Object Detection
4:45		Awards & Closing Remarks



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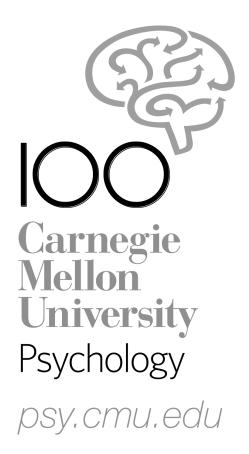
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OPAM 2016 Posters Hynes Ballroom A-C, Hynes Convention Center

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2)	Are Individual and Mean Identity Representations Immune to Changes in Emotional Expressions?
	Meral, Yildirim & Boduroglu
3)	Uncertainty in Perceptual Decision Making: The Time Course of False Pop-Out
	Cain
4)	Do the Temporal and Spatial Processing of Objects Share a Common Code?
	Clement, Brockmole, & Irwin
5)	Auditory Word Comprehension While Performing a Visual Task
	Dowling & Yee
6)	What do Visual Half-Field Studies Tell Us about Gender Perception?
	Harrison, Claiborne, & Strother
7)	The Genetic Influence of Spatial Reasoning: A meta-analysis
	King, Macnamara, & Katz
8)	Verb Semantics: Affordances or Object States?
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9)	Sound-Color Correspondences Do Not Affect Preference Ratings
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10)	Ensemble Representations of Semantic Meaning: Are Numerical Averages Generated in Parallel?
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12)	The Role of Eyelash Fullness and Length on Facial Attractiveness Mediated by Hormone Levels
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\	The state of the s

13) Imagining a Face Viewed from Novel Angles in Advance Facilitates Face Identification

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14) Does Task Relevance Modulate The Scene Sensitive P2 Component?

Noesen, Ewald, & Harel

15) Turning Your World Around: Effects of Cognitive Control vs. Movement Bias on Eye Movement Guidance

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- 16) Semantic Priming Facilitates Object Detection via Predictive Coding
 Orsten-Hooge, Skocypec, Jannuzi, & Peterson
- 17) The Processing of Object Orientation in Tactile and Visual Modalities
 Park & McCloskey
- 18) Identifying Distinctive Features in Object Recognition
 Roldan & Cate
- 19) "I'm in Love with a Liar": Physical Attractiveness and Motivations to Deceive
 Shannon & Scolaro
- 20) Which Neural Signatures can be Indicators to Evaluate the Sense of Agency when Using a Power Assist Suit?: An fMRI Study

Tanaka & Yoshida

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- 21) The Architecture of Interaction Between Visual Working Memory and Visual Attention
 Bahle, Hollingworth, & Beck
- 22) The Object-Based Attention Shift Direction Anisotropy May Depend on Expectation About Shifting Across Visual Field Meridians

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- 23) Transcranial Direct Current Stimulation of Superior Medial Frontal Cortex Disrupts Response Selection, but Only During Proactive Response Inhibition
 - Bender, Filmer, & Dux
- 24) Measuring Attentional Deployment and Sampling of Multiple Dynamic Features Within the Same Object

Callahan-Flintoft & Wyble

- 25) Multiple Attentional Control Settings on Different Locations Simultaneously
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- 26) Loss Aversion is Related to Attentional Priority to Reward & Loss: An IOR Study
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- 27) Affording Attention? Tool Ends Do Not Receive Attentional Prioritization in a Temporal Order Judgement Task.

Constable, Huffman, Welsh, & Pratt

- 28) Revealing the Existence of Distractor Suppression During Stimulus-Driven Attentional Capture
 - Cunningham, Blackstock, & Egeth
- **Value-Driven Attentional Capture in Positive and Negative Reinforcement Contexts**DiBartolo & Courtney
- 30) Effects of Anxiety on Attentional Disengagement from Neutral Faces of Other Races
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31) How is Access to Items in Episodic Long-Term Memory Attentional Control Settings? An ERP Investigation

Giammarco, Hryciw, & Al-Aidroos

32) What do Eye Movements Reveal About Search Processes with Long-Term and Visual Working Memory Attentional Templates

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33) Scan Patterns Among Significant Scene Regions Predict Individual Differences
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34) Mind-Wandering Recruits Sensory Cortices

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35) Pre-Stimulus Pupil Dilation Predicts the Degree of Goal-Directed Attentional Control Irons & Leber

36) The Effect of Mere Presence of a Mobile Phone Dependent on the Degree of Internet Addiction

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37) The Role of Task Relevance and of Attentional Control Settings in Processing Multiple Stimuli Simultaneously

Izoutcheev, Yovel, & Gronau

38) fMRI Study of Visual Search for Self-Controlled Moving Objects

Kazuma & Yoshida

39) The Influence of Figure-Ground and Depth on Attention in a Modified Stroop Task
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40) Sensorimotor-Conceptual Integration in Free Walking Enhances Divergent Thinking for Young and Older Adults

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41) Working with a Partner May Help Protect Against Frequency Effects in Difficult Visual Search

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- **Audibly Received, Unread Smartphone Messages Impair Visual Search Performance**Ludwig, Hale, & Moher
- 43) The Knowledge of Stimulus-Response Mapping, Not Feature-Reward Association, Induces Value-Driven Attentional Capture

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44) The Role of Distraction in a Hybrid Visual-Memory Search

Moore, Ransome, & Avansato

45) When "Nothing" Becomes "Something": Value-Driven Attentional Capture Without Reward

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46)	Distinguishing and Validating Mechanisms of Attention Bias Through Their Relation to
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47) Upside-Down: Perceived Space Affects Object-Based Attention

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48) Reexamining the Effect of Action on Attentional Deployment in Visual Search

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49) Response Interference due to Novelty Association

Rogers & Vickery

50) From Reflexive to Volitional Mechanisms

Saban, Sekely, Klein, & Gabay

51) The Effects of Age and Cognitive Task Demand on Peripheral Detection at Intersections

Savage, Spano, Islam, & Bowers

52) Finding the Green Ketchup Bottle: Investigating How Non-Essential Features Sometimes Aid in Search

Scarince & Hout

53) Reality vs. Simplicity: The Effecs of Real-World Objects on Attentional Selection

Scotti, Malcolm, Peterson, & Shomstein

54) Hemifield-Specific Attentional Spotlights Are Dependent on a Common High-Level Control Mechanism

Strong & Alvarez

55) The Role of Semantic Similarity in Inattentional Blindness

Suzuki & Okubo

56) Visual Search for Self-Controlled Biological Hand Motion Stimuli

Tajima & Yoshida

57) Perceptual Grouping is a Crucial and Unique Determinant of the Processing of Distracting Information

Teng, Kravitz, & Sohn

58) Neural Correlates of Goal-Directed Attentional Capture in the Absence of Conscious Perception

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59) Target Self-Relevance Speeds Search, But Does Not Alter Search Efficiency

Wade & Vickery

60) Identifying the Components of Attentional Deficits in Schizophrenia

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61) Does Target-Distractor Similarity Differentially Affect Visual Search Performance in Children, Adolescents and Adults?

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62) Perception of Feature Distributions Requires Focal Subselection

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Distracted from Distraction: Multiple Distractors Improves Target Perception in RSVPZhao, Wyble, & Most

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64) Unfamiliar Face Matching Has Profound Amnesia

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65) Infants Use an Agent's Object Representations to Overcome Their Own Working Memory Limits

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66) Learning to Learn: Contextual Cueing is Enhanced by Prior Exposure to Regularities in Search Configurations

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67) One Feature to Rule Them All: A Case for Location Being Special in Visual Working Memory

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68) Object Representations Influence Visual Short-Term Memory

Carter, Nah, & Shomstein

69) The Mirror Effect Within Perception: Not Another Recognition Memory Study Chávez De la Peña

70) Seeing Double: No Cost for Face Familiarity in Duplicate Image Detection
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71) Can an Accessory Feature be a Trigger to the Attentional Boost Effect?
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72) Investigating Visual Short-Term Memory with the Help of Eye-Tracking Technology
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73) All Targets are Not Created Equal: Some Targets Are Often Missed in Hybrid Visual Search Tasks

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74) The Impact of Military Service on Romantic Relationship Quality

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75) Working Memory Capacity and Cognitive Filtering Predict Demand Avoidance
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76) Precision Takes Time: Evidence for Retroactive Dual-Task Interference in a Color Delayed-Estimation Task

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77) Temporal Structure Learning Facilitates Inductive Generalization

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- 78) Reconsidering the Focus of Attention: Cued Items Contain More Information But Are Not More Accesible
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- 79) First Impressions in Visual Long-Term Memory
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- 80) Visual Encoding Limits Appear as a Capacity in Change Detection Sengupta, Yoo, Wloka, Kunic, & Tsotsos
- 81) Geometric Category Errors in Locating 3-Dimensional Objects in a Virtual Space Williams, Walsh, Chiu, Menezes, & Sampaio
- 82) Implicit Learning Interacts with Hemifield Independence in Visual Working Memory
 Won & Leber
- 83) Lasting Inhibition: Mapping the Time Course of Response Inhibition with Big Data
 Wynn & Mitroff

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Abstracts - Talk Sessions

Object Perception

Thursday, November 17th, 8:00 - 9:00 am Talk Session, Independence Ballroom Moderator: Jennifer Bittner

8:00 am - Recognizing and Interpreting Social Interactions in Local Image Regions

Guy Ben-Yosef, Alon Yachin, Shimon Ullman

Understanding social interactions (such as 'hug' or 'fight') is a basic and important capacity of the human visual system, but a challenging and still open problem for modeling. Here we study visual recognition of social interactions, based on small but recognizable local regions. The approach is based on two novel key components: (i) A given social interaction can be recognized reliably from reduced images (called 'minimal images'). (ii) The recognition of a social interaction depends on identifying components and relations within the minimal image (termed 'interpretation'). We show psychophysics data for minimal images and modeling results for their interpretation.

8:15 am - Examining the Neural Representation of Object Expertise by the Means of Fast Periodic Visual Stimulation Simen Hagen, James W. Tanaka

We used Fast Periodic Visual Stimulation to test the claim that expert recognition is supported by subordinate neural representations that are more differentiated than those of novices. Bird experts and novices were presented with sequences containing a repeating bird or face stimuli while electroencephalogram was recorded. Oddball stimuli were interspersed at a periodic frequency. A cortical response at the oddball frequency would suggest that the oddballs were discriminated from the repeating images. Consistent with our hypothesis, the oddball birds, but not the oddball faces, evoked a larger response in the bird experts relative to the bird novices.

8:30 am - Stimulus Awareness in an Inattentional Blindness Paradigm is Associated with Beta Phase Alignment and Increased Low Frequency Connectivity Throughout the Brain

Anthony Harris, Paul Dux, Jason Mattingley

Recent work has shown several candidate neural correlates of consciousness (NCCs) in fact relate to processes other than subjective awareness (e.g., report). Here we used a method for studying inattentional blindness without trial-by-trial report, to examine oscillatory NCCs with electroencephalography. We found awareness of a peripheral stimulus was associated with beta (22-29 Hz) phase alignment at the time and scalp location of the Visual Awareness Negativity event-related potential. This was followed by decreased alpha (10-16 Hz) amplitude, most likely reflecting attentional engagement, and increased low frequency (2-3.5 Hz) connectivity throughout the brain.

8:45 am - Face-Selectivity Precedes Selectivity for Curvilinear Shapes

Juliet Shafto, Michael Tarr

What visual features give rise to category-selective responses in the human ventral visual pathway? Neuroimaging research has demonstrated that face-selective areas respond preferentially to curvilinear shapes over rectilinear shapes. It is unclear however, whether the dissociation of curvature and rectilinearity precedes (and therefore, could contribute to) category-selective responses. We find that curved and rectilinear images give rise to dissociable signals over the posterior scalp. However, the signals diverge only following the initial divergence of face and scene ERPs. This suggests that contour type is not used in the initial segregation of faces and scenes in visual processing.

Attention 1

Thursday, November 17th, 9:15 - 10:15 am Talk Session, Independence Ballroom Moderator: Justin Ericson

9:15 am - Isolating the Roles of Similarity to Attended and Ignored Items in Inattentional Blindness

Katherine Wood, Daniel Simons

Whether people notice an unexpected object during an inattentional blindness task depends on that object's similarity to the attended and ignored items. However, previous research has not isolated whether similarity to the attended items, ignored items, or both influence noticing. We designed an inattentional blindness task in which people monitored either white squares or black-and-white checkerboards. The black or white unexpected objects were equally similar to these checkerboards. By varying whether the squares or checkerboards were attended, we isolated the contribution of similarity to the attended and ignored items. Both types of similarity independently contributed to noticing.

9:30 am - Is this Object "Gray" or is this Object "Not Blue"?: Confirmatory and Disconfirmatory Strategies Influence Object Identification During Visual Search

Stephen Walenchok, Joseph Houpt, Hayward Godwin, Michael Hout, Stephen Goldinger

Imagine searching for your blue car in a parking lot: You must identify and either reject or accept each fixated vehicle. We examined this process using the capacity coefficient, which gauges efficiency in object identification. Previous research suggests higher capacity (greater efficiency) when objects are complex (e.g., cars containing many potentially disqualifying features; Godwin, et al., 2015). However, capacity should be tempered when taking both confirmatory ("Is this gray?") and disconfirmatory ("Is this not blue?") strategies into account. This prediction was supported, suggesting that strategy use can account for the enhanced efficiency of complex object identification.

9:45 am - Getting the Gist: The Focus of Attention Within the First Glance at a Scene

Suzette Fernandes, Monica Castelhano

Research has shown that we can quickly ascertain scene gist (Potter, 1976) and do so using coarse-to-fine information extraction (Schyns & Oliva, 1994; Oliva & Schyns, 1997), which roughly maps onto background-to-foreground information. In the present study, we examined whether processing information from the background versus foreground changes over the course of the first fixation. We conducted two experiments where participants were required to categorize either Normal or Chimera scenes (i.e., scenes with background and foreground of different semantic categories). Results revealed that participants primarily utilize the foreground information. This foreground bias will be further examined by manipulating the task.

10:00 am - Seeing Stability: Perception and Attention Extract Features of Intuitive Physics

Chaz Firestone, Brian Scholl

We can easily tell whether a tower of blocks will topple or a stack of dishes will collapse. Might such sophisticated judgments have roots in more primitive operations of perception and attention? In a change-detection task, subjects better detected positional changes to blocks in a tower if those changes also altered the tower's stability, suggesting that stability automatically guides attention. Moreover, in a motion-detection task, impressions of instability were so compelling that static images of unstable (vs. stable) towers actually appeared to be slowly falling. These results imply that visual processing extracts surprisingly rich aspects of physics.

Memory

Thursday, November 17th, 10:30 - 11:30 am Talk Session, Independence Ballroom Moderator: Emma Wu Dowd

10:30 am - Directed Forgetting in Visual Working Memory: Detoured Not Lost

Katherine Moen, Juan Guevara Pinto, Megan Papesh, Melissa Beck

To efficiently maintain task-relevant information in VWM, task-irrelevant information must often be suppressed or forgotten. The current study used a change detection/directed forgetting paradigm to further examine the forgetting process in VWM. We compared performance for color squares to depictions of real-world objects, in order to examine the impact of LTM representations on forgetting. Results suggest that participants utilize cues to selectively maintain task-relevant information, but information is not completely forgotten once it becomes task-irrelevant. This partial forgetting leads to reduced access, which may be partially restored with the appropriate retrieval cues.

10:45 am - Alpha-Band Activity Tracks Updates to the Content of Spatial Working Memory

Eren Gunseli, Joshua Foster, David Sutterer, Edward Vogel, Edward Awh

The topography of alpha-band activity tracks locations maintained in spatial working memory (WM). We tested whether dynamic changes in alpha activity track the updating of information in spatial WM. Subjects were shown a memory location followed by an auditory cue which instructed subjects to update the location held in memory. Using an inverted encoding model, we found that time-resolved analysis of alpha topography tracked the initial location held in WM as well as the transition to the updated location following the cue. These findings highlight a new approach for observing active updating of the contents of visual WM.

11:00 am - Looking Inwards and Back: Realtime Monitoring of Visual Working Memories

Jordan Suchow, Daryl Fougnie, George Alvarez

Confidence in our memories is influenced by many factors, including beliefs about the perceptibility or memorability of certain kinds of objects and events, as well as knowledge about our skill sets, habits, and experiences. Here, we designed two experiments that strip away these cues and require observers to directly assess the quality of their memories. We show that individuals can monitor information in working memory as it degrades over time. Our findings suggest that people have access to information reflecting the existence and quality of their working memories, and furthermore, that they can use it to guide their behavior.

11:15 am - Characterizing the Relationship Between Item Updating and Set Shifting Processes in Working Memory Anthony Sali, Tobias Egner

The updating of items and shifting of task sets maintained in working memory (WM) are both considered core cognitive control operations, but it is currently not certain whether they reflect a single generic WM updating process or two dissociable processes. Participants judged whether consecutive digits in a stream matched according to one of two potential rules (magnitude or parity). Response times (RT) were slowed when they updated the digit stored in WM and when they switched rules. However, there was no interaction between the two control operations, suggesting that item updating and task-set shifting stem from dissociable cognitive mechanisms.

Attention 2

Thursday, November 17th, 2:30 - 3:30 pm Talk Session, Independence Ballroom Moderator: Eric Taylor

2:30 pm - Task-Irrelevant Semantic Relationships of Real-World Objects Bias Visual Attention

Joseph Nah, George Malcolm, Summer Sheremata, Sarah Shomstein

Every object, along with low-level properties, presents with a set of high-level properties that include semantic meaning. The ubiquitous nature of semantic information suggests that it may guide attentional allocation, even when task-irrelevant. Utilizing uni- and multivariate methods, we investigated the extent to which task-irrelevant semantic-based modulations influence processing in early visual cortex (EVC), lateral occipital cortex (LOC), and inferior parietal sulcus (IPS). Semantic-based attentional modulation was observed in behavior, and over spatially selective EVC and IPS but not object selective LOC, demonstrating that semantic information modulates cortical activity via enhancement of spatial representations.

2:45 pm - Oculomotor Capture Mediates the Attentional Bias Toward Temporarily Close Objects

Hauke Meyerhoff, Stephan Schwan, Markus Huff

We explore how changing interobject spacing reflexively biases visual attention in dynamic scenes. Our participants discriminated between probes that appeared on moving objects. Response latencies were shorter for probes that appeared on temporarily close objects. The same pattern of results held true even when probes were more likely to appear on spatially distant objects, thus signaling reflexive attentional capture toward objects with reduced spacing. When exploring the role of eye-movements, our results show that reduced spacing guides oculomotion towards close objects to enhance the local resolution of attention. In fact, preventing these eye-movements inverses the pattern of results.

3:00 pm - Connectome-Based fMRI Models Predict Separable Components of Attention in Novel Individuals

Monica Rosenberg, Tiffany Hsu, Dustin Scheinost,

Emily Finn, R. Todd Constable, Marvin Chun
Models based on whole-brain functional connectivity predict novel
individuals' ability to sustain attention (Rosenberg et al., 2016). Here we
extended our prior work to predict individual differences in other
components of attention. Using fMRI data from 44 participants,
connectome-based predictive models (CPM)s predicted several aspects of
Attention Network Task performance, including accuracy and response
variability. The original sustained attention CPM also generalized to predict
ANT performance in these novel participants. The success of CPMs in
predicting ANT performance makes significant progress towards developing
a suite of models that can be used to predict individuals' overall attentional
abilities.

3:15 pm - An Investigation of Visual Priming Mechanisms in Visual Search

Jordan Haggit, Joseph Houpt

Visual priming is one of the primary drivers of attentional guidance. In visual search, priming describes the facilitory effects of target repetition on performance. Although priming is well supported by empirical evidence, it is not clear where it is located in the visual processing hierarchy. This study aimed to determine the level at which priming occurs within a visual search task. Using Systems Factorial Technology, a model based empirical framework, a parallel processing model best represented the temporal ordering of priming and conspicuity, a well-established early visual mechanism. This suggests priming operates at early levels within the visual system.

Abstracts - Poster Session

Object Perception

Thursday, November 17th, 12:00 - 2:15 pm Poster Session, Hynes Ballroom A-C, Hynes Convention Center

1 - Encoding and Recognition of Faces Involves Different Eye-Movement Dynamics

Joseph Arizpe, Danielle McKean, Jack Tsao, Annie Chan We distinguish influences of phase (encoding/recognition) and stimulus presentation time (short/long) on eye-movements to faces. Discrimination (d') was reduced for short vs. long study (but not test) phase stimulus presentation time, indicating more facial feature sampling is needed at encoding than recognition for optimal performance. Fixation duration of the second ordinal fixation was shorter during the study than the test phase. Also fixation density was relatively greater over the eyes during the study phase and relatively greater over nose and mouth regions during the test phase, though the precise differential pattern interacted with stimulus presentation time.

2 - Are Individual and Mean Identity Representations Immune to Changes in Emotional Expressions?

Erdem O. Meral, İrem Yildirim, Aysecan Boduroglu It is known that viewers can average facial identity across different viewing conditions. However, no research to date has directly addressed whether identity representations can be extracted across various emotional expressions. Across three experiments involving an identity matching task in which viewers determined whether a test face was identical with one of the four studied faces, we found that viewers were able to represent both individual identity and mean identities of faces with different emotional expressions. Our results suggest that individual and average identity representations are immune to expression changes but reliance to them should be pushed by the task.

3-Uncertainty in Perceptual Decision Making: The Time Course of False Pop-Out

Sasen Cain

We used 3D hand-tracking to capture participants' uncertainty in an orientation singleton task. Participants were to reach toward the uniquely tilted shape on a rear-projected screen. However, trajectories were more curved than in previous color or shape singleton tasks (Moher & Song, 2013). These observations are consistent with the phenomenon of false pop-out, in which perceptual organization biases the representation of each item. We found that the slowest movements had much higher curvature than the quickest, confirming that these perceptual decisions unfold during movement, sometimes with several change-of-mind events.

4 - Do the Temporal and Spatial Processing of Objects Share a Common Code?

Andrew Clement, James Brockmole, David Irwin

Some researchers have argued that temporal and spatial processing share a common neural code. We tested this hypothesis by having participants make saccadic eye movements, which can suppress tasks that involve spatial processing, while also making judgments of temporal order. These judgments were not affected by the execution of saccades, suggesting that eye movements and temporal processing do not compete for resources. Thus, while time and space are behaviorally related, they may arise from separate coding systems.

5 - Auditory Word Comprehension While Performing a Visual Task

Caitlin Dowling, Eiling Yee

Sensorimotor-based theories of semantic memory state that object information is stored in areas activated during interaction, and that these regions are involved in its representation. It follows that 'occupying' these regions through a simultaneous task will interfere with cognitive processing. This was tested in the visual domain by having participants judge an object name in the presence or absence of a concurrent visual task (recalling if a shape was presented moments before). It was predicted that it would be more difficult to process primarily visual objects (e.g. "moon") than non-visual (e.g. "breeze") during the interfering task.

6 - What do Visual Half-Field Studies Tell Us About Gender Perception?

Matthew Harrison, Nicole Claiborne, Lars Strother

Faces and names can be categorized by gender, but how we do this is unclear. Here we use a visual half-field paradigm to determine whether there was a hemispheric difference in gender categorical processing between faces and names. Previous studies using this paradigm showed a left hemifield advantage for face processing, and a right hemisphere advantage for word processing, corresponding to the left-lateralization of the language system. We found a lateralized advantage for name but not face gender categorization, suggesting that gender perception generally might be subserved by a left-lateralized system of non-perceptual gender representation.

7-The Genetic Influence of Spatial Reasoning: A Meta-Analysis

Michael King, Brooke Macnamara, David Katz

Many cognitive abilities including spatial reasoning have been investigated in terms of the genetic contribution towards differences in ability. However, it appears that a systematic analysis of the literature on the genetic influence of spatial reasoning has not been produced. To provide clarity and a general consensus on this topic, a meta-analysis was conducted. Our results indicate that spatial reasoning ability is moderately heritable with additive genetic influence explaining a majority of the variance. Findings also suggest that spatial reasoning ability is slightly more heritable in females, with additive genetic influence explaining higher amounts of variation compared to males.

8 - **Verb Semantics: Affordances or Object States?** *Kyra Krass, Gerry Altmann*

This study investigates what drives anticipation during sentence processing. It focuses on verbs that entail object state change to determine which object state is active when participants anticipate upcoming referents. We hypothesized that if participants heard sentences describing object state change, they would look more to an object depicting its end state than its initial state, if both states are depicted in a concurrent visual scene. We found that participants did look more to the end state than the initial state, suggesting that at times we focus more on how the world will be than how it was.

9 - Sound-Color Correspondences Do Not Affect Preference Ratings

Erika Kumakura, Kazuhiko Yokosawa

Crossmodal correspondences are shared associations between features of different modalities. They are often discussed in the context of multisensory processing, but little is known about whether they affect hedonic appreciation. Do we like the multisensory stimuli more when different stimuli are congruent rather than incongruent? To address this question, we conducted preference rating task where participants had to rate their preference of a congruent and incongruent sound (triad/pure tone)-and-color pairs. Results indicated that participants' preferences of sound-color pairs were not affected by crossmodal congruency, suggesting that the preference ratings are insensitive to the crossmodal correspondences.

10 - Ensemble Representations of Semantic Meaning: Are Numerical Averages Generated in Parallel?

Kassandra Lee, Kenith Sobel, Olivia Cody, Amrita Puri
The ability to quickly gather summary information from visually crowded
environments is known as ensemble coding. Ensemble coding has been
demonstrated for low-level visual features such as circle size and line
orientation, and also for more complex attributes such as facial
characteristics. Here we investigated ensemble coding at the level of
semantic information by having participants report the average of full sets
and subsets of rapidly presented digits, and found evidence that just as with
features within the visual domain, parallel processing and some level of
automaticity may contribute to ensemble representations of semantic
meaning.

11 - Prioritization of Features in Object and Ensemble Perception

Benjamin Lin, Jose Rivera-Aparicio, Jeremy Cone, Mariko Moher

We examined whether certain dimensions (e.g., color, shape) are prioritized over others in visual processing of single objects or ensembles using the Dimensional Change Card Sort (DCCS), a task typically used to examine the development of executive function in children (Zelazo, 2006). Mechanical Turk participants (N=320) exhibited an asymmetric switch cost in which they were slower to switch from color to shape than the reverse for both objects and ensembles, suggesting that such a prioritization may exist and may be consistent over stimulus type.

12 - The Role of Eyelash Fullness and Length on Facial Attractiveness Mediated by Hormone Levels

Maedeh Mousavi, Jessie Peissig

Previous research has shown that increasing contrast in the eye region increases female attractiveness. The effect of eyelashes on judgments of beauty, however, is largely unstudied. The current study investigates the role of the eyelashes on facial attractiveness in females. The goal of this study was to determine whether naturally long, thick eyelashes are correlated with higher rating of attractiveness. A series of judgment tasks were used to test for a significant positive relationship between eyelash fullness/length and attractiveness ratings (r=0.42, t(94)=4.46, p<.001). Further studies are planned to investigate the link between estrogen levels and eyelash fullness/length.

13 - Imagining a Face viewed from Novel Angles in Advance Facilitates Face Identification

Hiroyuki Muto, Shiori Kano, Soyogu Matsushita, Kazunori Morikawa

We examined whether humans can imagine novel views of faces after learning a three-quarter view. Participants learned a three-quarter (30°) view of a face, then saw a face of the same or different identity from a 0° (frontal) or a 60° view and made an identical/different judgment. We manipulated the presence/absence and SOA of a cue forecasting the view angle of the test face. Results showed that the cue reduced judgment times by about 100 ms regardless of the view, suggesting that humans can imagine a face viewed from novel angles at least up to 30°.

14 - Does Task Relevance Modulate the Scene Sensitive P2 Component?

Birken Noesen, Jacklyn Ewald, Assaf Harel

Recent research has shown that the P2, a posterior Event-Related Potential (ERP) component indexes global scene information. However, it is still unknown how top-down factors, such as task relevance, modulate its magnitude. The current study manipulated task relevance and examined its impact on the P2 component in two separate experiments. Experiment 1 confirmed the P2 is sensitive to global scene properties using a passive task. Experiment 2 manipulated the task relevance of those properties and found minimal differences in the P2 amplitude. These results suggest that global scene properties are processed rapidly in a stimulus-driven fashion.

15 - Turning Your World Around: Effects of Cognitive Control vs. Movement Bias on Eye Movement Guidance Ellen O'Donoghue, Monica Castelhano

When viewing real-world scenes, humans typically make more horizontal saccades than in any other direction. Given that top-down cognitive influences strongly predict eye movements during visual search, the present research examines the extent to which the horizontal bias persists alongside competing top-down demands. Using an image-rotation paradigm, we demonstrated that although saccade direction is modified when scenes are rotated, it is not further impacted by practice or pre-planned search strategies. Together, these results suggest that the horizontal bias is fairly robust even when strong competing top-down influences are present.

16 - Semantic Priming Facilitates Object Detection via Predictive Coding

Kimberley Orsten-Hooge, Rachel Skocypec, Barnes Jannuzi, Mary Peterson

We investigated whether the prior activation of associated semantics facilitates object detection, using a paradigm designed to assess detection rather than recognition. Observers viewed briefly exposed displays divided into two equal-area regions by a central border. A portion of a familiar object was sketched in an upright or inverted orientation on either the left or right side of the border. Observers reported where they detected an object. Masked words that either identified or were unrelated to the familiar objects preceded the displays. Identity primes facilitated the detection of upright but not inverted objects, consistent with a predictive coding account.

17 - The Processing of Object Orientation in Tactile and Visual Modalities

Jeongho Park, Michael McCloskey

The current study investigated the processing of object orientation in tactile and visual modalities. In Experiment 1, participants used the tactile modality to encode and report the orientations of objects. The orientation errors made in this task resembled the pattern observed in previous studies using visual stimuli; the most common error involved reflection across the object's principal axis of elongation. In Experiment 2, encoding and response phases could be either visual or tactile. Although the pattern of reflection errors was similar across conditions, the Visual-Visual condition produced significantly lower overall error rates than other conditions.

18 - **Identifying Distinctive Features in Object Recognition**Stephanie Roldan, Anthony Cate

In an investigation of informative local object features, twenty photographs of visually diverse real-world objects were divided into square segments of equal size. Twenty participants viewed stimuli on a computer monitor as they accumulated one segment at a time until they could identify the object. Response data were analyzed to determine the modal frequency with which object segments appeared on-screen immediately preceding stimulus identification. Results revealed increased terminal frequency for various segments across objects, indicating potential regions of local feature saliency. We predict variations in frequency patterns are related to holistic and parts-based processing of intact objects.

19 - "I'm in Love with a Liar": Physical Attractiveness and Motivations to Deceive

Alissa Shannon, Ashley Scolaro

Although physically attractive individuals are labeled more positively, they sometimes rely on anti-social behavior to maintain their status (Hawley, et al., 2007). The goal of this study was to determine how physical attractiveness relates to the on-line anti-social behavior known as catfishing, in which someone lies to lure another individual into a romantic relationship. Catfishing scenarios were obtained by coding episodes a reality television show and mTURK participants provided attractiveness ratings. The results indicated that physically attractive individuals were more likely to catfish for anti-social purposes than those who were unattractive.

20 - Which Neural Signatures Can be Indicators to Evaluate the Sense of Agency When Using a Power Assist Suit?: An fMRI Study

Shota Tanaka, Takako Yoshida

A power assist suit is a wearable robot that augments human power. In spite of the growing demand for power assist suits, scientific understanding of user's human factors remains still unclear. Recent studies investigating the neural signatures of sense of agency may be useful to evaluate suit user's feelings and sensations. Here, we investigated brain activation due to congruency between an intentional action and actual body movement using an MRI-compatible wearable actuator. The result suggests that activity in the supplementary motor area can be used to evaluate user's agency when using a power assist suit.

Attention

Thursday, November 17th, 12:00 - 2:15 pm Poster Session, Hynes Ballroom A-C, Hynes Convention Center

21 - The Architecture of Interaction Between Visual Working Memory and Visual Attention

Brett Bahle, Andrew Hollingworth, Valerie Beck

Although much work establishes that visual working memory (VWM) can serve as an attentional template, there is debate over whether this guidance is limited to a single VWM item. In the present study, we reexamined evidence demonstrating that when VWM is required to maintain the search target, a secondary item in VWM fails to influence selection. Our paradigm was optimized to observe VWM-based capture. In contrast with previous studies, we observed robust capture from a distractor matching the secondary VWM item. These results suggest that two items in VWM interacted with selection simultaneously, supporting a multiple-item template hypothesis.

22 - The Object-Based Attention Shift Direction Anisotropy May Depend on Expectations About Shifting Across Visual Field Meridians

Adam Barnas, Adam Greenberg

Crossings of the visual field meridians produce a robust anisotropy between horizontal and vertical shifts of object-based attention. Here we examined object-based attention shifts that cross the meridians and how attention is allocated within an object that crosses the meridians. Participants were presented with objects and target displays that crossed the meridians or did not cross the meridians. Our results suggest that the robust horizontal-vertical anisotropy is not explicitly caused by attention shifts that necessitate crossing the meridians. Instead, it may depend on subject expectations regarding the location of upcoming shifts of attention.

23 - Transcranial Direct Current Stimulation of Superior Medial Frontal Cortex Disrupts Response Selection, but Only During Proactive Response Inhibition

Angela Bender, Hannah Filmer, Paul Dux

Cognitive control enables individuals to flexibly select task-relevant responses (response selection) and to suppress inappropriate responses (response inhibition) according to their goals. Using tDCS, we investigated the causal role of superior medial frontal cortex (SMFC) in response selection under conditions where response inhibition was either occasionally required or not. Cathodal stimulation of the SMFC modulated response selection by increasing reaction times relative to sham but only in the context of proactive response inhibition. Our results suggest a context dependent role of the SMFC in response selection and illustrate how task set influences the interaction between brain and behaviour.

24 - Measuring Attentional Deployment and Sampling of Multiple Dynamic Features Within the Same Object Chloe Callahan-Flintoft, Brad Wyble

This research investigates how attention samples information from dynamic stimuli in a modernized version of Wundt's complication paradigm. We measured latency of reporting continuously varying features (color and orientation) relative to a visual cue. Three statistical models were created to simulate results under the assumptions of simultaneous, sequential or independent sampling of the two features. Experiments 1 and 2 varied the feature rate of change and cue saliency, respectively. Color and orientation report errors were correlated when the cue was less salient, suggesting by adding variability to attentional latency, we can observe the simultaneous nature of access.

25 - Multiple Attentional Control Settings on Different Locations Simultaneously

Sang A Cho, Yang Seok Cho

To investigate whether multiple attentional control settings (ACSs) were maintained simultaneously in a location-specific manner, the effects of distractor inked in colors associated with a specific location were examined in Experiment 1 and spatial cuing effects with location-specific target color cues in Experiment 2. The experiments consistently showed attentional biases only when distractors and cues were presented at a location associated with their colors. Moreover, a significant spatial cuing effect was still evident when the cue-target repetition priming effect was controlled. These results imply that ACSs for multiple target on separate regions were set locally.

26 - Loss Aversion is Related to Attentional Priority to Reward & Loss: An IOR Study

Summer Clay, Catherine Reed, Alison Harris

We investigated whether attentional priority costs are influenced by previous experience with reward/loss and individual differences for loss aversion. After training participants to associate specific cues with reward or loss, we measured Inhibition of Return (IOR) in a covert-orienting paradigm. Although cues did not differ in the size of the IOR effect, highly loss averse individuals were less likely to return to previously attended reward locations, but faster to orient to and slower to reorient from loss locations. Thus, loss aversion may be related to differential attentional priority to cues previously associated with reward or loss.

27 - Affording Attention? Tool Ends Do Not Receive Attentional Prioritization in a Temporal Order Judgement Task.

Merryn Constable, Greg Huffman, Timothy Welsh, Jay Pratt We sought to determine if mechanisms associated with the automatic activation of affordances are observed in an attentional paradigm. Participants were presented with a horizontally oriented tool. Two targets, separated by a temporal order delay, were then presented in close proximity to the tool's ends. Participants judged which target appeared first. Psychometric curves fit to the data indicate that participants did not prioritise attention towards either end of the tool for both task irrelevant (left/right) and task relevant (functional/handle end) judgments.

28 - Revealing the Existence of Distractor Suppression During Stimulus-Driven Attentional Capture

Corbin Cunningham, Peyton Blackstock, Howard Egeth Substantial work in the visual attention literature has investigated the phenomenon known as attentional capture. Yet, while stimulus driven capture is a robust effect, there has been little work investigating the internal representation of the features by which one is captured. In the present study we probe those internal representations and query whether there is something more "top-down" going on during stimulus driven capture. While the effect of stimulus driven attentional capture is robust, we demonstrate the build-up over trials of a suppressive mechanism that reduces the impact of a salient singleton.

29 - Value-Driven Attentional Capture in Positive and Negative Reinforcement Contexts

Michelle DiBartolo, Susan Courtney

Rapid orienting of attention toward stimuli previously associated with reward is referred to as value-driven attentional capture (VDAC). We compared VDAC following learning in different motivational contexts in the same individuals. Participants learned to associate monetary values with cues in separate positive and negative reinforcement contexts. When previously valued cues were presented as irrelevant distractors in separate testing phases, loss-avoidance VDAC was larger than reward VDAC. The magnitude of reward and loss-avoidance VDAC were correlated with impulsivity and inhibition, respectively. Early attention to cues related to reward and loss-avoidance may be differentially allocated for different individuals.

30 - Effects of Anxiety on Attentional Disengagement From Neutral Faces of Other Races

Elizabeth Esser, Matthew Peterson

Previous work has demonstrated that individuals show a biased tendency to allocate their attention toward threat-relevant stimuli, including depictions of Black and Middle Eastern men. The present study uses eyetracking to record saccade latencies in a task designed to measure the time it takes to disengage attention from a centrally presented face (White, Black, or Middle Eastern males) toward a peripheral target. Unlike our previous work, which demonstrated increased saccade latencies when threatening stimuli were presented, we found no reliable evidence for differences in disengagement according to participant or stimulus race, however participant anxiety levels did affect attentional disengagement.

31 - How Fast is Access to Items in Episodic Long-Term Memory Attentional Control Settings? An ERP Investigation

Maria Giammarco, Jackson Hryciw, Naseem Al-Aidroos

A multitude of research suggests working memory is responsible for encoding the attentional control settings (ACSs) that guide stimulus-driven attention. Our recent work demonstrates that ACS items can also be stored in episodic long-term memory (LTM), as evidenced by selective attentional capture by task-irrelevant stimuli matching any of up to thirty target items stored in episodic LTM. Using a lateralized cueing paradigm, we recorded cuelocked ERPs to determine the timeframe in which control is exerted, and found the N2pc marker of selective attention was evoked by ACS-matching cues, consistent with a goal-driven model of capture.

32 - What do Eye Movements Reveal About Search Processes with Long-Term and Visual Working Memory Attentional Templates

Rebecca Goldstein, Melissa Beck

Studies examining contralateral-delay activity have demonstrated that attentional templates do not remain in visual working memory (VWM) when a target is constant across trials (Carlisle et al., 2011). The current study focused on identifying potential differences in the search processes produced by VWM and long-term memory (LTM) templates. Using eye tracking to segmant response times into three stages of the search process revealed that LTM templates speed up search initiation and verification. Therefore, LTM templates are more efficient than VWM templates when preparing to use a template to guide attention and when comparing the template to possible targets.

33 - Scan Patterns Among Significant Scene Regions Predict Individual Differences

Taylor Hayes, John Henderson

The influence of individual differences on scene viewing behavior was investigated by predicting viewer cognitive capacities from scan pattern regularities. Seventy-nine participants completed a scene encoding task for 40 real-world scenes. Successor Representation Scanpath Analysis (SRSA) was used to capture regularities in each participant's scan patterns across the 5 most fixated regions in each scene. Leave-one-out cross-validation demonstrated SRSA could explain individual differences in viewer intelligence (R2cv=0.40), speed of processing (R2cv=0.36), and working memory capacity (R2cv=0.37) scores, suggesting that individual differences influence how scene information is encoded.

34 - Mind-Wandering Recruits Sensory Cortices

Shao-Min (Sean) Huna, Po-Jana (Brown) Hsieh

Our mind is not always in a blank state when it wanders, rather, we experience rich phenomenology. Here we asked and examined: Are sensory cortices recruited during mind-wandering? When compared events where participants reported having visual-only versus auditory-only contexts, we discovered that visual cortex (i.e. Cuneus) and auditory cortex (i.e. Transverse temporal gyrus) were more activated, respectively. Moreover, early visual cortex (i.e. v1) yielded both distinct pattern activity and stronger mean BOLD activation when comparing visual events to non-mind-wandering events. Our results suggest a strong link between mind-wandering and sensory cortices.

35 - Pre-Stimulus Pupil Dilation Predicts the Degree of Goal-Directed Attentional Control

Jessica Irons, Andrew Leber

Previous research suggests that cognitive effort is required to maintain goal-directed attentional control during visual search. However, little is known about the role of effort in implementing control prior to searching. We measured preparatory effort using prestimulus pupil dilation while observers searched for easy (high salience) and difficult (low salience) targets. Results showed greater prestimulus dilation for difficult vs. easy search. Importantly, larger dilations predicted higher search accuracy on a trial-by-trial basis. The findings indicate that individuals vary effort exertion depending on anticipated search difficulty, and the magnitude of such exertion determines the degree of successful control.

36 - The Effect of Mere Presence of a Mobile Phone Dependent on the Degree of Internet Addiction

Motohiro Ito, Jun Kawahara

We examined whether the presence of a mobile phone causes a non-spatially localized distraction or a spatially localized bias during a visual search. We manipulated three factors: device presence (phone/notepad), target congruency (same/different side as the phone), and set size. Participants also completed the Internet Addiction Test. We observed the effect of spatially localized bias in the high addiction score group. Conversely, the effect of non-spatially localized distraction was present in the low addiction score group. These results suggest that the mere presence effect can be modulated by individual differences in the degree to Internet addiction.

37 - The Role of Task Relevance and of Attentional Control Settings in Processing Multiple Stimuli Simultaneously

Anna Izoutcheev, Galit Yovel, Nurit Gronau

Processing multiple stimuli may result in competition, or in Redundancy Gain relative to one. These phenomena's preconditions and nature are largely unknown. Here, participants performed change detection task with one, four identical or four different faces with the same expression, and responded to the face's expression or identity. In the expression task, redundancy gain was found for both multiple stimuli displays; performance in the Different display was enhanced only when participants knew about the identical expressions. In the identity task, competition was found for the Different display. These results suggest ensemble processing may rely on strategic attentional settings.

38 - fMRI Study of Visual Search for Self-Controlled Moving Objects

Horita Kazuma, Takako Yoshida

Self-controlled moving object is visually searched faster than other-controlled one. To examine neural correlates of this phenomenon, we conducted visual search in fMRI. The target movement types were as follows: self-controlled, delayed-controlled, no correlation with the control, and pre-recorded. The comparison between no correlation and self-controlled condition showed activation in bilateral inferior parietal cortex (IPC), right precuneus, left precentral gyrus and left superior temporal gyrus. IPC can be associated with absence of agency in previous research. Whether this type of activation can be associated to the tight relationship between attention and agency is discussed.

39 - The Influence of Figure-Ground and Depth on Attention in a Modified Stroop Task

Chris Koch

Figure-ground and depth cues were examined. Shadows (Experiment 1) produced interference (F(1, 23) = 28.01, p < .001) and slower RTs for occluded targets (F(1, 23) = 9.01, p < .01). Figure-ground images produced interference (F(1, 10) = 7.26, p < .03) in Experiment 2. Linear perspective (Experiment 3) produced interference (F(1, 17) = 15.50, p < .001) and an effect of depth (F(1, 17) = 9.28, p < .01) with longer RTs to closer bars. This finding is not due to perceived size (Experiment 4). Therefore, the effects of occlusion may be mediated by additional depth cues.

40 - Sensorimotor-Conceptual Integration in Free Walking Enhances Divergent Thinking for Young and Older Adults Chun-Yu Kuo. Yei-Yu Yeh.

Prior research has shown that free walking can enhance creativity. Nonetheless, it remains unclear whether bidirectional body-mind links are essential for observing the positive effect. It is unknown whether the positive effect can be generalized to older adults. In Experiment 1, participants experienced four different walking conditions while generating unusual uses for chopsticks. Only ones who walked freely showed better creativity. The results in Experiment 2 further showed that the positive effect can be generalized to older adults. Bidirectional links between proprioceptive-motor kinematics and metaphorical abstract concepts can enhance divergent thinking for young and older adults.

41 - Working With a Partner May Help Protect Against Frequency Effects in Difficult Visual Search

Alexis Lopez, Arryn Robbins, Hayward Godwin, Michael Hout We examined the performance of search teams and solo searchers hunting for many different targets of varying frequencies of occurrence. In this multiple-target hybrid search paradigm, observers looked for 16 categories of targets, appearing at 4 different rates of frequency. We found that collaborative teams had higher overall accuracy, and were less susceptive to frequency effects (i.e., disproportionately missing rarer targets) than solo searchers (in addition to committing fewer false-alarms). These results suggest that during difficult visual searches, having a partner may help alleviate important search errors, like missing uncommon targets.

42 - Audibly Received, Unread Smartphone Messages Impair Visual Search Performance

Calvin Ludwig, Elijah Hale, Jeff Moher

64% of Americans owned smartphones in 2015. Active use of smartphones, such as talking or texting, has been demonstrated to have deleterious effects on attention. Not yet well known are the effects on attention of inactive smartphone use. In the present study, participants completed a visual search task. During the task, participants audibly received, but were unable to read, a text message from the experimenter. We demonstrate that these unread text messages produced increased task error rates compared a non-smartphone auditory distractor. Thus, even inactive smartphone use can have potentially dangerous effects on distractibility, attention, and cognitive performance.

43 - The Knowledge of Stimulus-Response Mapping, Not Reature-Reward Association, Induces Value-Driven Attentional Capture

Chisato Mine, Jun Saiki

Feature-reward association induces value-driven attentional capture (VDAC), while the mechanism underlying VDAC remains unknown. In the current study, we addressed the issue of whether the VDAC can be fully explained by Pavlovian conditioning by examining the necessity of response. A significant VDAC was obtained when participants conducted a letter discrimination task to create color-reward association. VDAC disappeared when we used reward memory task that did not require response. However, when participants had the knowledge of stimulus-response mapping, a significant VDAC was recovered. These indicate that Pavlovian conditioning cannot fully explain the mechanism underlying VDAC.

44 - The Role of Distraction in a Hybrid Visual-Memory

Katherine Moore, Aziza Ransome, Jessica Avanzato

In a hybrid visual-memory search, increasing the number of search goals has a logarithmic effect on performance. In set-specific capture, search costs increase when a distractor resembles one of the searched targets on the same trial that a different target appears. We measured whether increasing search goals has an impact on capture using an RSVP display with performance-dependent speed calibration. We replicated hybrid search findings and discovered that contingent attentional capture costs were largest at large set sizes, whereas set-specific capture costs were largest at small set sizes.

45 - When "Nothing" Becomes "Something": Value-Driven Attentional Capture Without Reward

Eun Byul Oh, Yuna Kwak, Xinge Li, Sang A Cho, Yang Seok Cho

Using a visual search paradigm, this study investigated whether stimuli associated with relative reward or cost can elicit value-driven attentional capture. In a training session, two among three colors were associated with a certain amount of reward or cost while the remaining color was not, so that this non-associating one was regarded as relative cost or reward. In a test session, distractors that had been associated with a relative value but not with an absolute value in the training session elicited a distracting effect, implying that relative value-associated stimuli, if conspicuous, can capture attention involuntarily.

46 - Distinguishing and Validating Mechanisms of Attention Bias Through Their Relation to Individual Differences

Sandersan Onie, Steven Most

Visual cognitive research has identified distinct attention mechanisms, but such insights have rarely carried over to other areas of the field, where (for example) attentional biases have been implicated in several psychological disorders. Ninety-one participants completed two measures of attentional bias for aversive images: the Dot Probe, indexing spatial attention, and emotion-induced blindness (EIB), indexing localized competitive interference. The tasks did not predict each other and predicted unique variance in negative affect. Only EIB predicted persistent negative thought. Thus, lab-derived distinctions between attention mechanisms demonstrate external validity and can enhance understanding of real-world individual differences.

47 - Upside-Down: Perceived Space Affects Object-Based Attention

Frank Papenmeier, Hauke Meyerhoff, Alisa Brockhoff, Georg Jahn, Markus Huff

To investigate whether object-based attention and perceived space are interlinked, we used a three-dimensional attentive tracking task and manipulated the availability of depth cues and the orientation of the tracking space while leaving the motion characteristics of objects unaffected. The upside-down orientation of the tracking space (objects appeared to move on a ceiling) impaired performance as compared with an upright orientation (objects appeared to move on a floor) when rich depth cues were available. However, if the tracking space appeared flat, this upside-down effect was strongly reduced. We conclude that perceived space affects object-based attention.

48 - Reexamining the Effect of Action on Attentional Deployment in Visual Search

Maria Robinson, David Irwin

How does action affect attention? In a recent study, Weidler and Abrams (2014) reported that a simple response toward an object causes people to allocate attention preferentially towards properties of that object in an unrelated task. We reexamined whether these attentional effects were in fact due to a special role of action. We found that in the absence of task-relevance, a simple response is neither sufficient nor necessary to generate the observed influence on attentional processes. Instead, our results suggest that documented effects of action on attention may reflect task-set-defined attentional template matching.

49 - **Response Interference Due to Novelty Association** *Leeland Rogers, Timothy Vickery*

Prediction plays a key role in cognition, allowing us to anticipate and prepare for likely future events. We asked whether merely associating a stimulus characteristic with novel or predictable events influences performance. Participants searched for red or green circles among other colored circles, and reported the orientation of the target contained within. One target color predicted the subsequent, task-irrelevant presentation of a novel scene image, while the other color always preceded the same image. Participants were slower to identify novelty-predicting targets, suggesting that predicting a surprise interferes with performance, even when it is irrelevant to the current task.

50 - From Reflexive to Volitional Mechanisms

William Saban, Liora Sekely, Raymond Klein, Shai Gabay Previous studies emphasized the cerebral cortex' role in endogenous attention orienting. Herein, we applied two different methods to study subcortical regions' contribution to this process. First, we employed a behavioral manipulation to explore the contribution of monocular portions of the visual system to visual cognition. Second, we used the Archer fish as a phylogenetic model. Results indicate that subcortical regions have a functional role in endogenous orienting of attention. Interestingly, in addition to endogenous facilitation, the fish presented inhibition of return, which commonly emerges in reflexive tasks. Results provide converging evidence for the evolutionary origin of an endogenous ability.

51 - The Effects of Age and Cognitive Task Demand on Peripheral Detection at Intersections

Steven Savage, Lauren Spano, Mahedi Islam, Alex Bowers Older drivers are overrepresented in collisions at intersections. They may be preoccupied or distracted by events that are not visual but cognitive in nature, which may impair their ability to deploy visual attention. We investigated the effects of increasing the cognitive difficulty of a secondary central task while holding visual demand constant on peripheral detection. Results suggested that peripheral processing requires cognitive resources. Interestingly, the reduction in detection rates and reaction times was similar for both older and younger participants and was consistent over all eccentricities, supporting general interference over tunnel vision accounts of reduction in peripheral detection under load.

52 - Finding the Green Ketchup Bottle: Investigating How Non-Essential Features Sometimes Aid in Search

Collin Scarince, Michael Hout

The current experiment investigated whether non-defining visual features that are repeatedly associated with target stimuli can aid in attentional guidance and target detection. Participants searched for images of real-world objects among similar distractors that appeared in one of three colors and moved at one of three speeds. For the critical manipulation, target items disproportionately possessed one of four features across the entire experiment (either red, green, remained stationary or moved). Although motion tended to reduce accuracy of target detection overall, when participants expected the target to be moving, this effect of motion was mitigated.

53 - Reality vs. Simplicity: The Effects of Real-WorldObjects on Attentional Selection

Paul Scotti, George Malcolm, Mary Peterson, Sarah Shomstein

Real-world objects contain complex low-level and high-level (semantic) properties. Most object-based attention research, however, has been conducted with simple, geometric objects that lack high-level information. Therefore, whether more realistic object representations guide attentional selection remains an open question. We investigated whether: real-world objects guide attention similarly to simple objects; high-level semantic relationships between object-pairs modulate attentional selection; and semantic relationships influencing object-based guidance can be learned in abstract stimuli. We observed that only when objects were perceptually and semantically dissimilar did the attentional system rely on object-based selection.

54 - Hemifield-Specific Attentional Spotlights are Dependent on a Common High-Level Control Mechanism. Roger Strong, George Alvarez

The left and right visual hemifields appear to have separate spotlights of attention, as two moving targets divided between the hemifields can be tracked as successfully as one target moving within a single hemifield (Alvarez & Cavanagh, 2005). We found that although observers displayed such hemifield independence when a second target had the same motion type as the first (both rotational or both translational), tracking performance was significantly worse when the second target had a different motion type (one rotational, one translational). This suggests that the separate attentional spotlights for each hemifield are dependent on a common high-level control mechanism.

55 - The Role of Semantic Similarity in Inattentional Blindness

Hikaru Suzuki, Matia Okubo

Koivisto & Revonsuo (2007) demonstrated the semantic categories of visual object affect the size of inattentional blindness. The present study investigated the effect of semantic similarity on visual attentional capture using an inattentional blindness paradigm. We used a static version of an inattentional blindness task (Mack & Rock, 1998) and continuously manipulated the magnitude of semantic similarity of visual objects. The result showed that the magnitude of semantic similarity positively predicted the detection of unexpected stimulus, suggesting that semantic similarity not only categorically but also continuously alters attentional capture of visual objects.

56 - Visual Search for Self-Controlled Biological Hand Motion Stimuli

Daisuke Tajima, Takako Yoshida

In visual search, an operator can easily detect a self-controlled target, but not others. To investigate this relationship in the context of embodiment, we used a biological hand motion stimulus as our target. The task was to find the target reflecting the participant's hand movement among distractors following pre-recorded movement. To alter search difficulty, a delay was inserted between the target and the hand movement. The results showed accuracy dramatically changed before and after 250 ms, showing trends similar to previous research findings and suggesting that the context of embodiment does not matter for visual search.

57 - Perceptual Grouping is a Crucial and UniqueDeterminant of the Processing of Distracting Information

Chunyue Teng, Dwight Kravitz, Myeong-Ho Sohn
Understanding what factors determine how goal-relevant information is selected within complex displays is critical for numerous tasks. Various perceptual factors (load, dilution, and salience) have been shown to determine distractor processing and here we extend this set of contributing factors to one of the most basic – grouping. Grouping, defined by color or size, determined the extent of distractor interference even when the other factors were controlled. This novel and general effect of grouping suggests that many factors may simultaneously contribute to selective attention and argues for experiments that tease apart how their relative contributions vary under different contexts.

58 - Neural Correlates of Goal-Directed Attentional Capture in the Absence of Conscious Perception

Susan Travis, Paul Dux, Jason Mattingley

We tested whether a set-matching cue can capture attention to its location even when that cue is masked from awareness. We used a classic contingent capture paradigm, in which participants searched four-letter arrays for a single target in a specific, cued color. Cue displays were masked using continuous flash suppression such that cues were seen on approximately half of the trials. Target-colored cues yielded significantly faster responses when spatially valid than spatially invalid and were observed for both conscious and unconscious cues. Target-colored cues also produced a robust N2pc response for both conscious and unconscious cues.

59 - Target Self-Relevance Speeds Search, but Does Not Alter Search Efficiency

Gregory Wade, Tim Vickery

Associating one's self with a stimulus is enough to enhance performance in a label-matching paradigm (Sui, He, & Humphreys, 2012), implying prioritized processing of self-relevant stimuli. Does self-relevance enhance perceptual processing, or only affect later processing stages? Responses to self-relevant targets were faster than to non-self-relevant targets in visual search. Whereas greater perceptual salience leads to shallower search slopes, self-relevant targets received a constant benefit regardless of set size. Processing benefits to self-relevant stimuli may reflect enhancement of one or more post-perceptual processes.

60 - Identifying the Components of Attentional Deficits in Schizophrenia

Laura Wall, Juanita Todd, Scott Brown

There is consistent evidence that people with schizophrenia show deficits across a number of different tasks used to measure attention. Since most of these tasks require participants to make repeated speeded decisions, it is possible that performance on such tasks is more a measure of decision making processes, such as caution and bias, than attentional deficits. We found impaired performance of people with schizophrenia on a search task, then used a mathematical decision making model to decompose performance into bias, caution, motor speed and processing speed.

61 - Does Target-Distractor Similarity Differentially Affect Visual Search Performance in Children, Adolescents and Adults?

Audrey Wong-Kee You, Leyla Safar, Alice Kim, R. Shayna Rosenbaum, Scott Adler

Top-down attention, relative to bottom-up, shows a protracted developmental course well into childhood and pre-adolescence [4,5]. To further examine this trend, children (9- to 10-years), adolescents (14- to 15-years) and young adults, were tested on a visual search task, in which the level of target-distractor similarity was manipulated. RT results revealed that in comparison to adolescents and adults, children were slower at all levels of similarity. This suggests that target-distractor similarity differentially affects visual performance across development, likely due to differences in the development of top-down and bottom-up mechanisms.

62 - Perception of Feature Distributions Requires Focal Subselection

Dian Yu, Steve Haroz, Steven Franconeri

Our visual system rapidly extracts statistical summaries of features, such as sizes, orientations, and hues. We argue that these feature ensembles do not include information about the distributions of features across space, without secondary subselection of local areas. In Experiment 1, a global ensemble judgment led to center fixation, consistent with global selection, while a spatial judgment of that display generated saccades toward specific spatial areas. Experiment 2 provides independent evidence that judging spatial distributions requires a secondary subselection, by showing that this task requires far more time than global feature judgments.

63 - Distracted From Distraction: Multiple Distractors Improves Target Perception in RSVP

Jenna Zhao, Brad Wyble, Steven Most

Salient distractors can disrupt perception of subsequent targets during RSVP. But what if the distractors follow other salient distractors? In three experiments, participants searched RSVP streams of images for a rotated landscape target. Critical distractors were emotionally negative or neutral pictures. Trials with multiple distractors elicited better target perception than those with only one distractor, even when the separation between the critical distractor and the preceding ones was larger than the typical attentional blink window. This benefit only emerged when distractors in the trial were matched in emotional valence, suggesting against mere prepulse inhibition of critical distractors.

Memory

Thursday, November 17th, 12:00 - 2:15 pm Poster Session, Hynes Ballroom A-C, Hynes Convention Center

64 - **Unfamiliar Face Matching Has Profound Amnesia**Dina Acklin, Megan Papesh

Unfamiliar face matching is a notoriously difficult task. Less well-known is whether, or how much, individuals remember about faces encountered during matching tasks. Face-matching difficulty was manipulated using a temporally separated 8-face lineup, simultaneous 4- or 8-face lineup, or 2-face matching decision and subsequently testing face recognition memory. Easing face-matching difficulty had little effect on long-term memory performance (60% average hit rate). Assessing short-term memory revealed much higher rates of memory performance (93% hit rate). This suggests that faces can be maintained in short-term, but not long-term, memory.

65 - Infants Use an Agent's Object Representations to Overcome Their Own Working Memory Limits

Jessica Beal, Melissa Kibbe

Infants can hold three objects in working memory, but if that number is exceeded, infants fail to remember any of the objects. We investigated whether 12-month-old infants could recruit another agent's object representations to supplement their own when their memory limit was exceeded. We hid four objects from infants, but showed them that an agent knew about only two of them. Infants' behavior suggested that they used the agent's representation, and not their own, to track the objects. These results suggest that infants can use another's representations to prevent catastrophic memory failure.

66 - Learning to learn: Contextual Cueing is Enhanced by Prior Exposure to Regularities in Search Configurations Corey Beinhart, Timothy Vickery

Humans adeptly acquire and exploit knowledge about statistical regularities. For instance, repeated configurations of target and distractor items are searched faster compared to novel configurations ('contextual cueing'). In order to examine the dependence of cueing effects on prior experience, we developed a paradigm that allows for the continuous introduction of new search configurations, which repeat across eight subsequent blocks. We found that cueing effects grew over the course of the experiment, suggesting that past exposure to regularity in search configuration enhances regularity acquisition and/or expression. Exposure to search configuration statistical regularity benefits future sensitivity to such regularity.

67 - One Feature to Rule Them All: A Case for Location Being Special in Visual Working Memory

Alexander Burmester, Kartik Sreenivasan, Daryl Fougnie How are features bundled into objects in visual memory? Here we suggest that location acts as an organizing feature for objects in memory. We presented participants with five colored triangles and, after a delay, either the location or color of one object was probed and observers responded by indicating the values of the other two features. We found evidence that location was special. There was an asymmetric dependency between an item's location and the other feature; poor performance on location predicted poor performance on orientation, but not vice-versa. In contrast, color and orientation information were lost independently.

68 - Object Representations Influence Visual Short-Term Memory

Breana Carter, Joseph Nah, Sarah Shomstein

Mounting evidence suggests that visual attention and VSTM are interrelated, and similarly engage the attentional control network. These similarities lead to a hypothesis that both systems may operate under similar constraints. We investigate whether VSTM, like attention, is constrained by object representations. We observed that precision of memory of a stimulus is jeopardized if it shares an object with other stimuli. Low-capacity individuals require salient objects for object representations to constrain attention, while high-capacity individuals benefit from objects independent of salience. Our results suggest that objects flexibly influence VSTM, and object boundaries affect the quality of maintained information.

69 - The Mirror Effect Within Perception: Not Another **Recognition Memory Study**

Adriana Chávez De la Peña

In Recognition Memory studies where Signal Detection Theory has been applied to describe subjects' performance, a pattern known as the Mirror Effect has shown that when comparing subjects' responses between classes of stimuli that are differentially recognized, this difference appears for the identification of both targets and lure stimuli (hits and false alarms). The extensiveness of this pattern to other areas has not been explored yet. We present evidence of the Mirror Effect outside recognition memory, in a detection task involving perception only, where two conditions of discriminability were built upon what is known about optical illusions.

70 - Seeing Double: No Cost for Face Familiarity in **Duplicate Image Detection**

James Dunn, David White, Richard Kemp

Current theory proposes that familiarity improves face identification through incremental refinement of memory representations. Representations enable face recognition despite substantial variation in appearance across different images of an individual's face. We asked whether perceptual encoding of superficial image information differs for familiar and unfamiliar faces. We found no differences in between unfamiliar and familiar faces across three different paradigms testing image memory. Contrary to a recent report, familiar face representations do not appear to affect the encoding of idiosyncratic image properties but rather, this information is retained in memory despite being unnecessary for face

71 - Can an Accessory Feature be a Trigger to the **Attentional Boost Effect?**

Keiji Konishi, Erika Kumakura, Kazuhiko Yokosawa Recent studies (Jiang & Swallow, 2014) reported that transient increases in attention to one task can boost performance in a subsequent encoding task. Although this boost effect appears to be triggered by target detection, other factors may be involved. To examine whether an accessory feature, unrelated to target detection, may cause this boost effect, we conducted a dual-task procedure in which accessory tone's volume varied. Results revealed that salient tones also boost memory for information currently presented. This confirms that the attended stimulus itself may be related to mechanisms underlying the boost effect.

72 - Investigating Visual Short-Term Memory With the Help of Eye-Tracking Technology

Polina Krivykh, Galina Menshikova

The aim of our study was to reveal eye movement characteristics when 1) memorizing a set of images; 2) recognizing them among other images. In session 1 the participants were shown a short comic strip (15 pictures, each for 5000 ms) and asked to learn them. In session 2 they were shown a set of the same 15 images with 5 unfamiliar but related story images added. The participants were asked to recognize the images they learnt. During both sessions eye movements were recorded. Our results indicate that eye movement characteristics may be considered as reliable indicators of learning processes.

73 - All Targets Are Not Created Equal: Some Targets Are Often Missed in Hybrid Visual Search Tasks

Jessica Madrid, Hayward Godwin, Corbin Cunningham, Arryn Robbins, Michael Hout

Hybrid visual memory search involves searching for a large number of targets at once. Previous work has assumed that during such searches, all targets are found (and missed) in equal proportion. Here, participants memorized 30 target pictures from either two categories or from 30 distinct categories. When searching for a large number of distinct targets, participants were more likely to miss some targets altogether, relative to when they were searching categorically. These findings suggest that it is unsafe to assume that all targets are safely encoded into memory during hybrid search. In fact, some may be forgotten entirely.

74 - The Impact of Military Service on Romantic **Relationship Quality**

Dakota McNamara, Ashley Scolaro

The goal of the current study was to examine the ways in which military service impacts romantic relationship quality in men and women. Participants completed the Couple Satisfaction Index (Funk & Rogge, 2007) and other surveys of their combat exposure, military service history, alcohol use and PTSD symptomology. The results revealed that predictors of relationship satisfaction are different for male and female military personnel with alcohol abuse being a higher predictor for men and PTSD symptoms a higher predictor for women. An exploratory analysis revealed that memory impairments were positively correlated with relationship satisfaction. Implications and future directions are discussed.

75 - Working Memory Capacity and Cognitive Filtering **Predict Demand Avoidance.**

Jeff Nador, Brad Minnery, Matt Sherwood, Randall F. Green, Assaf Harel, Ion Juvina

Contralateral Delayed Activity (CDA) provides a neural index of processing target objects and filtering out distractors in visual working memory (VWM) (Vogel et al., 2005). Generally, cognitive processes avoid demanding alternatives (Kool et al., 2010). We therefore hypothesize that relative demand of processing versus filtering objects explains individual differences in VWM capacity. We measured CDA and demand avoidance in a single sample of observers, using delayed match to sample and demand selection tasks, respectively. We find that demand avoidance is positively correlated with behaviorally measured working memory capacity, and that cognitive filtering ability predicts demand-induced reaction time increases.

76 - Precision Takes Time: Evidence for Retroactive **Dual-Task Interference in a Color Delayed-Estimation**

Rob Nijenkamp, Mark Nieuwenstein, Garrett Swan, Nico Broers

We examined whether the presence of a second task (T2) would interfere with the formation of a precise memory representation for a color, using a delayed-estimation task. The question was whether the precision of a memory representation increases with the amount of time that is available for processing, and whether the precision of the memory trace can be disrupted after a mask. Our results show that T2 interrupts the consolidation of the precision of a memory trace at shorter processing times, even after masking. This suggests that masking a stimulus does not fully interrupt consolidation, but merely decreases precision.

77 - Temporal Structure Learning Facilitates Inductive Generalization

Athula Pudhiyidath, Katherine Sherrill, Anna Schapiro, Alison Preston

Though events in our lives unfold in a continuous stream, we perceive them as discrete events by implicitly segmenting them based on temporal proximity. Events experienced closer together in time come to be represented more similarly in psychological and neural terms relative to those experienced across longer delays. Here, we asked whether representation of temporal communities influences cognitive behaviors such as inductive inference. Participants learned a temporal sequence of novel objects and were then asked to make inductive generalizations about an object's habitat. We found that participants used community structure knowledge to infer relationships unrelated to the structure itself.

78 - Reconsidering the Focus of Attention: Cued Items **Contain More Information But Are Not More Accessible**

Myriam Sbeiti, Timothy Brady, Daryl Fougnie

The focus of attention is the state in working memory in which items are assumed to be directly accessible. Here we explored whether items in the focus of attention are always successfully retrieved. Participants were given two chances to report an item's color from memory. The second report is meaningful only if information is not fully retrieved from memory during the first response. Performance was above chance in the second report, even when the tested item was cued. Our findings suggest that retrieval failures can occur even for items in the focus of attention.

79 - First Impressions in Visual Long-Term Memory

Mark Schurgin, Jonathan Flombaum

Objects seen twice are remembered better than objects seen once, but little is known about how multiple encounters with the same object are integrated in long-term memory. We investigated how temporal spacing and quality of each encounter support integration. We did this by varying the number of intervening items between encounters with a single object, and by injecting varying degrees of noise during repeated presentations. Memory was better when spacing between encounters increased, and when less noise was present during an initial encounter (compared to less noise during a second encounter), providing a high-quality basis for later integration.

80 - Visual Encoding Limits Appear as Capacity in Change Detection

Rakesh Sengupta, Sang-ah Yoo, Calden Wloka, Toni Kunic, John Tsotsos

We implemented a visual working memory module for the cognitive programs architecture of Tsotsos et al. (2014). Working memory is a neural network parallel to and physically yoked to the visual processing network, and the limited capacity of working memory during change detection tasks consequently arises as a result of representational interference due to overlapping visual receptive fields which creates interference in the detection and subsequent maintenance of these representations. Therefore, manipulating the display sizes should lead to changes in capacity. A series of behavioral experiments show that visual working memory capacity increases with display size, supporting our prediction.

81- Geometric Category Errors in Locating 3-Dimensional Objects in a Virtual Space

Michael Williams, Chase Walsh, Ryan Chiu, Sabrina Menezes, Cristina Sampaio

Location memory is known to be a compromise between the metric coding of a target position and the general coding of its region, an effect called the category bias. The bias has been robustly found with simple 2-dimensional geometric spaces (Huttenlocher, Hedges, & Duncan, 1991), and our work investigated the category bias in a 3-dimensional virtual environment. Participants completed a 3-D object localization task on a virtual circular table. The data showed that the bias typically found with remembering locations of dots in simple 2-D spaces generalizes remembering locations of 3-D virtual objects.

82 - Implicit Learning Interacts With Hemifield Independence in Visual Working Memory

Bo Yeong Won, Andrew Leber

Visual working memory has a limited capacity, so it is essential to use it efficiently. Previous studies have shown that implicit learning modulates working memory to prioritize relevant information. However, working memory is also restricted anatomically, within left/right visual hemifields (such that each hemifield has its own independent capacity). In this study, we tested how implicit learning interacts with hemifield. Two experiments showed implicit learning dynamically prioritizes working memory allocation to items based on their relevance, but only within hemifield, not across. These findings show that implicit learning modulates visual working memory, but under the restriction of hemifield independence.

83 - Lasting Inhibition: Mapping the Time Course of Response Inhibition With Big Data

Rachel Wynn, Stephen Mitroff

Response inhibition—withholding a planned action—negatively influences behavior on subsequent trials making performance slower and less accurate. To examine the mechanisms of this inhibition effect, the current study used "big data" from the mobile app Airport Scanner to evaluate time course questions. A prolonged negative effect on performance was observed during stimulus repetitions (inhibited item and later target were identical), consistent with a memory association account. A brief negative effect was observed during stimulus switches, consistent with adjustments in control settings. The results suggest memory associations and control settings influence behavior following response inhibition, but on different time scales.

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