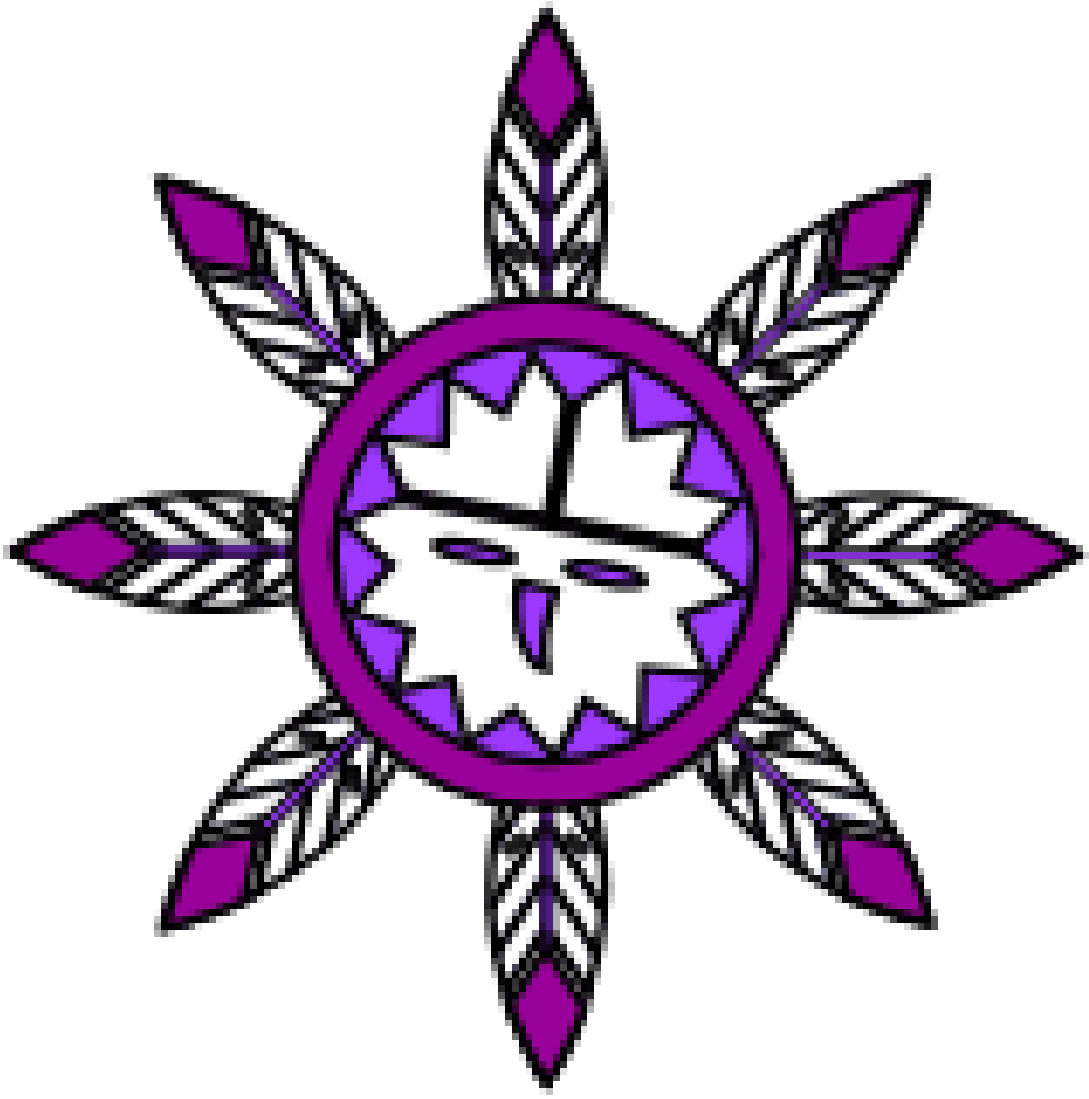

Tenth Annual Meeting of the Cognitive Science Association for Interdisciplinary Learning

July 22–26, 2004
Hood River Hotel
Hood River, Oregon

Cognitive Science Association for Interdisciplinary Learning

July 22–26, 2004
Hood River Hotel
Hood River, Oregon

PROGRAM

July 22 Evening

5:00 Appetizers

5:40 Opening Remarks, and Bill's Tips by Bill Prinzmetal

— TALKS —

6:00-6:15
Roberto Dell'Acqua, Pierre Jolicœur, Francesco Vespignani, & Paolo Toffanin, Department of Psychology, University of Padova, Italy

Central processing overlap modulates the P3

SYMPOSIUM ON ATTENTION AND EXPERTISE IN SENSORYMOTOR SKILLS

6:15-6:30
Thomas H. Carr, Department of Psychology, Michigan State University

"Being like Mike" as a function of expertise: Showtime versus practice, red hot versus choking under pressure, in the zone versus totally focused, attending to performance input and output versus performance execution

6:30-7:10
Gabriele Wulf, Department of Kinesiology, University of Nevada, Las Vegas

Attentional focus and expertise

7:20 Adjourn

July 23 Morning

8:30 Morning Refreshments

SYMPOSIUM ON ATTENTION AND EXPERTISE IN SENSORYMOTOR SKILLS

— TALKS —

9:00-9:40
Rob Gray, Department of Applied Psychology, Arizona State University East

Attention, perception, and skill execution in baseball batting

9:40-10:20
Sian L. Beilock, Department of Psychology, Miami University of Ohio

Expertise, attention, and the speed-accuracy trade-off in sensorimotor skills

10:30 Break till 5:00

July 23 Evening

4:45 Appetizers

— POSTERS —

Andrew W. McCollough & Edward K. Vogel, Department of Psychology, University of Oregon

Appending new representations into visual working memory

— TALKS —

5:30-6:10
Edward K. Vogel, Maro G. Machizawa, & Andrew W. McCollough, Department of Psychology, University of Oregon

Memory capacity and the efficiency of attentional control over access to visual short-term memory

6:10-6:50
Pierre Jolicoeur, Benoit Brisson, Catherine Ouimet, Nicolas Robitaille, Emilie Leblanc, & Biljana Stevanovski, Département de Psychologie, Université de Montréal

Modulations of N2pc by concurrent central processing

6:50-7:30
Shlomo Bentin, Yulia Golland, Ani Flevaris, Lynn C. Robertson, & Morris Moscovitch, Department of Psychology, Hebrew University of Jerusalem

Processing trees before the forest during initial stages of face perception: Electrophysiological evidence

7:30 Adjourn

July 24 Morning

8:30 Morning Refreshments

— TALKS —

9:00-9:40
Catherine M. Arrington & Gordon D. Logan, Department of Psychology, Vanderbilt University

Voluntary task switching: Chasing the clever homunculus

9:40-10:20
Edward Awh, Kristin Williamson, & Andrew Culberson, Department of Psychology, University of Oregon

Experience-dependent deficits in visual selective attention

10:20-11:00
Michael Esterman, Joseph DeGutis, Eliot Hazeltine, & William Prinzmetal, Department of Psychology, University of California, Berkeley

Facing differences between voluntary and involuntary attention

11:00 Break till 4:45

July 24 Evening

4:45 Appetizers

— POSTERS —

Jennifer E. Corbett & James T. Enns, Department of Psychology, University of British Columbia

Proprioceptive roll and pitch interact in contributing to visual tilt-induced effects

Steven Macramalla & Bruce Bridgeman, Department of Psychology, University of California, Santa Cruz

Motor interference of mental egocentric orientation

— TALKS —

5:30-6:10
D. Stephen Lindsay & Larry L. Jacoby, Department of Psychology, University of Victoria

Exploring the item-specific proportion-congruent stroop modulation effect

6:10-6:50
Alex Stevens, Department of Behavioral Neuroscience, Oregon Health Sciences University

Neural correlates of disrupting auditory perceptual consolidation

6:50-7:30
Amy Lynne Shelton, Department of Psychology, Johns Hopkins University

Using neuroimaging to investigate individual differences

7:30 Adjourn

July 25 Morning

8:30 Morning Refreshments

— TALKS —

9:00-9:40
Robert B. Post, Department of Psychology, University of California, Davis

Inverted vision-action dissociation with induced motion

9:40-10:20
Edward H. Cornell, Elena Nicoladis, & Melissa Gates, Department of Psychology, University of Alberta

Preschool children's response to *where...?*

10:20-11:00
Andrew P. Yonelinas & Neal E.A. Kroll, Department of Psychology, University of California, Davis

What ROCs tell us about recognition memory (no, actually, this is quite interesting!)

11:00 Break till 5:00

July 25 Evening

4:45

— POSTERS —

Diane E. Marian & Arthur P. Shimamura, Department of Psychology, University of California, Berkeley

Effects of emotional facial expressions on memory for faces and associated expressions

Erin K. Gibson, David P. Corina, Richard Martin, Andrew Poliakov, James Brinkley, George A. Ojemann , University of Washington

Action and object naming may rely on punctate regions in temporal and frontal cortices.

— TALKS —

5:20-6:00
Marci A. Flanery, Department of Psychology and Brain Sciences, Johns Hopkins University

Explicit category learning and transfer: Effects of task and experience

6:00-6:40
Michael K. McBeath, Thomas G. Sugar, & Dennis M. Shaffer, Department of Psychology, Arizona State University

Catching things that change direction: Frisbees and bouncing grounders

6:40 Adjourn

7:00 Banquet

July 26 Morning

8:30 Morning Refreshments

— **TALKS** —

9:00-9:40
Mark Stewart, Department of Psychology, Willamette University

Photism congruency and false recognition in grapheme-color synesthesia

9:40-10:20
Thomas Van Vleet, Department of Psychology, University of California, Berkeley and Veterans Affairs, Martinez

Alerting the attentional blink

10:20 Closing remarks

10:30 Adjourn for the year

ABSTRACTS

Alphabetical by first author

Catherine M. Arrington & Gordon D. Logan
Department of Psychology, Vanderbilt University

Voluntary task switching: Chasing the clever homunculus

Task switching paradigms are widely used to study executive control. However, standard paradigms may not require active control to switch tasks. We developed a new voluntary task switching procedure, in which subjects choose which task to perform on each trial. Subjects performed parity or magnitude judgments on single digits. Instructions were to perform each task equally often and in a random order. RTs were longer on switch trials than repetition trials. Subjects showed a repetition bias, producing more task repetitions than would be expected based on a random sequence of tasks. Both RT switch cost and repetition bias reduced as the time interval between trials increased. In direct comparison to a standard explicit task cueing procedure, voluntary switches resulted in smaller switch costs. By requiring subjects to actively choose a task, the voluntary switching procedure may provide a measure of the elusive homunculus that other switching procedures miss.

Edward Awh, Kristin Williamson, & Andrew Culberson
Department of Psychology, University of Oregon

Experience-dependent deficits in visual selective attention

Previous research has shown that prior sensory experiences can influence the functional properties of visual selective attention. For example, studies of congenitally blind subjects have indicated more sharply focused selection gradients for auditory targets in the peripheral regions of space (Roder et al, 1999). In addition, training with a visually challenging video game has been shown to influence the efficiency of attentional processing in several different paradigms (Green & Bavelier, 2003). In the present research, monolingual English speakers showed a marked deficit in their ability to discriminate targets amongst distractors in the upper left visual field. There was no trace of this deficit when an equally difficult discrimination task was performed in the absence of distractor interference, suggesting that the problem relates specifically to the suppression of interference from irrelevant objects. Two further results suggest that this suppression deficit is causally related to the prior language experience of the subjects. First, a separate sample of subjects with a non-English first language (mostly Japanese and Chinese speakers) showed no trace of this deficit. Second, neither group of subjects showed this deficit when the distractors were non-linguistic objects. The results will be discussed in terms of how experience can shape visual selection, and why we now need funding to go to Japan, Russia and perhaps some control island in the Caribbean.

Sian L. Beilock
Department of Psychology, Miami University of Ohio

Expertise, attention, and the speed-accuracy trade-off in sensorimotor skills

We manipulated the deployment of attentional resources during on-line golf putting in an attempt to shed light on differences in the control structures governing novice and expert sensorimotor skill execution. Novice and expert golfers took a series of golf putts using either a regular or "funny putter" (consisting of an s-shaped and arbitrarily weighted putter shaft) under instructions that emphasized either putting accuracy, with unlimited time to prepare and execute each putt, or speed, with a time deadline that had to be met on each putt. Speed instructions were intended to reduce the time available to monitor and explicitly adjust execution parameters relative to the time available under accuracy instructions. Novices putted better under accuracy instructions, regardless of type of putter used. Experts using the "funny putter," designed to disrupt automated procedures and force attention to step-by-step execution, benefited from longer execution times as well. In contrast, experts using the regular putter performed better under speed instructions. Consistent with theories of skill acquisition and automaticity, novice performance was enhanced by conditions that allow for on-line attentional monitoring (i.e., accuracy instructions) in comparison to environments that prevent explicit attentional control of skill execution (i.e., speed constraints). In contrast, the proceduralized skill of experts — as long as not disrupted by novel task constraints — benefitted from environments that limited attention to execution rather than encouraging it.

Shlomo Bentin, Yulia Golland, Ani Flevaris, Lynn C. Robertson, & Morris Moscovitch
Department of Psychology, Hebrew University of Jerusalem

Processing trees before the forest during initial stages of face perception: Electrophysiological evidence

Although configural processing is considered a hallmark of normal face perception in humans, there is ample evidence that processing face components also contribute to face recognition and play an important role in face identification and personalization. Indeed, most contemporary models posit a dual-code view according to which face recognition relies on the extraction of featural codes, that is, local analysis of individual face components, as well as on the extraction of configural codes, that is, the computation of the spatial relations among the face components. In the present study we explored the time-course of processing configural and local component information by recording the N170 — an ERP component that manifests early perception of physiognomic information. In contrast to the robust N170 effect observed comparing ERPs elicited by schematic faces and line-drawn schematic objects, no N170 effect was found in response to schematic faces when a pair of small meaningful objects substituted for the usually meaningless schematic eyes. However, if a pair of two little faces substituted for the schematic eyes the N170 effect was evident. This pattern suggests that, the (local) analysis of the "eyes" preceded the perception of the global face configuration. Further, we found that if faces with object eyes are presented among regular objects in a mixed block, an N170 effect is evident. We hypothesized that this effect was induced by the imposed implicit categorization, which alerted the perceiver about the global face configuration. In support of this top-down effect, we found that priming the face context by presenting first a block of regular schematic faces reinstalled the N170 effect in response to faces with objects eyes presented in a pure block.

Thomas H. Carr
Department of Psychology, Michigan State University

"Being like Mike" as a function of expertise: Showtime versus practice, red hot versus choking under pressure, in the zone versus totally focused, attending to performance input and output versus performance execution

Considerable progress has been made in the last few years on a long-standing problem: the role of attention in expert performance of well-practiced skills. If you are a student of "attention and automaticity," you may believe this problem is already solved: increases in expertise result from practice, and practice reduces or even eliminates the need for attention in controlling performance. If you are a student of "expertise," you may also believe this problem is solved: increases in expertise result from knowledge about the task domain and what to attend to within it, this knowledge is gained from practice, and experts have learned during their extensive practice to focus attention very tightly on just the right information needed to execute their skill. If your reaction is that these two views might end up contradicting one another in their predictions and hence being hard to fit together, you are right. This symposium provides both new research on performance at different levels of expertise, and a possible reconciliation and synthesis between the "attention and automaticity" approach and the "expertise, knowledge acquisition, and education of attention" approach to learning.

Jennifer E. Corbett & James T. Enns
Department of Psychology, University of British Columbia

Proprioceptive roll and pitch interact in contributing to visual tilt-induced effects

Perceptual judgments of "horizontal" are influenced by both visual context (tilt-induced effects) and proprioceptive context (tilt-induced effects increase if proprioceptive cues for gravitational upright are disturbed), causing real world phenomena such as "magnetic hills" and "mystery spots." Roll (rotation about the horizon) and pitch (rotation about the line of sight) of the visual environment independently contribute to tilt-induced illusions (Nelson & Prinzmetal, 2002). The present study examined the contributions of roll and pitch of the observer to tilt-induced effects. Observers peered inside a box and adjusted a rod to horizontal with respect to gravity. Tilting the box resulted in standard tilt-induced effects (Asch & Witkin, 1948; Witkin & Asch 1948; Prinzmetal & Beck, 2001). However, rolling the observer enhanced the illusion whereas pitching the observer reduced the illusion. We are now exploring how these visual-proprioceptive interactions are modulated when the observer must actively maintain an upright posture.

Edward H. Cornell, Elena Nicoladis, & Melissa Gates
Department of Psychology, University of Alberta

Preschool children's response to *where...?*

We describe the development of the human ability to communicate location. Three groups of toddlers ranging from 30 to 58 mo were asked where rooms were in their homes. Although they could not see the target rooms, the children communicated their knowledge effectively by pointing directly through walls, by pointing to routes to walk to the rooms and by simple verbalizations. Pointing directly to the absolute locations of same-floor rooms, rather than routes to these rooms, increased with age; however, pointing directly to rooms was less frequent if the target rooms were on other floors. This result is consistent with the analysis that pointing across elevations is difficult because it requires an integration of azimuthal bearing and elevation. We also found that the frequency of uttering "there" increased with age, suggesting that children are associating pointing with linguistic conventions for showing (deictics), even though the target rooms were out-of-sight. Their verbalizations were more likely to include prepositions if the target room was on another floor. The latter result indicated that children were sensitive to the difficulties of pointing and attempted spatial referents when travel involved changing elevation.

Roberto Dell'Acqua, Pierre Jolicœur, Francesco Vespignani, & Paolo Toffanin
Department of Psychology, University of Padova, Italy

Central processing overlap modulates the P3

Using a psychological refractory period (PRP) paradigm, two sequential stimuli (T1 and T2) were presented on each trial at varying stimulus onset asynchronies (SOAs), and each was associated with a speeded choice response. Response times in Task 2 increased as SOA decreased, reflecting the expected PRP effect. A systematic investigation of the T2-locked P3 component amplitude and latency was undertaken in order to discover whether either of these P3 parameters was correlated with the PRP effect. One of the two response categories in Task 2 was more frequent than the other and this was used to elicit a frequency-related P3 (henceforth denoted $P3_{fr}$) ERP component by subtracting the waveform in the frequent condition from the waveform in the infrequent condition. The results showed lengthening of the T2-locked frequency-related $P3_{fr}$ component latency as SOA was decreased, and, across subjects, a positive correlation between the PRP effect and $P3_{fr}$ latency lengthening. No SOA-dependent $P3_{fr}$ amplitude variation was observed. Interestingly, a large proportion of the subjects had very small frequency-related $P3_{fr}$ responses. In Experiment 2, the stimuli in Experiment 1 were used but subjects performed only Task 2 (while ignoring the sounds that had been stimuli in Task 1 in Experiment 1). All but one subject produced a substantial frequency-related $P3_{fr}$ under single-task conditions. The combined results from the two experiments suggest that there are substantial dual-task costs revealed either in terms of the amplitude or the latency of the frequency-related $P3_{fr}$ response. The results suggest that part of the processing reflected in $P3_{fr}$ activity occurs at or after the locus of the PRP effect.

Michael Esterman, Joseph DeGutis, Eliot Hazeltine, & William Prinzmetal
Department of Psychology, University of California, Berkeley

Facing differences between voluntary and involuntary attention

Behavioral evidence suggests differences between voluntary (endogenous) and involuntary (exogenous) spatial attention. Using fMRI, we sought to dissociate the neural correlates of these processes. Subjects performed a face recognition task. We manipulated involuntary attention by preceding the target face with a spatial cue (box brightening) that was uncorrelated with the subsequent target position. For voluntary attention, we used identical spatial cues, but the stimulus appeared in the cued location on 75% of the trials (valid trials) and in the uncued location on 25% of the trials (invalid trials). The stimulus parameters were identical for voluntary and involuntary attention experiments, only the proportion of valid and invalid trails differed. As in previous studies, we found a behavioral dissociation between voluntary and involuntary attention: both affected RT, but only voluntary attention affected accuracy. The fusiform face area (FFA) was more active when target faces were preceded by predictive cues (voluntary attention) than nonpredictive cues (involuntary attention), suggesting that the FFA is more strongly modulated by voluntary attention. In the inferior parietal lobe (IPL), there was generally greater activity in the invalid than valid trials for both voluntary and involuntary attention. However, within the IPL, there were qualitative differences in the locus of maximum activation for voluntary and involuntary attention. In summary, we demonstrated partially dissociable neural mechanisms that underlie the behavioral dissociation between voluntary and involuntary attention.

Marci A. Flanery
Department of Psychology and Brain Sciences, Johns Hopkins University

Explicit category learning and transfer: Effects of task and experience

How do humans acquire and apply perceptual category knowledge? Historically, models of categorization based on single-categorization systems have been used to understand patterns of behavioral data. However, recent evidence from mathematical modeling of behavioral data as well as behavioral results from tests of neuropsychological populations appear to support hybrid or multiple-system categorization models. We sought to use fMRI as a source of converging evidence with respect to this debate. In a series of studies we manipulated the underlying category feedback structure (deterministic versus probabilistic), the category learning condition (explicit instruction versus explicit exposure), and the subject's level of experience with the stimulus set (early versus late learning). Analysis revealed both a core network of regions active across all tasks and separate neural regions differentially responsive to manipulations of task and experience even when experimental conditions were equated on measures of behavioral performance.

Erin K. Gibson, David P. Corina, Richard Martin, Andrew Poliakov, James Brinkley, George A. Ojemann
University of Washington

Action and object naming may rely on punctate regions in temporal and frontal cortices.

Lesion and neuroimaging studies have suggested a dissociation between action and object retrieval and production (Martin, 2003). We compared language-dominant temporal and frontal cortex activation patterns during lexical production of actions and objects in covert naming using functional magnetic resonance imaging (fMRI) in normal adult participants (n = 4; 2M/2F; mean age=25). Participants viewed 224, 2-second videotaped vignettes of humans performing transitive actions upon concrete objects and covertly named either the action or the object when prompted. Activation in left frontal operculum (OpIFG) and left supramarginal gyrus (SMG) was compared in action- and object-naming conditions. We found increased activation in OpIFG and SMG in action-naming condition in 2 participants. These preliminary findings support the hypothesis that although there is variation in localization of lexical retrieval and production across individuals, action- and object-naming at the individual level may rely on punctate regions in temporal and frontal cortices.

Rob Gray
Department of Applied Psychology, Arizona State University East

Attention, perception, and skill execution in baseball batting

Ted Williams once said: "hitting a baseball is the single most difficult thing to do in sport." We have investigated this challenging behavior using a virtual-reality baseball batting setup in which realistic 3D simulations of an approaching ball, pitcher, and field are combined with real-time recording of bat and limb movements. Comparisons between expert batters (college baseball players) and novice batters have revealed that: (i) experts utilize a wider range of perceptual information sources including the pitch count and pitch sequence, the direction of ball rotation, and the arm speed of the simulated pitcher, (ii) experts have sufficient available attentional resources to attend to information extraneous to the act of hitting whereas novices do not, and (iii) experts show increased movement variability and decreased batting success when attending to skill execution. Within expert batters, changes in the focus of attention also appear to be strongly related to "choking" under pressure and performance slumps. Implications for theories of skill acquisition will be discussed.

Pierre Jolicoeur, Benoit Brisson, Catherine Ouimet, Nicolas Robitaille, Emilie Leblanc, & Biljana Stevanovski
Département de Psychologie, Université de Montréal

Modulations of N2pc by concurrent central processing

N2pc, an electrophysiological indicator of the moment-to-moment locus of visuo-spatial attention, was used to monitor the deployment of visual attention in simple visual search displays presented while subjects were also engaged in a concurrent central task. In several different paradigms, N2pc was significantly attenuated by concurrent central processing. The results suggest that the control of spatial attention has some overlap with mechanisms involved in the control of central attentional processes such as response selection and short-term consolidation.

D. Stephen Lindsay & Larry L. Jacoby
Department of Psychology, University of Victoria

Exploring the item-specific proportion-congruent stroop modulation effect

Jacoby, Lindsay, and Hessels (2003, PB&R) reported Stroop experiments in which some color-name words were usually presented in their congruent colours (e.g., RED usually in red, only occasionally in green) whereas other color-name words were usually presented in their incongruent colours (e.g., BLUE usually in yellow, only occasionally in blue). Items were randomly intermixed. Stroop effects were smaller for mostly-incongruent (MI) items than for mostly-congruent (MC) items. I will report some follow-up experiments, with results that suggest that this item-specific proportion-congruent Stroop modulation effect is partly due to associative learning (i.e., people learn to say "yellow" to BLUE) but that an inhibition mechanism (i.e., reduced influence of word-reading on MI items) also plays a role.

Steven Macramalla & Bruce Bridgeman
Department of Psychology, University of California, Santa Cruz

Motor interference of mental egocentric orientation

A growing body of literature suggests that higher cognitive processes recruit basic motor functions. If so, then errors in mental simulation may be biased in the direction of isomorphic motor activity. In Experiment 1, 19 participants were required to mentally change orientation, at one of three levels of difficulty, in an imaginary room while physically rotating. Errors in the direction of the physical rotation occurred more frequently, $p = .089$. In Experiment 2, we controlled visual input by having participants rotate with eyes open, closed, and while wearing a box on their head. Trends suggested that decreasing the amount of visual input diminished the bias in errors. In Experiment 3, we found that switching mental rotations within a trial reversed the effect, so that responses undershot the correct answer in the direction opposite the physical rotation. In sum, looking for bias of motor activity in mental simulation requires that the motor action and the simulation share the same act, plane and axis while mental task-switching being minimized.

Diane E. Marian & Arthur P. Shimamura
Department of Psychology, University of California, Berkeley

Effects of emotional facial expressions on memory for faces and associated expressions

Past research has suggested that memory is better for faces with happy expressions compared to faces with other emotional expressions. However, it is unclear whether this happy face advantage extends to memory for the face itself or is limited to memory for the emotional expression. Our results indicate that the memory benefit does extend to recognition of the face, however the effect is not as robust as memory for the associated emotional expression. Furthermore, our findings suggest that recognition memory is reduced for angry faces compared with other facial expressions - a reduction not evident when testing recall for emotional expressions. Finally, the effects of emotional facial expression on later memory appear to be automatic, consistent with other studies demonstrating that detection of facial expressions is an automatic process.

Michael K. McBeath, Thomas G. Sugar, & Dennis M. Shaffer
Department of Psychology, Arizona State University

Catching things that change direction: Frisbees and bouncing grounders

People, animals, and robots appear to utilize several simple control heuristics to navigate to intercept moving targets like balls. Past findings support that pursuers select routes that keep the image of the ball moving along a straight path (LOT = Linear Optical Trajectory) at a constant rate (OAC = Optical Acceleration Cancellation). Here we review past work in which target objects move along simple deterministic paths, and then discuss applicability of the same control principles to more complex target paths such as curving Frisbees and bouncing balls. In these cases the pursuer appears to initiate the same control mechanisms, and then simply readjust to establish a new LOT and OAC when the original parameters becomes too difficult to maintain. The findings support a viewer-based Universal Fielder Model of navigation that generalizes to interception of both air and ground based targets, and can adapt to targets with more complex motion patterns.

Andrew W. McCollough & Edward K. Vogel
Department of Psychology, University of Oregon

Appending new representations into visual working memory

The small storage capacity of visual working memory (VWM) necessitates that the current contents of memory be continuously updated to follow changes in the environment and the individuals present task goals. One important aspect of the updating process is the ability to append new items into memory while still maintaining old representations. Here, we recorded ERPs while subjects performed a VWM task in which they needed to append a new set of items to an existing set of items in memory. Specifically, subjects were presented a bilateral array of colored squares and were asked to remember the objects in one hemifield. Shortly following the first memory array, a second memory array of squares was presented in the same hemifield. One second later, a test array was presented containing both the first and second arrays simultaneously and subjects reported whether the test array and memory arrays were identical. Both the behavioral and electrophysiological results indicated that subjects were highly successful at appending new items into VWM. Moreover, the pattern of ERP activity suggests that under the present circumstances the appending process is perfectly additive, such that adding new representations does not overwrite or lower the resolution of previously existing representations.

Robert B. Post
Department of Psychology, University of California, Davis

Inverted vision-action dissociation with induced motion

In vision-action dissociation, visual illusions influence motor responses directed toward the illusory stimulus less than might be predicted from the size of the illusion. One example is induced motion, wherein a dot appears to move opposite the real motion of a surrounding stimulus. Open loop pointing directed at the apparent endpoint of the dot's motion is displaced in the direction of seen motion less than would be predicted from the perceived velocity and duration of motion. I used both open loop pointing and a vernier alignment task to measure the apparent seen location of a dot following induced motion. Pointing was biased in the direction of the previously seen induced motion. However, there was no effect of induced motion on the vernier task. This pattern is the inverse of that typically reported with vision-action dissociation, as the illusion's influence was greater on the motor task than on the perceptual task.

Amy Lynne Shelton
Department of Psychology, Johns Hopkins University

Using neuroimaging to investigate individual differences

Cognitive science has a long history of examining both similarities and differences in cognitive processes among individuals. Functional neuroimaging work has largely focused on group commonalities to map functional processes to the underlying brain structures, but it may also provide a powerful tool for examining differences. We have adopted two different approaches to examining correlations between spatial skills and brain activation using fMRI. One approach correlates brain activation with performance during the task of interest, assessing how changes in behavior within and between individuals might map onto changes in brain function. The other approach correlates brain activation with external measures of spatial skills, independent of task performance during scanning to allow assessment of strategic differences that might support similar performance. Data from these two approaches will be presented, demonstrating how neuroimaging results may complement behavioral studies to enrich our understanding of sources of variability in human performance.

Alex Stevens
Department of Behavioral Neuroscience, Oregon Health Sciences University

Neural correlates of disrupting auditory perceptual consolidation

The formation of a stable percept capable of guiding behavior develops over a brief period of time that can be measured by varying the delay between the stimulus and the presentation of an effective mask. Previously we demonstrated that this period of "perceptual consolidation" for complex auditory stimuli is substantially shorter in congenitally blind individuals compared to sighted controls. Here we present a functional MRI study in which we identify the neural systems involved perceptual consolidation, which includes thalamic, striatal, temporal lobe and frontal lobe areas. An analysis of how the fMRI signal in these regions covary with subjects' performance at different mask onset delays suggests how these structures participate in the backward masking task and the early stages of auditory (echoic) memory.

Mark Stewart
Department of Psychology, Willamette University

Photism congruency and false recognition in grapheme-color synesthesia

In the most common form of synesthesia, grapheme-color, an individual reports perceiving a specific hue upon seeing a particular letter. For example, seeing the letter y may reliably evoke the percept (i.e., "photism") of red. Known to science for over 300 years, not until recently have investigators begun re-examining the condition in earnest, with the vast majority of these behavioral and neuroscientific efforts seeking to verify the perceptual basis of the phenomenon. As a result, considerably less empirical attention has been paid to exploring issues of potential interest to researchers in memory and language. I present data from experiments exploring the relationship between synesthesia and memory, in particular emphasizing the effects of photism congruency on recognition memory. Results show that synesthetes are more likely to falsely recognize lure words (domineer) whose base study words (dominoes) are congruently (vs. incongruently) colored, suggesting differential sensitivity to distinctive perceptual details encountered during study.

Thomas Van Vleet
Department of Psychology, University of California, Berkeley and Veterans Affairs, Martinez

Alerting the attentional blink

Hemispatial neglect has long been characterized as a deficit in attention to the side of space opposite a brain lesion. Recent studies indicate that patients with neglect also experience deficits in non-spatially lateralized attention. For example, Husain et al. (1997) demonstrated that patients with neglect exhibit a protracted visual attentional blink (AB) that extended to approximately 1440 ms after the presentation of an initial visual target stimuli (T1). Patients with neglect were impaired at detecting a subsequent visual target (T2) if it occurred within the so-called "blink" time window. Robertson et al. (1998) has shown that spatially non-specific phasic auditory alerting can improve visual attention to stimuli in the contralesional side of space in patients with neglect. The current study sought to contribute to the understanding of cross-modal interactions and phasic alerting in patients with neglect by examining the effect of an auditory alerting tone in a non-spatially lateralized visual attention task (AB). Patients with neglect and extinction were tested in a visual AB paradigm utilizing rapid serial visual presentation (RSVP) of letters at fixation. An irrelevant auditory alerting tone (1000 Hz, 300 ms) was presented at a fixed interval (100 ms) after T1 on 50% of trials in which T2 was present. The temporal location of T2 varied across 5 time lags and was present on 50% of trials. The results indicate that an auditory alerting tone improves detection of T2 within the blink time window and restores T1+1 sparing in neglect. These results indicate that the effects of phasic auditory alerting extend to non-spatially lateralized deficits in patients with neglect and provide direction for investigating therapeutic interventions.

Edward K. Vogel, Maro G. Machizawa, & Andrew W. McCollough
Department of Psychology, University of Oregon

Memory capacity and the efficiency of attentional control over access to visual short-term memory

The storage capacity of visual short-term memory (VSTM) for simple objects is known to be very small and to vary considerably across individuals. These individual differences in capacity have been proposed to be due to variability in memory storage space. However, it is also possible that much of the variability stems from the efficiency of attentional control mechanisms that restrict access to VSTM. Here, we presented subjects with arrays of objects and asked them to remember only a subset of the objects in the display so that we could measure how efficient each subject was at keeping distractors from being stored in VSTM. Using a neurophysiological index of the current number of objects in memory, we found that the efficiency of excluding distractors from VSTM is strongly predicted by an individual's memory capacity, with low memory capacity individuals maintaining more irrelevant items in VSTM than high capacity individuals.

Gabriele Wulf
Department of Kinesiology, University of Nevada, Las Vegas

Attentional focus and expertise

Several studies have demonstrated that the adoption of an external focus of attention (focus on movement effect) can enhance motor performance and learning, compared to an internal focus (body movements). In those studies, relatively complex motor tasks were used, and performers were typically inexperienced. In some more recent studies using balance tasks, we examined how the performer's level of expertise, or the relative task difficulty, interacts with attentional focus effects. The results suggest that a certain level of relative task difficulty is required for external focus benefits to emerge. Furthermore, the optimal (external) focus appears to change with the level of expertise, such that action control — and thus the optimal attentional focus — shifts to a higher hierarchical level.

Andrew P. Yonelinas & Neal E.A. Kroll
Department of Psychology, University of California, Davis

What ROCs tell us about recognition memory (no, actually, this is quite interesting!)

There is a rapidly growing body of research using receiver operating characteristics (ROCs) to examine the processes supporting recognition memory. Several regularities have now been established that place critical constraints on theories of human memory. We examine the current theories in light of these findings and argue that dual-process and possibly multi-process theories are necessary in order to account for the existing results.

Name	email address
Kate Arrington	kate.arrington@vanderbilt.edu
Ed Awh	awh@uoregon.edu
Sian Beilock	beilocsl@muohio.edu
Shlomo Bentin	bentin@socrates.berkeley.edu
Tom Carr	carrt@msu.edu
Jennifer Corbett	jecorbet@psych.ubc.ca
Ed Cornell	ecornell@ualberta.ca
Roberto Dell'Acqua	dar@unipd.it
Mike Esterman	esterman@berkeley.edu
Marci Flanery	flanery@jhu.edu
Anastasia Flevaris	ani@socrates.berkeley.edu
Erin Gibson	erkgibso@u.washington.edu
Rob Gray	robgray@asu.edu
Pierre Jolicoeur	pierre.jolicoeur@umontreal.ca
Steve Lindsay	slindsay@uvic.ca
Steven Macramalla	smacram@hotmail.com
Diane Marian	dmarian@socrates.berkeley.edu
Michael McBeath	m.m@asu.edu
Andrew McCollough	vogel@darkwing.uoregon.edu
Robert Post	rbpost@ucdavis.edu
Bill Prinzmetal	wprinz@socrates.berkeley.edu
Dell Rhodes	Dell.Rhodes@directory.Reed.EDU
Lynn Robertson	lynnrob@socrates.berkeley.edu
Amy lynne Shelton	ashelton@jhu.edu
Alex Stevens	stevenal@ohsu.edu
Mark Steward	mstewart@willamette.edu
Michael Sullivan	sullivan@ohsu.edu
Thomas van Vleet	vanvleet@berkeley.edu
Edward Vogel	vogel@darkwing.uoregon.edu
Gabriele Wulf	Gabriele.Wulf@ccmail.nevada.edu
Andy Yonelinas	apyonelinas@ucdavis.edu

Conference home page:
http://www.ohsu.edu/csail