Seventeenth Annual Meeting

Cognitive Science Association
for Interdisciplinary Learning

Hood River, Oregon
August 4 to August 8, 2011

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│   Cognitive Science Association for Interdisciplinary Learning│
│                August 4 to August 8, 2011                   │
│                     Hood River Hotel                        │
│                     Hood River Oregon                       │
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Seventeenth Annual
Cognitive Science Association for Interdisciplinary Learning
August 4 to August 8, 2011
Hood River Hotel
Hood River Oregon

See Breakfast Poster Titles at End of Schedule

Thursday, August 4

4:30 PM   **Reception & Appetizers**

4:45 PM   **Welcome And Introductory Remarks**

Presentations – 10 minutes
4:55-5:05 PM   Bill Prinzmetal, Ariel Rokem, & Michael A. Silver
What Stimulus Attributes are Enhanced by Attention?

5:05-5:15 PM   Ali Jannati & John J. McDonald
Investigating Salience-driven Attention Caption in Fixed Feature
Visual Search: Behavioural and ERP evidence

Talks – 30 minutes
5:20-5:50 PM   David E. Anderson & Edward Awh
Discrete Resource Limits in Visual Search

6:00-6:30 PM   Carly J. Leonard & Steven J. Luck
Tracking Changes in the Attentional Window with Visual Event
Related Potentials

6:40-7:10 PM   John J. McDonald, Jennifer A. Schneider, Christina M. Hull &
Steven A. Hillyard
Covert Spatial Orienting of Attention in Spatial and Nonspatial
Auditory Tasks

7:20 PM   **Adjourn For Evening**

Friday, August 5

8:30 AM   **Breakfast - Posters**

9:00-9:30 AM   Frederick J. Gallun & Anna Diedesch-Rouse
Distinguishing the Impacts of Peripheral and Central Auditory Dysfunction

9:40-10:10 AM   G. Christopher Stecker & Andrew D. Brown
Sensory weighting of sound-localization cues by human listeners

10:20-10:50 AM   Adrian KC Lee
Cortical Dynamics of Auditory Spatial Attention

11:00 AM   **Break until 4:15 PM**

4:15 PM   **Appetizers**

Presentations – 10 minutes
4:30-4:40 PM   Irida M. Mance, Mark W. Becker & Taosheng Liu
Parallel consolidation of simple features into visual short-term memory

4:40-4:50 PM   Jason Fischer & David Whitney
Visual perception is serially dependent

4:50-5:00 PM   Gerrit W. Maus and David Whitney
Visual Crowding is based on perceived positions

Talks – 30 minutes
5:05-5:35 PM   Jonathan G. Hakun & Timothy J. Pleskac
Cross-Modality Interaction and Dynamic Signal Detection in Working Memory

5:45-6:15 PM   Zachary Raymond Ernst & Geoffrey M. Boynton
Evidence for object-based attention: A study of divided attention within and between surfaces

6:25-6:55 PM   Edward F. Ester, Daniel Klee, & Edward Awh
Visual Crowding reflects a Misbinding -not an Averaging- of Features

7:05 PM   **Adjourn for Evening**

Saturday, August 6

8:30 AM **Breakfast - Posters**

9:00-9:30 AM Ashleigh May Chapman, Peter Graf & Todd C. Handy
The Brain's Response to Big and Small Surprises

9:40-10:10 AM John A. Dewey & Thomas H. Carr
Neural responses to expected and unexpected sensory action-effects: Dissociating self-agency from the predictability of the action-effect

10:20-10:50 AM Genevieve Quek & Matthew Finkbeiner
Pointing to the locus of attentional effects in subliminal priming

11:00 AM **Break until 4:15 PM**

4:15 PM **Appetizers**

Presentations – 10 minutes
4:30-4:40 PM Andrew W. McCollough, Trafton Drew, Edward K. Vogel
Perceptual Grouping during Multiple Object Tracking

4:40-4:50 PM Scott Reed, Andrew W. McCollough, & Edward K. Vogel
Neural Measures of Object Tracking are Modulated by Sensitivity to Motion Information

4:50-5:00 PM Benjamin D. Lester & Paul Dassonville
TMS reveals a right parietal role in processing visuospatial contextual information in a perceptual illusion

Talks – 30 minutes
5:05-5:35 PM Allison E. Connell Pensky, Valerie Morash, & Joshua A. Miele
Multiple fingers do more than expand haptic view

5:45-6:15 PM Kimberly Mae Halvorson & Eliot Hazeltine
Feedback rather than performance influences perceptual judgments

6:25-6:55 PM Arne Ekstrom, Hui Zhang, & Ksenia Zherderva
Survey and route learning differentially recruit view-dependent and holistic spatial representations

7:05 PM **Adjourn for Evening**

8:30 AM   **Breakfast - Posters**

9:00-9:30 AM   Monica A. Riordan & Roger J. Kreuz
Expressing Emotion Online: What We've Got Here is a Failure to Communicate

9:40-10:10 AM   Eve a. Isham, Joy J. Geng, Arne D. Ekstrom & William P. Banks
Fame & Fortune: External Information Guides Perception

10:20-10:50 AM   David Whitney, Jason Haberman, & Tom Harp
The desirability of groups

11:00 AM   **Break until 4:30 PM Rafters, be packed and ready to go with a sack lunch so you can be <u>at</u> Zoller's by 12:00 PM or sooner.**

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No appetizers on Banquet Night

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Talks – 30 minutes

4:45-5:15 PM   Kimberly A. Jameson, Natalia L. Komarova, Sean Tauber & Louis Narens
New results on simulated color categorization behaviors using realistic perceptual models, heterogeneous observers and pragmatic communication constraints

5:25-5:55 PM   Louis Narens
Putting Steven's Methods of Magnitude Estimation and Production on a Rigorous Measurement-Theoretic Foundation

6:05-6:35 PM   Dav Clark, Daniel Reinholz , Sarah Cohen, Benjamin Walklet & Michael Ranney
Overcoming climate change biases by teaching the "Goldilocks Asymmetry" of Energy Transfer Rates: A cognitive-strategy attempt to save us organisms

6:45 PM   **Adjourn**   **Banquet At Cornerstone Cuisine 7:15**

Monday, August 8

8:00 AM **Breakfast – Posters (Note earlier time for those need to catch a flight.)**

8:30-9:00 AM Christopher J. Smith, Jeremy M. Silverman & Arthur S. Reber
Normal implicit learning in an autism spectrum disorder population – but with diminished ability to transfer information to novel displays

9:10-9:40 AM Rolf Reber & Sascha Topolinski
The Phenomenology of Insights

9:50-10:20 AM Thomas H. Carr, Mura Dominko, John M. Dewey, & Andrew Schaad
Test-Enhanced Learning Across Domains: Text, Math, and Transfer

10:30 AM **Have a safe trip home.**
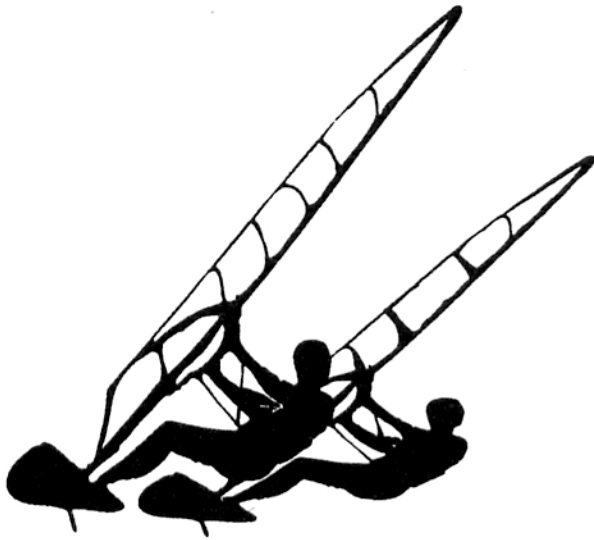
Roll on, Columbia
Woody Guthrie

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

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

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

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

Breakfast Posters

Santani Teng, Bryan Low, David Whitney, UC Berkeley
The auditory flash-drag effect: Distortion of auditory space by visual motion

A brief visual flash presented in the presence of visual motion is displaced in the direction of motion (Whitney and Cavanagh, 2000). Here we investigated whether visual motion also distorts auditory space. In a 2AFC method of constant stimuli task, observers judged the laterality of brief auditory bursts presented from a horizontal speaker array while viewing a translating sinusoidal grating. We found that reported auditory positions were skewed in the direction of visual motion. In a second experiment, we varied the location of a moving visual grating displayed concurrently with an auditory tone while observers localized the tone in a 3AFC task. The perceived speaker location was biased in the direction of the grating location—consistent with the ventriloquism effect—but modulated by the direction of grating motion. Our results demonstrate a cross-modal flash-drag effect and suggest a shared influence of motion on visual as well as auditory spatial representations

Paul F. Bulakowski, Nicole Wurnitsch, Gerrit Maus, David Whitney, Robert B. Post, University of the Pacific, UC Berkeley, UC Davis
Psychophysical investigation of a baseball umpire bias during close plays at first base

Judging the temporal order of fast-paced audiovisual events requires precise timing and compensation for physical and neural latency differences. Analyzing more than 300 close plays at first base from MLB 2008-09, we discovered runners are called "out" more often the further they stood from the base (based on independent judgments of umpire distance). In a set of psychophysical experiments, we varied the SOA between auditory and visual events during a temporal order judgment to test a potential explanation. We found that fast moving, but not slow moving, objects are seen to collide prior to the onset of a transient auditory event. We then show that a transient auditory event paired with a fast visual object can actually slow the perceived time of collision relative to a second visual object. This is consistent with an account that umpires employ different strategies depending on the information available to them at different distances.

Dean G. Purcell, Alan L. Stewart, Oakland University; Stevens Institute of Technology
The face in the crowd effect is a special case of priming

Interest in facial affect increased in 1988 when visual search paradigms were adapted to study emotional expression. The Initial finding that angry faces captured an observer's attention won it the sobriquet of the face-in-the-crowd effect (FCE). But the effect may have resulted from stimulus confounds. Today there is no consensus regarding the FCE. We have come to think of the search for an emotion laden target in a crowd of non-angry faces as sequential self-terminating same-different decisions. We modified the facial-affect priming paradigm so that observers determined if the affect of two sequential faces was the same or different. We found hat happy primes with angry targets produced faster responses than angry primes with happy targets. This is consistent with the fact angry faces are found quickly when surrounded by happy faces. Thus, it is the crowd affect that determines search time, not the target affect.

Andrey Markus, Zohar Eviatar, Haifa University
Inhibition by schemata: A behavioral hemispheric approach

The accepted view within the schemata-driven behavior hypothesis (Shallice & Burgess, 1993; Stuss, 1995) is that a cross-domain cognitive inhibitory mechanism acts as a part of a high level supervisory system. It was further suggested (e.g., Aaron & Poldark, 2004) that a major component of a general inhibitory mechanism is situated in the right cerebral hemisphere. The current work challenges this view. A combination of Logan's (1984) Delayed Stop Signal Task and the Divided Visual Field paradigm was used to examine a possible Right Hemisphere advantage in responding to a stop signal. The first experiment showed no right hemisphere advantage in stop signal processing. The second experiment indicated that a short-term shift in hemispheric advantage can be caused by a failure to inhibit a response in a preceding trial. Those findings are consistent with the view that response inhibition is caused by schemata competition rather than by a dedicated mechanism.

Brittany J. Dungan, Andrew W. McCollough, Edward K. Vogel, University of Oregon
Category learning aids visual working memory

Category learning is an important cognitive ability, yet individual differences in category learning have not been extensively studied. Here we extend the Posner, Goldsmith, and Welton (1967) distorted dot pattern prototype task to multiple category set sizes and levels of distortion. In Experiment 1, subjects learned 2, 4, or 6 categories (numbers, letters, or shapes consisting of nine dots) in separate blocks. Subjects showed a monotonic decrease in accuracy as set size increased. We then examined categorization in a second experiment where subjects were asked to classify exemplars from 2 categories and then perform a category change detection task. Subjects were presented with an exemplar from one category and then a new exemplar from either the same or different category. Change detection accuracy was greater for learned than new categories. We then further extended our examination of category learning to other items such as polygons.

Steffen Werner, Universty of Idaho
Development of GoCognitive – a Web-Based Resource for Cognitive Neuroscience

GoCognitive is a web-based project, which attempts to create and disseminate materials relevant for the teaching of cognitive psychology and cognitive neuroscience. It is currently funded through an NSF Division of Undergraduate Education grant and consists of a number of online demonstrations and video interviews freely available to any interested student, instructor, or researcher through the goCognitive.net website. The goal of goCognitive is to create an easily searchable, reliable resource with a sufficient coverage of the main areas of cognitive neuroscience. Based on a needs assessment of instructors in the areas of cognitive psychology and cognitive neuroscience, goCognitive is currently focused on the creation of a number of different interviews and instructional videos. To this end, goCognitive is seeking researchers willing to contribute to the site by (a) being interviewed on their particular research domain, (b) assisting in the creation of instructional videos (e.g., how to conduct an fMRI study, EEG analyses, etc.), or (c) provide existing materials to be included in the goCognitive data base.

Abstracts Thursday

Bill Prinzmetal, Ariel Rokem, & Michael A. Silver, UC Berkeley
What Stimulus Attributes are Enhanced by Attention?

In studies of visual attention, performance is often rendered difficult by degrading the stimulus (adding noise, reducing contrast). We investigated the impact of several types of stimulus degradation on the perceptual effects of voluntary spatial attention. Subjects performed orientation judgments on Gabor patches, and spatial attention was directed using spatial-cueing paradigms. In the first experiment, subjects performed an orientation discrimination made difficult by making the orientation difference small. The second experiment employed an anti-cueing design in which the cue instructed subjects to perform a discrimination in an opposite location. External white noise was added to the targets to make their detection difficult, and orientation thresholds were obtained. In both experiments, voluntary attention affected accuracy, but involuntary attention did not. In Experiments 3-5, predictive cues were used. Performance was limited by adding external noise in Experiment 3 and by using low-contrast stimuli in Experiment 4. Experiment 5 replicated Experiment 1 with fiduciary markers to eliminate possible effects of location uncertainty. The results suggest that attention enhances both fine and coarse orientation discrimination but the accuracy with low contrast stimuli were not affected by attention.

Ali Jannati & John J. McDonald, Simon Fraser University
Investigating salience-driven attention capture in fixed-feature visual search: Behavioural and ERP evidence

Salient distractors interfere with visual search even when the target is fixed across trials (fixed-feature search). This interference has been attributed to salience-driven attention capture. To test this hypothesis, we recorded event-related potentials (ERPs) in two fixed-feature search experiments. Participants searched for a shape singleton in the presence of a more salient colour singleton (Experiment 1) or for a colour singleton in the presence of a less salient shape singleton (Experiment 2). The results were inconsistent with the salience-driven capture hypothesis: (i) the salient colour distractor caused no more interference than did the shape distractor (8 vs. 6 ms; difference n.s.); (ii) the distractors failed to elicit the N2pc, an ERP index of attentional selection; (iii) neither the presence nor the relative position of the distractor influenced the timing of the target-elicited N2pc. Further analyses of lateralized ERP activities that preceded the N2pc revealed no evidence for capture.

David E. Anderson & Edward Awh, University of Oregon
Discrete Resource Limits in Visual Search

Visual search behavior requires that an observer locate a target item among an array of distractors, which requires both the filtering of distractors and identification of the target. Duncan and Humphreys (1989) proposed that a subset of search items is stored in visual working memory (VWM), where a parallel search for the target is performed. This process is performed iteratively until the target is identified. Since the proposition of this model, little evidence has shown a direct link between WM storage capacity and search efficiency. To test this model, we had observers search through an array of items (set sizes 1 through 8) for a letter L among distractor Ts. The high target-distractor similarity ensured that search would be inefficient. We manipulated distractor-distractor similarity by randomly orienting the Ts with respect to each other. This ensured that grouping mechanisms would not influence the processing of distractor items. The displays were presented until the observer responded with a button press, indicating which direction the L was facing. Our primary measure was reaction time (RT), and search efficiency was defined as the slope of the RT function, with smaller slopes indicative of more efficient search. In line with the predictions of Duncan and Humphreys (1989), we found a strong relationship between VWM capacity and search efficiency. This finding suggests that observers store a number of items in VWM, and search for the target among these items; individuals with larger storage capacities are more efficient searchers because they can store more search items at one time, resulting in a more shallow slope. We propose that visual search is performed in a capacity-driven, serial manner.

Carly J. Leonard & Steven J. Luck, UC Davis
Tracking changes in the attentional window with visual event-related potentials

Our ability to interact with the world around us in a goal-directed and stimulus appropriate manor is dependent on the dynamic coordination of a variety of attentional mechanisms. For example, feature-based attention provides a means to detect a potentially relevant target without knowing its location in advance. During search, spatial attention must be adjusted accordingly, at times distributed broadly over a scene or at other times focused narrowly on an object of interest at the fovea. We used ERPs to examine how changes in this "attentional window" influenced sensory processing by measuring modulation of the occipital P1 component to a task-irrelevant probe. The results show that attending narrowly at fixation versus more broadly influences early sensory processing, and changes in this window of attention can be quickly initiated due to feature-based detection mechanisms.

John J. McDonald, Jennifer A. Schneider, Christina M. Hull & Steven A. Hillyard, Simon Fraser University; UC San Diego
Covert spatial orienting of attention in spatial and nonspatial auditory tasks

Auditory spatial attention effects are largely contingent on the degree to which sound location is relevant to the task at hand. Here, we investigated the behavioural and neural underpinnings of this contingency. One series of experiments addressed a recent study showing that spatially nonpredictive auditory cues can influence nonspatial discrimination performance when sounds are presented monaurally over headphones (Roberts et al., 2009). These results were replicated but did not generalize to sounds presented in external space, suggesting that spatial-attention capture by external sounds is contingent on a spatial task set. In a second series of experiments, we used event-related potentials (ERPs) to investigate involuntary spatial attention effects on auditory target processing. Surprisingly, cues led to relatively early enhanced target ERP negativities in both spatial and nonspatial tasks, suggesting that the auditory cues influenced target processing regardless of task set.

Abstracts Friday

Frederick J. Gallun & Anna Diedesch-Rouse, Portland VA Medical Center, OHSU
Distinguishing the impacts of peripheral and central auditory dysfunction

As listeners, we rely upon the auditory system to provide a wide range of information about the surrounding environment. In theory, impairments of the ability to make use of this information could occur at a variety of processing stages, but the most fundamental distinction is between peripheral impairment and central impairment. This can be considered as problems on the "input" side or problems on the "processing" side, and the appropriate rehabilitation of each is likely to be substantially different. Two approaches to these issues will be discussed, one involving a group of aging listeners, and the other a group of hospitalized members of the U.S. armed services who had been exposed to high-intensity explosions in the line of duty. In both cases, distinguishing peripheral from central impacts depended upon the use of control subjects as well as a range of tests of auditory function. Both studies revealed strong evidence of central impairment related to the ability to process simultaneously presented speech and to make use of rapidly changing temporal information. These results will be discussed in terms of both what can be concluded about the stages of processing that are impacted and what ambiguities remain. Potential implications for rehabilitation will also be discussed.

G. Christopher Stecker & Andrew D. Brown, University of Washington
Sensory weighting of sound-localization cues by human listeners

The ability of human listeners to localize and segregate sound sources depends on sensitivity to various binaural acoustic cues, including interaural time and level differences (ITD and ILD, respectively). These cues are, in turn, variously affected by distortion arising from echoes, reverberation and competing sound sources, such that the relative reliability or informativeness of specific cues depends significantly on the listening context. In reverberant environments, for example, ILD cues are typically reduced, whereas post-onset ITD cues may take on large and fluctuating values that bear little relation to the sound-source location. Current experiments in our lab have addressed the weighting of binaural information across cues and over the durations of brief sounds. Results suggest a context-dependent weighting mechanism that avoids overdependence on uninformative cues while maintaining sensitivity to cues that reliably identify sound-source locations or detect changes in the acoustic environment.

Adrian KC Lee, University of Washington
Cortical dynamics of auditory spatial attention

Spatial attention is often described as supramodal, e.g., crossmodal spatial cues can enhance the perception of stimuli in another modality when presented in the same location. How similar is the auditory spatial attentional network compared to its visual counterpart? In a series of experiments, we studied different aspects of auditory spatial attention by using magneto- and electro- encephalography, combined with anatomical information captured by magnetic resonance imaging. We examined the differences in cortical regions recruited for auditory spatial and non-spatial attention. We also investigated what cortical network is involved in switching of auditory attention from one hemifield to another. Results from these studies show that the cortical regions involved in auditory spatial attention parallels closely to those identified in the vision domain, but with some special twists.

Irida M. Mance, Mark W. Becker & Taosheng Liu, University of Oregon; Michigan State University
Parallel consolidation of simple features into visual short-term memory

A long history of research has revealed much about the limited storage and precision capacity of visual working memory (VSTM), however, little is known about the initial formation (i.e., the consolidation) of VSTM representations. Here we used a sequential-simultaneous manipulation to examine the limits of consolidating items into VSTM. Participants viewed briefly presented and masked color patches (targets), which were shown either sequentially or simultaneously. A probe color followed the targets and participants decided whether it matched one of the targets or was a novel color. In four experiments, we consistently found equal performance for sequential and simultaneous presentations for two targets. Worse performance in the simultaneous than the sequential condition was observed for larger set sizes (three and four). Contrary to previous results suggesting a severe capacity limit of one item at a time, our results indicate that consolidation into VSTM can occur in parallel and without capacity limits for at least two simple items.

Jason Fischer & David Whitney, UC Berkeley
Visual perception is serially dependent

How does the visual system achieve stable and continuous perception? One possibility is that the brain may use serial dependence to promote perceptual stability: what we perceive at the present moment may depend on visual input from prior timepoints. We tested for serial dependence in visual perception using an orientation judgment task. Subjects reported the orientations of sequentially presented suprathreshold, high contrast gratings, which were separated in time by several seconds. We found that on a given trial, a subject's perception of the grating orientation reflected not only the currently viewed stimulus, but also a systematic attraction toward the orientations of the previously viewed stimuli. This perceptual attraction extended over several trials, and occurred only at attended locations. We propose that such serial dependence helps to maintain continuity in the perception of object and scene properties in the face of a dynamic environment.

Gerrit W. Maus and David Whitney, UC Berkeley
Visual crowding is based on perceived positions

Objects in the visual periphery become hard to distinguish when surrounded by other objects. This phenomenon – termed crowding – depends on objects' absolute and relative positions in the visual field (e.g. objects aligned along meridians are more crowded than misaligned objects). Physical positions on the retina and perceived positions are not always in perfect agreement. Recently we showed that when perceived positions are dissociated from retinal positions by a motion-induced mislocalization illusion, perceived positions determine the severity of crowding (Maus et al., PLoS ONE, 2011). Here we generalize these findings to other mislocalization illusions – position aftereffects (Whitaker et al., Vision Research, 1997). When physically aligned Gabor stimuli were perceptually shifted out of alignment by a position aftereffect, orientation discrimination performance improved (i.e. less crowding), whereas physically misaligned Gabors led to worse performance when being perceived as aligned. These findings demonstrate that crowding occurs in a coordinate frame of perceived positions.

Jonathan G. Hakun & Timothy J. Pleskac, Michigan State University
Cross-modality interaction and dynamic signal detection in working memory

Models of working memory and stimulus encoding propose distributed representation of information. If information from a working memory task is distributed in mental representation then cross-modality (visual/phonological) facilitation could be expected during performance. In the current study we asked: to what degree does visual working memory predict performance on a verbal working memory task? We observed that WM span, as measured by a visual change detection task, predicted accuracy on verbal N-back performance equivalently ($r \approx .5$) across load levels (N = 1-, 2-, & 3-back). This result indicated a load-independent contribution of visual WM span to N-back performance. The specific advantage that visual WM span conferred upon N-back performance was explored through the application of a dynamic signal detection approach. Early results indicate that an increase in visual WM span confers an advantage specifically to non-target N-back trials resulting in an increased correct-rejection rate/decreased false-alarm rate. This condition-specific effect was observed in the absence of a "no-signal" response-bias as measured through a dynamic signal detection model. These initial results suggest that either: 1) visual WM span facilitates N-back performance due to cross-modality encoding of verbal information during the N-back, or 2) estimation of WM span with visual change detection represents a modality independent measure of WM which confers a specific advantage to N-back performance.

Zachary Raymond Ernst & Geoffrey M. Boynton, University of Washington
Evidence for object-based attention: A study of divided attention within and between surfaces

Models of object-based attention suggest that features compete for perceptual resources between surfaces but not within surfaces.We superimposed two surfaces, defined by random dot fields with unique color-motion conjunctions. Observers were cued to monitor the motion or color of a single surface (single-task condition), or to divide attention across the two features within the same surface or between the two surfaces (dual-task conditions). Observers performed a yes-no detection task on the cued feature(s).Within-surface dual-task performance was equivalent to single-task performance; suggesting that there was no perceptual cost to dividing attention across features within the same surface. However, dividing attention between surfaces resulted in a large dual-task performance cost. Our results are consistent with the hypothesis that object-based attention facilitates the sharing of resources across features within the same surface, but when monitoring features between competing surfaces, limits resource allocation in an all-or-none fashion.

Edward F. Ester, Daniel Klee, & Edward Awh, University of Oregon
Visual crowding reflects a misbinding - not an averaging - of features

Visual perception is dramatically impaired when a peripheral target is surrounded by nearby distractors. This phenomenon is known as crowding, and it is thought to place fundamental constraints on reading and object recognition. A prominent view is that the jumbled percept from crowded scenes reflects the compulsory averaging of target and distractor feature values. However, the extant evidence can also be explained by a substitution model in which target and distractor features are swapped rather than averaged. Using a task and analytic procedure that was sensitive to both outcomes, we found no evidence for compulsory averaging. Instead, crowding led to the substitution of feature values from distractors to targets. These findings resolve a fundamental question regarding the nature of this basic limit in visual perception

Abstracts Saturday

Ashleigh May Chapman, Peter Graf & Todd C. Handy, University of British Columbia
The brain's response to big and small surprises

Student volunteers made liking ratings (6-point scale) about visually-masked common words while ERPs were being recorded. Most words (~92%) were displayed with the same medium-density mask herein called the standard mask. In order to create discrepancy aka surprise reactions, a small portion of the words were displayed with either a higher density mask or a lower density mask, and in order to influence subjects' awareness of the non-standard masks, the latter differed from the standard either by a minimal amount or by a substantial amount. Consistent with discrepancy attribution theory (DAT), we expected discrepancy reactions and higher liking ratings for all words displayed with a non-standard mask, but only for subjects who did not consciously apprehend the oddness of the non-standard mask. Based on DAT, we expected different ERP signatures for subjects who were aware versus not-aware of the non-standard masks. The results are broadly consistent with these expectations.

John A. Dewey & Thomas H. Carr, Michigan State University
Neural responses to expected and unexpected sensory action-effects: Dissociating self-agency from the predictability of the action-effect

People regularly discriminate between expected and unexpected sensory events. A common type of expected sensory event is one that is produced as a consequence of a deliberate action (action-effects). Previous neuroimaging work (e.g. Blakemore, Rees and Frith, 1998; Blakemore, Frith, and Wolpert 2001; Farrer et al. 2008; Schnell et al. 2007) has shown that a frontoparietal network including parts of dorsolateral prefrontal cortex, insula, inferior and superior temporal cortex, and right parietal cortex is involved in predicting and monitoring action-effects caused by self-generated actions. In a rapid event-related fMRI study, we aimed to characterize which, if any, areas of this frontoparietal network are specific to self-monitoring, and which are involved in predicting sensory action-effects without regard for source. Preliminary results suggest that neural responses to sensory action-effects may be modulated by both self-agency and predictability, but the same network is involved in predicting sensory action-effects, regardless of the source.

Genevieve Quek & Matthew Finkbeiner, Macquarie Centre for Australia
Pointing to the locus of attentional effects in subliminal priming

In the masked congruence priming paradigm, participants respond faster and more accurately to targets that are preceded by subliminal primes from the same category (i.e. congruent) than from a different category. Intriguingly, these masked priming effects are limited to attended prime stimuli. Unattended primes do not produce priming. Nevertheless, very little is known about the specific role of attention in masked priming. In this study, we investigate the first-order question of where information processing the modulatory effects of attention arise in subliminal priming. To do this, we employed a new pointing paradigm that yields both a target-detection measure and a target-classification measure on each trial. We found that manipulations of temporal and spatial attention modulated target detection, but not target classification. These findings suggest that the modulatory effects of attention on subliminal priming arise in the early components of visual processing that subserve target detection.

Andrew W. McCollough, Trafton Drew, Edward K. Vogel, University of Oregon
Perceptual grouping during multiple object tracking

Previous research has suggested that perceptual grouping may significantly aid performance in Multiple Object Tracking (MOT) tasks. That is, observers may track multiple items by spontaneously grouping disparate items into a single "virtual object". According to this hypothesis a virtual polygon is initially created and then updated during tracking, with the vertices of the polygon consisting of the tracked elements (Yantis 1992). Recently our lab has demonstrated an ERP component, the CDA, sensitive to the number of successfully tracked items in a MOT task such that the amplitude of the component increases with increasing set size up to the individual subject's tracking capacity (Drew & Vogel 2008 J. Neuroscience). Here, we investigated whether a real or virtual polygon between targets in a tracking task would enhance behavioral performance and reduce tracking load (as indexed by a reduction in amplitude of the CDA). We found that the the presence of actual grouping lines connecting the three targets in a MOT task reduced tracking load when the lines were present as compared to when they were absent. These results suggest that perceptual grouping does indeed play a role in tracking, but this role may be primarily restricted to situations when there are strong bottom-up cues for grouping the objects together.

Scott Reed, Andrew W. McCollough, & Edward K. Vogel, University of Oregon
Neural measures of object tracking are modulated by sensitivity to motion information

Our ability to track moving objects is constrained by the number of objects being tracked and by the attentional processes required to select and sustain objects in memory (Drew & Vogel, 2008), but few studies have examined how motion information modulates tracking ability. Here, we used behavioral and neurophysiological measures of tracking performance to examine whether speed discrimination thresholds are associated with tracking ability under conditions of variable speed changes during object tracking. Specifically, we used ERP's to measure tracking sensitivity as subjects attended to rotating pinwheels that either decreased or increased their rotational speed relative to a baseline speed. It was found that changes in the amplitude of the CDA across tracking conditions were systematically modulated by changes in rotational speed, but only in low speed discrimination threshold subjects. These results indicate that sensitivity to motion information has direct neural correlates in the brain during multiple object tracking.

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Benjamin D. Lester & Paul Dassonville, University of Oregon
TMS reveals a right parietal role in processing visuospatial contextual information in a perceptual illusion

Previous work (Walter & Dassonville, 2008) has shown that predominantly right-lateralized regions of superior parietal lobule (SPL) are active when participants make location judgments in the presence of an illusion- inducing visual context. However, the specific role played by these regions in encoding contextual information remains unclear. We assessed the effects of suppressing the neural activation within these regions by applying repetitive TMS. Participants performed an orientation judgment in the context of the Rod- and-Frame illusion (RFI) or the Simultaneous-Tilt illusion (STI). Accuracies in these judgments were assessed before and after rTMS, to the right SPL, left SPL, or a control site at the vertex. Participants' susceptibility to the illusion- inducing effects of the RFI decreased after TMS over right SPL, compared to left SPL and vertex. In contrast, susceptibility to the STI was unaffected by TMS, regardless of the stimulated region. These findings indicate that right SPL is involved in the active processing of global, but not local, contextual information.

Allison E. Connell Pensky, Valerie Morash, & Joshua A. Miele, UC Berkeley; Smith-Kettlewell Eye Research Institute
Multiple fingers do more than expand haptic view

The possible benefits or disadvantages of using multiple fingers during haptic perception have never been systematically studied. Multiple fingers could aid perception by increasing the haptic field of view, allowing a finger to mark a position while other fingers explore, and allowing multiple features to be touched at once. Alternatively, using more fingers may hinder performance due to increased attentional and computational demands. To test these possibilities, we asked participants to explore and answer questions about tactile maps using different finger combinations. Five 1-hand conditions were tested (ranging from single index to all five fingers) and two 2-hand conditions (one index on each hand and all 10 fingers). We observed different patterns of performance (accuracy and RT) depending on the question answered, including: a benefit of multiple hands but not multiple fingers, a benefit of additional fingers, and no benefit of additional fingers or hands.

Kimberly Mae Halvorson & Eliot Hazeltine, University of Iowa
Feedback rather than performance influences perceptual judgments

Previous research suggests that acting on an object may affect subsequent perceptual judgments about that object (Witt and Proffitt, 2005; Witt et al., 2008). For example, Witt and Proffitt, 2005 found a correlation between players' batting averages and the perceived size of the ball. Players with higher batting averages reliably chose larger circles as matching the size of a softball. Similar results have been reported for other activities, including field goal kicking (Witt & Dorsch, 2009). We examined the role feedback plays on action effects as indicated by subsequent perceptual judgments. We used a computerized version of a throwing task, in which participants "launched" an item into a target by moving the mouse; participants' subsequent size estimates of the target were reliably larger only when they knew whether or not their "launch" was successful. This suggests that many of these effects may be driven by participants' knowledge of their performance.

Arne Ekstrom, Hui Zhang, & Ksenia Zherderva, UC Davis
Survey and route learning differentially recruit view-dependent and holistic spatial representations

How we structure representations of a spatial environment may be influenced by whether we first learn this information by exploring it directly through active navigation or by studying it from a map. In three experiments, we compared view-dependent (egocentric) and holistic (allocentric) knowledge obtained as a result of active navigation or map drawing of virtual spatial environments. Results from learning the locations of stores arranged in a circular pattern within a simple virtual environment showed that subjects formed equivalent degrees of egocentric and allocentric knowledge as a result of driving and map drawing. Results form learning the locations of stores arranged in a rectangular axis enclosed within a visually enriched environment containing salient landmarks, roads, and other features, in contrast, demonstrated that map drawing resulted in a disproportionate increase in allocentric compared to egocentric knowledge. We conclude that, in the presence of a salient axis and other features in which to structure a spatial representation, moderate experience with driving and map drawing tap into partially dissociable systems of spatial representation.

Abstracts Sunday

Monica A. Riordan & Roger J. Kreuz, University of Memphis
Expressing emotion online: What we've got here is a failure to communicate

Research on nonverbal cues in computer-mediated communication (CMC) has primarily focused on the interpretation of these cues, such as whether a smiling emoticon is interpreted in the same manner as a smiling facial expression. However, because nonverbal cues are deliberate textual displays of affect rather than spontaneous facial displays, and because the number of nonverbal cues available in CMC is limited compared to face-to-face, the interpretation of nonverbal cues is arguably more complex. We had participants generate emotional emails and then readers rated the email on the type and degree of emotion. Results show that the encoding of emotion by writers and the interpretation of the emotion by readers is not only distinctly discrepant but that readers themselves rarely give uniform interpretations. We suggest that textual nonverbal cues are subject to contextual constraints that, being different between the writer and the reader, result in different meanings for the cues.

Eve A. Isham, Joy J. Geng, Arne D. Ekstrom & William P. Banks, UC Davis; Pomona College
Fame and fortune: External information guides perception

Things are not always what they seem. Our final interpretation of visual information is not exclusively determined by the internal processing of the brain's visual system, but is additionally guided by environmental factors. Two realms of research will be presented. In one study, we explore how the perceived time of an effortful action is modulated by the presence of monetary reward (Isham & Geng, under review). In a separate study (Isham, Ekstrom, & Banks, 2010), we examine the influence of prestige of authorship on aesthetic ratings of artworks. Findings from our study challenge V.S. Ramachandran's Universal Laws of Neuroaesthetics. Collectively, the results from these two avenues of research provide the necessary evidence that our final interpretation of visual information is not exclusively governed by the visual system, but that external influences also modulate and guide what we see.

David Whitney, Jason Haberman, & Tom Harp, UC Berkeley; Harvard University; UC Davis
The desirability of groups

We frequently encounter groups of objects that are brought together intentionally or by chance. Consumers encounter groups of objects for sale almost constantly: a parking lot full of used cars, a table piled high with fruit at a farmer's market, a garden center overflowing with plants, a stack of soup cans at a grocery store. Naturally occurring groups also occur frequently: a grove of trees, a lawn of grass, a sidewalk of brick, a crowd of people. How observers perceive groups guides decisions in realms ranging from economic to social and political, and the perception of these groups depends, at its heart, on visual processing. Here we show that the attractiveness of a group cannot be simply predicted from the attractiveness of the individuals that comprise that group—there is an amplification of apparent attractiveness when objects are presented in a group. Objects that are attractive look even better when in a group; unattractive objects look even less attractive in a group. We suggest that this nonlinear relationship arises because groups provide more information on which the visual system can base a decision, thereby improving sensitivity, which manifests as amplified preference.

Kimberly A. Jameson, Natalia L. Komarova, Sean Tauber & Louis Narens, UC Irvine
New results on simulated color categorization behaviors using realistic perceptual models, heterogeneous observers and pragmatic communication constraints

We investigated the formation and sharing of population color categorization systems using evolutionary game theory simulation techniques. Simulated agents were designed to realistically vary on individual categorization performance, and were based on human data from observers with different perceptual abilities. Constraints implemented in agent categorization and communication games also included (i) varying amounts of normal observer heterogeneity in populations, and (ii) varying degrees and forms of observer color deficiency within populations. In addition, we incorporated different forms of social network structure in agent communication game interactions (approximating communication scenarios that typically occur among humans), and used forms of social reinforcement based on pragmatic considerations. For the various realistic approximations tested we observed interesting consequences for shared stochastic categorization solutions evolved by agent populations. The results reveal interesting formal constraints exist for population categorization solutions that optimize successful performance in color category learning and communication games. The ways these constraints might apply to human color categorization solutions is discussed.

Louis Narens, UC Irvine
Putting steven's methods of magnitude estimation and production on a rigorous measurement-theoretic foundation

In 1946, S. S. Stevens presented new methods for measuring psychological phenomena called "magnitude estimation" and "magnitude production" that were radical departures from established measurement methods, particularly those from the physical sciences. For measurement specialists outside of psychology--and from many within psychology—Stevens' methods were considered to be non-rigorous and unsound. This talk describes a new, rigorous approach to magnitude estimation and production based on modern measurement theory. The bottom line is that the assumptions behind Stevens' methods, while internally consistent, are dramatically inconsistent with data--if the correct kind of data is collected. Nevertheless, magnitude estimation and production data can be modeled by ratio scales, but not in the manner described by Stevens' methods. This is illustrated by recent theory and experiments by Luce, Steingrisson, \& Narens (e.g., Psychological Review, 2010, volume 117, 1247--1258).

Dav Clark, Daniel Reinholz , Sarah Cohen, Benjamin Walklet & Michael Ranney, UC Berkeley
Overcoming climate change biases by teaching the "Goldilocks Asymmetry" of energy transfer rates: A cognitive-strategy attempt to save us organisms

Americans are exceptionally reticent to accept evolution and global warming, compared to peer nations' residents. Ranney's Reinforced Theistic Manifest Destiny theory (RTMD; e.g., Ranney & Thanukos, 2011) explains this, incorporating geopolitical history with six constructs: afterlife, deity, nationalism, creation, evolution, and global warming. After observing general ignorance of the greenhouse effect's mechanism, we hypothesized that instruction regarding this mechanism would significantly impact participants' understanding and attitudes toward global warming. Prior to instruction, no participants indicated the centrality of infrared light and its relationship to greenhouse gases. Yet after being introduced to the "Goldilocks Asymmetry" regarding entering/exiting energy transfer rates, participants frequently used such concepts. As observed previously, RTMD-relevant attitudes predicted global warming acceptance. Participants who provided mechanistic descriptions prior to instruction exhibited enhanced surprise. Furthermore, our intervention seems to have shifted RTMD-relevant attitudes. Based on supporting research, we expect that surprise and attitudes will be notably predictive of durable learning.

Abstracts Monday

Christopher J. Smith, Jeremy M. Silverman & Arthur S. Reber, Southwest Autism Center; Mt Sinai Medical Center; University of British Columbia
Normal implicit learning in an autism spectrum disorder population – but with diminished ability to transfer information to novel displays

ASD subjects, their family members and a group of controls and their parents were run through a Serial Reaction Time (SRT) task using sequences of geometric forms, faces and pieces of furniture. All groups showed intact implicit learning to all displays – including ASD subjects on the series of faces. Familial effects emerged; ASD sibs and parents showed overall RT speeds more similar to autistics than to controls. Marked differences were observed during transfer where sequences were restored but with different exemplars from those used during learning. RTs in ASD subjects increased dramatically while the RTs for their sibs and controls returned to previous baseline. Clearly, whatever is being acquired during the learning phase is being encoded differently in ASD and controls and/or these groups react dramatically differently to novelty. These results have implications for understanding the nature of cognitive functioning in ASD. They also contradict the suggestion (Klinger et al., 2007) that autism is marked by a breakdown in the implicit learning system.

Rolf Reber & Sascha Topolinski, University of Bergen; University of Würzburg
The phenomenology of insights

Insight is a fascinating yet underresearched phenomenon. In the traditional problem solving literature, the insight experience has been defined by four attributes: (1) suddenness; (2) ease; (3) positive affect; (4) the confidence in the truth of the solution. Based on earlier research, we have recently presented an account for how these four attributes are connected: Surprising ease results in positive affect and the confidence that one's solution is correct. We present new data from experiments that show (1) the effect of immediacy in judgments of truth, corroborating the role of suddenness in insight; and (2) the effect of coherence – a potential trigger of insights that is supposed to result in higher fluency – in eliciting positive affect. Positive affect, as measured by activation of the Zygomaticus Major, is elicited before participants are able to accurately judge coherence. In sum, the findings support the predictions from the fluency account of insight.

Thomas H. Carr, Mura Dominko, John M. Dewey, & Andrew Schaad, Michigan State University
Test-enhanced learning across domains: Text, math, and transfer

The "testing effect" or "test-enhanced learning" has struck a chord with investigators of learning and memory, and it has struck fear into the hearts of undergraduates who've heard about it. When asked how to practice, most people say they'd rather study than take a test, but the results show they're wrong. Taking a test is better. However, almost all the data collected to date have involved verbal learning (either word lists or schoolbook-like passages of text) Our talk will report new data -- not collected yet, with collection about to begin -- comparing verbal learning with learning of mathematical problem solving. For each domain, we will report final-test performance (remembering a text, solving complex arithmetic problems) as a function of several variables. One will be what happened in between an initial learning episode and the final test. The intervening activity could be study (rereading of the text, reviewing step-by-step printed solutions of math problems) or test (recalling the text, solving the math problems). The primary data will be final-test results on both the either-studied-or-tested familiar texts/problems, plus performance on new texts or new problems. The latter provides a measure of transfer to new materials of a strategy that might have been acquired during test versus study. Thus we are interested in whether the earlier experiences influence how people approach new experiences.
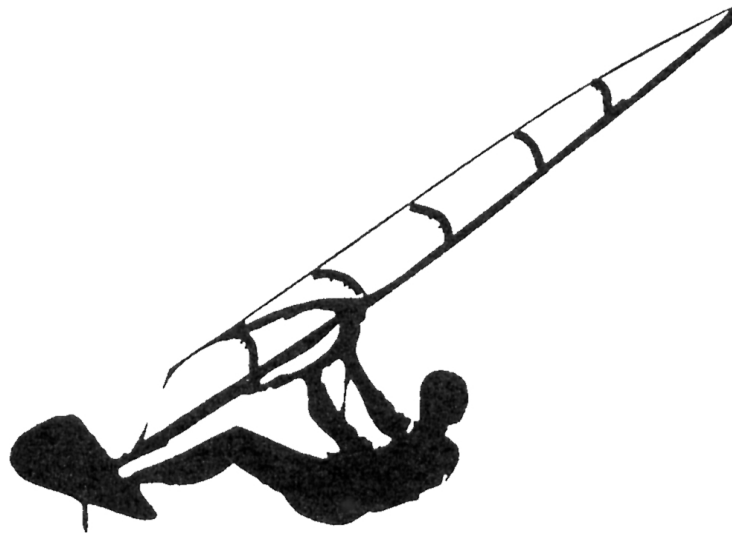
E-Mail Addresses

Name	Email
Adrian Lee	akclee@u.washington.edu
Ali Jannati	aja19@sfu.ca
Allison E Connell Pensky	allison.connell@berkeley.edu
Andrew McCollough	awm@uoregon.edu
Andrey Markus	andreimarkus@gmail.com
Arne Ekstrom	adekstrom@ucdavis.edu
Arthur Reber	areber@brooklyn.cuny.edu
Benjamin D. Lester	blester@uoregon.edu
Bill Prinzmetal	wprinz@berkeley.edu
Brittany Dungan	bdungan@uoregon.edu
Carly Leonard	cjleonard@udavis.edu
Dav Clark	davclark@berkeley.edu
David Eugene Anderson	danders3@uoregon.edu
David Pick	pick@purdue.edu
David Whitney	dwhitney@berkeley.edu
Dean G Purcell	Purcell@oakland.edu
Ed Vogel	vogel@uoregon.edu
Edward Ester	eester@uoregon.edu
Emily Martin	Em81@nyu.edu
Eric Larson	larson.eric.d@gmail.com
Eve Isham	eaisham@ucdavis.edu
Frederick J. Gallun	Frederick.Gallun@va.gov
G. Christopher Stecker	cstecker@uw.edu
Gerrit Maus	gwmaus@ucdavis.edu
Gregory J. Christie	greg_christie@sfu.ca
Irida Mance	iridam@uoregon.edu
Jason Fischer	jtf@berkeley.edu
John A. Dewey	deweyjoh@msu.edu
John J. McDonald	jmcd@sfu.ca
John M. Gaspar	john.m.gaspar@gmail.com
Jonathan G. Hakun	hakunjon@msu.edu
Kim Halvorson	kimberly-halvorson@uiowa.edu
Kimberly A. Jameson	kjameson@uci.edu
Louis Narens	Lnarens@uci.edu
Matthew Finkbeiner	matthew.finkbeiner@mq.edu.au
Michael Pitts	mpitts@reed.edu
Michael Sullivan	sullivan@ohsu.edu
Monica Riordan	mschpers@memphis.edu
Paul Dassonville	prd@uoregon.edu
Paul F. Bulakowski	pbulakowski@gmail.com
Rhianon Allen	rhianon.allen@liu.edu

Roger Kreuz	rkreuz@memphis.edu
Rolf Reber	rolf.reber@psysp.uib.no
Ross Maddox	rkmaddox@bu.edu
Santani Teng	steng@berkeley.edu
Scott Reed	sreed@uoregon.edu
Steffen Werner	swerner@uidaho.edu
Thomas H. Carr	carrt@msu.edu
Trafton Drew	tdrew1@rics.bwh.harvard.edu
Valerie Morash	valmo@berkeley.edu
Zachary Raymond Ernst	zernst@uw.edu
Zohar Eviatar	zohare@research.haifa.ac.il

Internet

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

Useful web pages:
Conference Home Page: http://www.ohsu.edu/csail/
Hood River Hotel: http://www.hoodriverhotel.com/

Gorge Activities: http://128.32.103.38/~billprinzmetal/   (Bill's picks)
      http://www.bingenschool.com/links.htm   (Almost everything)
      http://www.mind.net/dlmark/gorge.htm   (More sights to see)

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The Columbia and Mount Hood

On May 12, 1792, the American Captain Robert Gray, became the first explorer to enter the Columbia River by crossing over the sandbar that blocked its mouth. Gray sailed about 20 miles up the estuary of the river, traded with the Indians for a few days, and then left after drawing a chart of the mouth of the river. He named the river the Columbia after his ship, and claimed it for the United States. British Captain George Vancouver obtained a copy of Gray's chart from the Spanish governor at Nootka Sound and sailed to the mouth of the Columbia River in October 1792. He was unable to get his flagship Discovery over the sandbar, but Lt. William Robert Broughton succeeded with his smaller ship, the Chatham. Broughton advanced nearly 100 miles to a site opposite present-day Portland, Oregon, which he named Point Vancouver. On 29th, 1792, to the east he saw a majestic mountain peak, which he named Mount Hood, after British Admiral Samuel Hood.