

THE 9TH ANNUAL WORKSHOP ON
OBJECT PERCEPTION AND MEMORY



ABSTRACTS

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Schedule Overview

8:00	REGISTRATION
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8:50	COLOR PRIMING AND ADAPTATION IN COLOR-SINGLETON SEARCH (Goolsby & Suzuki)
9:10	A DISSOCIATION IN ATTENTIONAL CAPTURE BETWEEN OBJECTS AND COLOURS (Owens & Spehar)
9:30	BREAK
9:40	DEPTH OF THE ATTENTIONAL BLINK IS MODULATED BY CIRCADIAN PHASE (Santhi, Horowitz & Wolfe)
10:00	IS ATTENTION ESSENTIAL FOR HOLISTIC FACE ENCODING? (Boutet, Gentes-Hawn & Chaudhuri)
10:20	DIRECT EVIDENCE FOR ANALYTIC REPRESENTATIONS OF ATTENDED IMAGES AND HOLISTIC REPRESENTATIONS OF IGNORED IMAGES (Thoma, Hummel, & Davidoff)
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5:00	WHY DO WE PREFER LOOKING AT SOME SCENES RATHER THAN OTHERS? (Vessel & Biederman)



8:00 REGISTRATION

8:25 OPENING REMARKS

8:30 THE EFFECT OF DISTANCE ON ORIENTATION JUDGMENT

**Melanie Palomares and Howard Egeth
Johns Hopkins University**

Does spatial separation between attended objects affect their recognition? While viewing letters or gratings, observers determined whether one or two diagonal targets appeared among non-diagonal distractors (with letters, N, Z among H, I). Though intuition may predict that objects in one attentional window would be perceived better, we found that detection of two targets is better at large separations. For letters, accuracy is always poorest at separations of < 3.9 deg, regardless of whether the targets were same or different. However for gratings, the effect of inter-target separation depended on whether targets were the same or different in orientation. Our results support the idea that simple features such as gratings and complex objects such as letters are detected by different mechanisms.

8:50 COLOR PRIMING AND ADAPTATION IN COLOR-SINGLETON SEARCH

**Brian A. Goolsby and Satoru Suzuki
Northwestern University**

Previously, we showed that repetition of a target-distractor color relationship in a color-singleton search task facilitates allocation of attention to subsequent singleton targets (Psychonomics, 1999; 2000). Here, we investigated the conditions for which color-singleton search is also facilitated through distractor-color adaptation. RT was reduced when the distractor color on a color-singleton trial was repeated from a previous trial where all items were the same-color. A large central distractor-colored patch did not similarly facilitate later singleton detection. The adaptation items and color-singleton items did not need to share position, eccentricity, or shape. These results suggest that the color representation underlying this distractor-adaptation effect is specific to discrete items, but not to position and shape.

**9:10 A DISSOCIATION IN ATTENTIONAL CAPTURE
BETWEEN OBJECTS AND COLOURS**

**Caleb Owens and Branka Spehar
Univ. of New South Wales**

Attentional capture is often regarded as a unitary phenomenon, which includes the exogenous capture of attention, by objects, colours, and motion. However an issue that has generated considerable controversy is whether colour-singletons can capture attention as effectively as sudden-onset objects appear to be able to. Here we present evidence which demonstrates that task-irrelevant, colour-changing stimuli can affect performance during visual search. However the pattern of reaction time costs and benefits strongly suggests this form of attentional capture is not the same as that by sudden-onset. While sudden-onset objects appear to cause a genuine shift in the



allocation of attention, colour-changing stimuli merely cause a filtering cost. A similar pattern of results is found in luminance-change conditions.

9:30 BREAK

9:40 DEPTH OF THE ATTENTIONAL BLINK IS MODULATED BY CIRCADIAN PHASE

**Nayantara Santhi, Todd. S. Horowitz and Jeremy. M. Wolfe
Brigham & Women's Hospital and Harvard Medical School**

How is attentional selection in time related to alertness? Alertness is governed by two factors: time awake, and the phase of the endogenous circadian pacemaker. These two factors are also known to affect reaction time and psychomotor vigilance, but not the rate of visual search. In this experiment, we studied circadian and time awake effects on *attentional blink*. We did not observe any effects on the duration of the blink. Time awake did not affect the depth of the blink, even after 36 h of sleep deprivation. However, blink depth varied with circadian phase. We conclude that the attentional dwell time may be constant over time, while attentional capacity is governed by the circadian pacemaker, independent of overall alertness.

10:00 IS ATTENTION ESSENTIAL FOR HOLISTIC FACE ENCODING?

**Isabelle Boutet, A. Gentes-Hawn, and A. Chaudhuri
McGill University**

We examined the influence of attention on holistic face encoding using the composite effect (Young et al., 1987). In Exp. 1, stimuli composed of a face superimposed on a house were shown during encoding, Ss delineated either the face or the house, thus manipulating attention away or toward the face. In Exp. 2, an intact face image was presented with letters scrolling from top to bottom. Ss were asked to either ignore the letters or read them. Aligned and misaligned composite stimuli were shown at testing. We found recognition performance to be consistently better for misaligned than aligned stimuli, regardless of the allocation of attention during encoding. We take this as evidence that holistic encoding is one aspect of face analysis that can be performed without attention.

10:20 DIRECT EVIDENCE FOR ANALYTIC REPRESENTATIONS OF ATTENDED IMAGES AND HOLISTIC REPRESENTATIONS OF IGNORED IMAGES

**Volker Thoma, John Hummel, and Jules Davidoff
University of London**

Attended images prime themselves and their left-right (mirror) reflections; ignored images prime themselves but not their reflections (Stankiewicz et al., 1998). These and other effects are predicted by a model that represents attended images both analytically and holistically, and ignored images holistically only (Hummel & Stankiewicz, 1996). The model also predicts that priming for attended images will generalize over configural distortions whereas priming for ignored images will not. Two



experiments tested this prediction. In Experiment 1, attended split images primed their intact counterparts, whereas ignored split images did not. Experiment 2 demonstrated that a substantial component of the observed priming is specifically visual. These data provide direct support for the model's use of a hybrid analytic/holistic representation of object shape.

10:40 BREAK

**10:50 INTEGRATION OF VISUAL MEMORIES AND VISUAL PERCEPTS:
WHAT IS THE MEMORY PROCESS?**

**James R. Brockmole, Ranxiao Frances Wang, and David E. Irwin
University of Illinois, Urbana-Champaign**

Integration of distinct percepts occurs when the delay between them is <100 msec. Integration also occurs when the delay exceeds 1000 msec. Characteristics of visual memory during this later integration process were investigated. Two dot arrays were presented within a grid. Subjects identified the one space left unfilled. Integration was possible whether subjects were biased to remember the dots or the spaces left empty, suggesting integrable memory is flexible. Integration also occurred when the grid moved during the delay. Earlier displacements led to better performance, indicating memory for the first array is obtained quickly and can be transferred across changes in spatial location, but integration benefits from the opportunity to reconstruct the remembered array in the appropriate location.

11:10 PERCEIVING AMBIGUOUS POINT-LIGHT ACTIONS

**Jan Vanrie, Mathias Dekeyser and Karl Verfaillie
Laboratory of Experimental Psychology, K.U. Leuven**

Without occlusion, a point-light figure constitutes a perfectly ambiguous stimulus: From all viewpoints, multiple interpretations are possible concerning the figure's depth orientation. In a first experiment, we demonstrated that a bi-stable point-light walker can indeed be perceived in different orientations. However, we also observed a clear bias to interpret the walker as facing the viewer instead of facing away from the viewer. Another experiment, with a point-light figure walking backwards, indicated that this tendency was not due to the perceived direction of articulatory motion, but might be a more general property of point-light figures. Subsequently, we performed a third experiment, using several point-light actions. The results showed that the facing-bias depends on the actual movement pattern.

11:30 TIME COURSE OF PERCEPTUAL GROUPING: A PRIMING STUDY

**M. F. Schulz (1,2), M. A. Peterson (2), T. Sanocki (1), and E. W. Sellers (1)
(1) University of South Florida, (2) University of Arizona**

We used priming to investigate whether similarity grouping occurs before or after color constancy. In ambiguous masked prime displays, a central column of elements appeared behind a transparent surface. The central column could group with elements on the right or left depending on whether grouping was based on a pre- or post-constancy representation of color. Participants reported the grouping of unambiguous



target displays. No transparency was present in targets, so the central elements were the same color as either the right or left elements. At short prime durations, responses were faster when the target grouping matched the pre-constancy prime grouping. At long prime durations, responses were faster when the target grouping matched the post-constancy prime grouping. Thus, grouping can operate on both pre- and post-constancy representations.

11:50 LUNCH

2:00 KEYNOTE ADDRESS: INTERACTIONS BETWEEN ATTENTION AND LEARNING IN VISUAL PERCEPTION

**Marvin Chun
Vanderbilt University**

2:40 BREAK

2:50 LEARNING TO IDENTIFY HUMAN FACES

**Lisa R. Betts, Pat Bennett, and Bob Sekuler
University of Toronto**

The current experiment investigates the mechanisms that underlie the perceptual learning of spatial frequency information in facial stimuli. In particular, the authors were interested in determining whether training on the first day with faces that contain a specific range of spatial frequency transferred to the same faces that contain a different range of spatial frequency information on the second day of testing. The results indicate that the amount of transfer between different spatial frequency conditions was very limited, and that in some cases, the performance in the second condition actually dropped below pre-training levels. Furthermore, extensive experience with all pass faces improved observers' abilities to recognize low pass (2-7 cycles per image), medium pass (8-31 cycles per image), and high pass faces (32-127 cycles per image), but a substantial portion of this improvement was due to familiarity with the task demands.

3:10 INTERFERENCE BETWEEN CAR AND FACE EXPERTISE

**Kim Curby and Isabel Gauthier
Vanderbilt University**

Face and car expertise recruit common extrastriate regions. However they could rely on a common system or functionally independent systems within these areas. Functional overlap should result in interference in car experts when both abilities are engaged simultaneously. Eighteen car experts and 17 novices performed a two-back sequential part-matching task with cars and faces interleaved. Holistic processing for faces was measured in the context of two car conditions: a normal and a modified configuration. Increased holistic processing for cars led to decreased holistic processing for faces. This interference was positively correlated with an independent measure of car expertise. This suggests functional overlap of the neural networks for face and car



expertise, rather than the mere proximity of two independent mechanisms.

3:30 SEX IS A PART OF WHO WE ARE: EVIDENCE FOR PERCEPTUAL INTEGRALITY BETWEEN THE SEX AND IDENTITY OF FACES

**Tzvi Ganel and Yonatan Goshen-Gottstein
Tel-Aviv University**

According to current face-recognition models, sex and identity of faces are processed by parallel, independent routes. Using Garner's speeded-classification task, we provide evidence that, contrary to this "parallel-route hypothesis", sex and identity are processed within a single route. In four experiments, participants judged the sex or the familiarity of faces while the other dimension either remained constant or varied randomly. Critically, the results showed that participants failed to attend to each of the dimensions while ignoring variations in the other, irrelevant dimension. Furthermore, we showed that hairstyle heuristics can sometimes over ride the critical processing of identity. The reported Garner interference suggests that the dimensions of identity and sex are integral and therefore depend on a single source of information.

**3:50 USING REVERSE CORRELATION
TO INFER THE REPRESENTATIONS DISTINGUISHING
FACIAL GENDER, AFFECT, AND INDIVIDUALS.**

**Michael C. Mangini and Irving Biederman
University of Southern California**

People reveal considerable expertise in the classification of a face in terms of gender, expression, and identity, yet the representation mediating such performance is often not available to conscious, explicit description. To specify these representations, observers classified faces appearing in sinusoidal noise as male/female, happy/unhappy, or Tom Cruise/John Travolta. Unbeknownst to the subjects, the underlying face stimulus was identical on every trial. Therefore, all variations in the stimuli—and the subjects' responses—could be attributed to the noise. The correlation of the subjects' responses with the noise was used to compute a "classification image" (Ahumada, 1996) that yielded clear exemplars of the classes. Reverse correlation may thus provide a method for making explicit otherwise ineffable perceptual representations.

4:20 WHAT CREATES THE FLASH IN FLASHBULB MEMORIES?

**Hedy Amiri, Lisa C. Elo, and Chad J. Marsolek
University of Minnesota**

The greater the affective arousal elicited by a stimulus, the greater the subsequent memory for its perceptual details. We tested potential explanations for this aspect of "flashbulb memories," including one stemming from neuroanatomical findings. We conducted an old/new recognition memory experiment using photographs from the International Affective Picture System. These were visual scenes that varied in affective valence (negative versus positive) and affective arousal (low versus high). We tested the level of detail remembered by manipulating the left-right orientation of the scene at test, relative to the picture's orientation during encoding. Results indicate that memory enhancements for highly arousing information can be diminished in



predictable ways, helping to constrain theories of the effects of emotion on scene recognition and memory.

4:40 SWITCHING BETWEEN ROUTE AND SURVEY PERSPECTIVES

**Paul U. Lee and Barbara Tversky
Stanford University**

Two experiments examined perspective switching in comprehension and retrieval of spatial information. Participants read route or survey descriptions of environments. For half of the descriptions, the perspective was switched during comprehension. True/false verification sentences followed from both perspectives. Switching perspective increased reading times but increased verification times only for survey sentences. This suggests that perspective switching exacts a cost in comprehension, but that the cost dissipates after information retrieval, especially for route descriptions. The second study examined whether viewpoint or terms of reference accounted for switching costs. Switching terms of reference slowed reading times more than switching viewpoint. Together, the experiments suggest that switching perspective plays a role in comprehension that diminishes with repeated retrieval. They also point to a fundamental asymmetry between route and survey perspectives, one that depends on orientation.

**5:00 WHY DO WE PREFER LOOKING AT SOME SCENES
RATHER THAN OTHERS?**

**Edward A. Vessel and Irving Biederman
University of Southern California**

People prefer to look at some scenes rather than others. Why? Subjects rated their preference for 60 scenes, with each scene repeated five times to assess habituation of preference. Other subjects rated each scene for the extent to which it depicted a Vista, a place of Refuge, Mystery, Nature (vs. Urban), Coherence (Could the scene be understood in a glance?) and Legibility (Are there significant landmarks in the scene?). Multiple regression revealed that these factors (except for Coherence) accounted for 59% of the initial preference ratings, but only 12% of the habituation rates. These results are generally consistent with Kaplan's (1992) evolutionary theory of scene preference.

POSTERS

(1) THE SPATIAL ALLOCATION OF ATTENTION ACROSS TWO OBJECTS

**Laurence Becker and Howard Egeth
Johns Hopkins University**

When we attend to two locations, is the intervening space also attended, or is processing split into two noncontiguous regions? Pan and Eriksen (1993) found response competition from a distractor placed between two attended locations, suggesting that intervening locations are attended. However, in that study, response competition was confounded with the distractor's distance from fixation. This confound was eliminated in the present study. A dual-target identification procedure was used in



which retinal eccentricity of distractor elements was controlled for across conditions. Distractor elements were either placed along a line connecting the two targets (collinear condition) or orthogonal to this line. Target identification performance was worse for the collinear condition than the orthogonal condition. It is hypothesized that attention is oriented in an elliptical shape, along the axis connecting attended locations.

(2) AGE-RELATED EFFECTS OF MULTIPLE ONSETS IN VISUAL SEARCH

**Nicholas Cassavaugh and Arthur Kramer
University of Illinois, Urbana-Champaign**

The appearance of an abrupt onset can influence performance in a visual search task. Recently, the additional effect of multiple onset distractors on search performance for a singleton target by young adults was found to be negligible. The present study explored search performance of older adults in a singleton search task requiring eye movements. While overall age-related effects were found in response time (RT) and saccade latency, older adults were not disproportionately affected by the presence of multiple onsets as compared to younger adults in RT, latency, fixation duration, accuracy or proportion of trials on which the eyes were captured by an onset. Neither old nor young adults indicated any awareness of the occurrence of onset distractors.

**(3) OBJECT-BASED ATTENTIONAL REPRESENTATIONS ARE
NOT INSTANTANEOUS**

**Ming-Chou Ho and Paul Atchley
University of Kansas**

Last year at OPAM, we demonstrated that the precedence of objects is necessary to evoke object-based attention (Ho, Atchley, Shellourne, and Hoffman, 2000). In the present work, we investigated how much time it takes for an object-based attentional representation to develop. Observers detected a target embedded in overlapping dashed lines. A cue (70% validity) was also presented. The SOA between the cue and objects was varied (cue before target/objects by 75 and 150 ms, cue and objects simultaneously presented, or object preceded cue by 75 and 150 ms). As before, when target and objects were presented simultaneously, no object-based effects were found. Also, object-based effects occurred in the 150 ms SOA case (objects before cue) but not the 75 ms SOA case, suggesting that object-based representations do not occur instantaneously.

**(4) EFFECTS OF GLOBAL AND LOCAL ATTENTION ON CATEGORIZING
OBJECTS AT DIFFERENT LEVELS**

**Mary-Ellen Large and Patricia A. McMullen
Dalhousie University**

Objects are identified more quickly at basic than subordinate levels. This effect may be due to global and local attentional differences. A global/local, divided attention task primed a category detection task. Distractors varied in their degree of visual similarity to target categories. The same paradigm was used in a second experiment and sizes of global/local stimuli were varied to test perceptual effects on attentional priming. Both experiments showed that local processing primed detections when distractors were visually similar and global processing primed detections when distractors were visually dissimilar. These results support the involvement of global and local attention in object



recognition. Effects of physical size of the attentional stimuli suggest that this type of priming cannot be explained by attentional factors alone.

(5) ATTENTIONAL CONTROL, TASK SWITCHING, AND A NEW DEFINITION FOR THE RESIDUAL SWITCH COST

**Andrew B. Leber and Howard E. Egeth
Johns Hopkins University**

Recent research suggests that attentional control is largely influenced by top-down processes. It follows that it should behave like other executive control functions, and we explored this intuition by creating tasks – using single-target rapid serial visual presentation (RSVP) - requiring subjects to switch their attentional sets from trial to trial (similar to traditional task switching paradigms). While our early work (Leber & Egeth, 2001) found a pattern of data typical of traditional switching tasks, the characteristic residual switch cost (Rogers & Monsell, 1995) was not observed. Present work manipulated the temporal position of the target in the RSVP stream, and residual costs were observed for earlier targets. The existence of the cost supports the notion that attentional control is like other executive functions, and its dependence on temporal position shows that engagement in the task (rather than completion) is necessary to overcome the residual cost.

(6) ANTI-PRIMING OF VISUAL OBJECTS

**Carmen E. Westerberg, David R. Andresen,
William E. Stevenson, and Chad J. Marsolek
University of Minnesota**

Recognizing an object facilitates subsequent recognition of that object (priming), but also reduces recognition of other objects (“anti-priming”). We tested the possibility that anti-priming occurs in one, but not another, visual subsystem; in neural-network simulations, it occurred in a subnetwork that represented inputs in non-independent ways to recognize categories, but not in a subnetwork that represented inputs in independent ways to recognize exemplars. Participants were visually primed with objects or non-visually primed with auditory names of objects. Consistent with the models, when different objects were presented at test, anti-priming was observed in direct left-hemisphere, but not direct right-hemisphere test presentations.

(7) DIFFERENT PROCESSES FOR ENUMERATING ELEMENTS OF OBJECTS AND SCENES

**Anthony Cate
Carnegie Mellon University**

These experiments examined healthy subjects' abilities to enumerate cylinders that were either parts of the same object or different objects. The results indicate that objects and scenes are processed in fundamentally different ways, even when the object and scene stimuli are highly similar, and even for a relatively simple task. When the cylindrical elements were separate objects ("scenes"), performance declined with greater numbers of elements, suggesting that each element was represented individually. When they were part of the same object ("objects"), the enumeration judgments appeared to be based on categorical judgments (i.e. "many" or "few").



Furthermore, learned expertise in making the enumeration judgment was exemplar-specific for the object stimuli, but generalized to new exemplars for the scene stimuli.

(8) PICTURE-OBJECT EQUIVALENCE AND NATURAL CONCEPT FORMATION IN HUMANS AND BABOONS: INTRA-MODAL (VISUAL-VISUAL) AND CROSS-MODAL (VISUAL-AUDITORY) PRIMING IN A "HUMAN VERSUS BABOON" CATEGORIZATION TASK.

Julie Martin-Malivel and Joel Fagot

Centre de Recherche en Neurosciences Cognitives, CNRS, Marseille

Picture-object equivalence and concept formation were investigated in baboons and humans using intra-modal and cross-modal priming procedures. Subjects were trained to go/no-go sort target pictures of either humans or baboons presented after a prime image. For both species, response times were shorter when the primes and targets were category consistent rather than category inconsistent (Experiment 1). Categorical priming remained in baboons with grayscale or cutout prime pictures (Experiment 2). Further experiments used images as visual primes and vocalizations as auditory targets. Categorical cross-modal priming with either color or grayscale primes was demonstrated in humans and in one of two baboon subjects (Experiments 3-4). Results confirm categorical abilities of baboons and demonstrate that these animals have the ability to process pictures as representations of real humans or baboons. They further suggest the existence of interindividual differences in picture processing modes.

(9) LARGEST AREA AND HIGHEST ILLUMINATION DETERMINE OBJECT LIGHTNESS

**Suncica Zdravkovic and Alan Gilchrist
Rutgers University**

When an object lies in two different illuminations, observers give different lightness matches for the two regions (patches). They also make an independent match for the whole object. Our goal was to determine whether there is a systematic relationship between the object and patch matches. Seven experiments are reported showing that object lightness depends on two rules: 1) object matches will follow the patch matches under the larger field of illumination, 2) object matches will follow the patch matches under the highest illumination. This implies a parallel between anchoring in the illumination domain and anchoring in the lightness domain.

**(10) CANCELLED
ISOLATING THE "SPECIAL" COMPONENT OF FACE RECOGNITION.**

**Elinor McKone
Australian National University**

Several paradigms have demonstrated a qualitative difference between upright and inverted faces: upright faces are processed as wholes, while inverted faces are processed as a collection of separable parts. With most current methods, however, it is difficult to isolate the whole-face component of face recognition, independent of part-based and early visual processing. Here, I describe two simple techniques for doing so. Each produces good performance for upright whole faces, together with chance performance for inverted faces and for single face parts. The techniques are also used



to explore properties of whole-face processing, including its orientation tuning and size tuning. Results have implications for theories of pattern recognition in general, and of face recognition in particular.

(11) RECOGNITION OF DYNAMIC FACIAL EXPRESSION IN POINT LIGHT DISPLAYS

Yukari Takarae (1) and Michael K. McBeath (2)

(1) Kent State University (2) Arizona State University

We investigated roles of global and local motion in recognition of dynamic facial expressions and measured its threshold using point-light displays. We videotaped actors producing each of six basic emotions while wearing black make-up with variable numbers of white dots to manipulate amount of information available. For most expressions, recognition accuracy increased with number of point lights from a threshold of about 14 lights, supporting reliance on global motion patterns produced by facial muscles. However, recognition accuracy for happy was notably higher and unaffected by number of point lights, and appears to rely on characteristic local motion. The findings support that facial expression recognition is not a unitary process and that each expression may be conveyed by different perceptual information.

(12) DEVELOPMENTAL PROSOPAGNOSIA WITH NORMAL NON-FACE INDIVIDUAL ITEM DISCRIMINATION

Brad Duchaine

University of California, Santa Barbara

Bill Choisser is a developmental prosopagnosic who reports no object recognition difficulties. Work with other prosopagnosics has shown normal object recognition performance, but these reports did not include measures of response time. This leaves open the possibility that abnormally long latencies on these object recognition tests allowed these subjects to pull their accuracy scores into the normal range. I have run a variety of object recognition tests with Bill that measured both discrimination and response time. Bill showed difficulties with unfamiliar face recognition tasks, but did not show any impairments with shoes, cars, horses, houses, or natural scenes. This demonstrates that even when response time is measured face recognition can dissociate from object recognition.

(13) DO FACES AND OBJECTS COMPETE FOR ATTENTION?

Karen Borrmann, Isabelle Boutet, and A. Chaudhuri

McGill University

In this study, we examine whether faces and objects compete for attention, and whether their differential processing is reflected in the way attention influences recognition. In a priming paradigm, positive priming was found for both attended faces and attended houses. Negative priming was found for unattended faces, suggesting that faces and objects compete for attention. However, negative priming was not found for unattended houses, indicating a differential influence of attention, whereby faces might either capture attention, or be processed in a highly automatic fashion.



(14) OBJECT--BUT NOT FACE--MATCHING IS INVARIANT TO DIFFERENCES IN CONTRAST POLARITY FOR BOTH NAÏVE AND EXPERT SUBJECTS.

**Marissa Nederhouser, Michael Mangini, and Irving Biederman
University of Southern California**

Face matching suffers tremendously when the faces differ in contrast polarity but no such costs are apparent when matching objects. Unlike face matching, object matching can generally be accomplished by using discontinuities that would be unaffected by changes in contrast polarity. Would object recognition remain invariant when differences in edges and nonaccidental properties were not available? Subjects matched pairs of smooth, blobby, asymmetric volumes generated from the harmonics of a sphere. Changes in contrast polarity had no effect on the matching of these stimuli, either for naïve subjects or for “experts” that had practiced for over 8,000 trials with images of positive contrast. These results suggest that faces are special with respect to sensitivity to direction of contrast.

(15) VISUAL WORKING MEMORY FOR CATEGORIES AND EXEMPLARS OF OBJECTS

E. Darcy Burgund (1), Lisa C. Elo (2), and Chad J. Marsolek (2)

**(1) Department of Radiology, Washington University School of Medicine
(2) Department of Psychology, University of Minnesota**

We examined visual working memory for unfamiliar objects. In each trial, a sample object was presented briefly in the central visual field, and after a blank display, a probe object was presented briefly in the left or right visual field. In one task, subjects judged whether the probe object belonged to the same abstract category as the sample object, and in the other task they judged whether the probe object was the same specific exemplar as the sample object. Abstract-category judgments were more accurate when the probe was presented directly to the left hemisphere than to the right, and specific-exemplar judgments were more accurate when the probe was presented directly to the right hemisphere than to the left.

**(16) COMPARISON-INDUCED MISESTIMATES OF BODY SIZE:
A WARNING FOR VISION SCIENTISTS**

**Jessica M. Choplin, Gia M. Hovannisian and Elysabeth Nguyen
University of California, Los Angeles**

Five experiments explored the effects of comparisons on body-size judgments. In Experiment 1, participants judged the size of an average-sized woman after using either the word “thinner” or the word “fatter” to comparing her to an overweight or underweight woman. These comparisons biased judgments of her body size. In Experiments 2-4, participants from three populations – Los Angeles gym patrons, American undergraduates and Vietnamese undergraduates – compared themselves to others and judged their own body sizes. Idiosyncratic uses of comparisons within these populations produced different patterns of egocentric body-size judgments. In Experiment 5, factors irrelevant to body size mediated body-size comparison effects. We argue that



analogous comparisons might be a confounding variable in effects traditionally thought perceptual (e.g., Ebbinghaus illusion).

(17) CAPACITY LIMITS IN VISUAL SHORT-TERM MEMORY FOR LOCAL ORIENTATIONS

Jean-Francois Delvenne (1) , J. Braithwaite (2) , M. Riddoch (2), and Glyn Humphreys(2)

(1) University of Louvain-la-Neuve (Belgium)

(2) University of Birmingham (United Kingdom)

We used a change detection paradigm to assess the capacity of visual short-term memory (VSTM) for single feature such as orientation or texture of line elements. We demonstrated that when the support of configural information was minimized (by the addition of circles around each line), VSTM capacity was selectively disrupted for line orientation, whereas capacity limits on memory for line texture were irrespective of whether circles were presented to disrupt the coding of lines into a more global configuration. We conclude from these observations that the relational information of individual visual items, based on global spatial configuration, is stored in VSTM and may, in some cases, increase the capacity of VSTM.

(18) GARNER INTERFERENCE AS A DIAGNOSTIC FOR LOW-LEVEL VISUAL GROUPING AND EMERGENT FEATURES

James R. Pomerantz

Rice University

Garner Interference (GI) has been shown to measure the grouping of lines into unitary perceptual configurations. E.g., when Ss classify curved line pairs such as ((, (,), (, and)) on the basis of one line, RTs rise sharply when the other varies orthogonally. Altering the lines' positions (and thus perceived grouping) changes their GI levels in an orderly fashion. We extend these findings to simpler forms of perceptual organization with just two dots in the field, and we discuss GI's potential to identify such emergent features as symmetry, collinearity, parallelism, closure, relatability, intersections, terminators and edges. Lastly, we contrast GI with other diagnostics for grouping, and we ask whether GI results from a failure to focus attention.

(19) DOES FADING ACCELERATE PERCEPTUAL LEARNING?

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Recent work suggests that learning of relatively complex discriminations (e.g., linguistic sounds: Jamison and Morosan, 1986, 1989; Merzenich et al, 1996) can be sped up by fading (i.e., beginning with magnified stimulus differences and gradually reducing the contrast.) We asked whether this would apply to elementary discriminations on a sensory continuum (pitch discrimination, line length discrimination.) We compared fading to hard training, where observers were required to try to distinguish between the same difficult discrimination (the same discrimination as they would be tested upon) for the same number of trials. At least for an elementary continuum, fading does not appear to generally produce superior learning.



(20) ELECTROPHYSIOLOGICAL ANALYSIS OF VISUAL MARKING
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Visual marking is an attentional mechanism that enables observers to selectively search through new information in a visual field. In a visual marking task search items are presented in two sets, separated by a time interval (gap interval), and with the second set containing the target. ERPs were used to investigate whether visual marking operates during the gap interval. Premasks, created by overlapping all possible stimulus segments, were used to generate the search items. ERPs were recorded to the probe, presented at the old and new locations in the gap interval. Significant differences in N1 and P300 components were found, with the amplitude larger at the locations of the new objects, indicating differential allocation of attention.

(21) GROUPING OF PLACES TO REGIONS DOES INFLUENCE
HUMAN ROUTE PLANNING
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It is widely accepted that spatial memory is hierarchically structured. However, little is known about the consequences of hierarchical organization on route-planning and navigation. Here we demonstrate the influence of grouping places into regions on active navigation in virtual environments. Subjects had to learn a spatial layout of 12 interconnected places which could be grouped into three regions according to the object types found at each place. In subsequent navigation tasks subjects were asked to find the shortest routes connecting 3 of those places. When there were two alternative solutions of equal length, subjects preferred the route that led through fewer regions. We conclude that regions exist within spatial memory and that route-planning is based on region, not place connectivity.

(22) EFFECTS OF ORIENTATION ON AMODAL COMPLETION:
PRIMED-MATCHING PARADIGM
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To further demonstrate that orientation affects amodal completion (Srebotnjak 1984; Sekuler 1993; Sgorbissa & Gerbino 1999) we used a primed-matching paradigm with variable-duration primes (50, 400, 1000 ms). At long prime durations one region of the prime could be perceived as an amodally completed fish-like shape. According to the field model of visual interpolation (Gerbino & Fantoni, 2000), a fish-like shape is perceived only when orientation along the cardinal axes supports the good continuation of amodally completed contours. Matching stimuli were fishes and crosses displayed in



two orientations, always consistent with the orientation of the prime. Orientation modulated priming only at long prime durations. As predicted by the field model of visual interpolation, good continuation was more effective when T-junction stems were collinear with cardinal axes.