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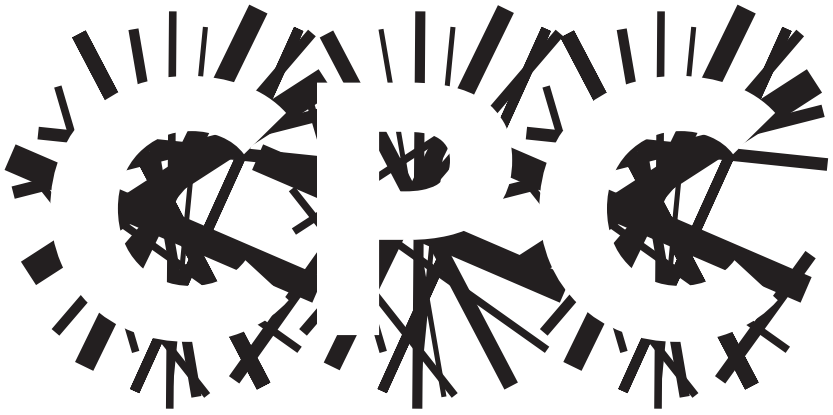

2016

Configural Processing Consortium

www.configural.org

Wednesday, November 16, 2016
8:30 a.m. - 5:30 p.m.

Meeting Room: Back Bay D (2nd Floor)

CPC 2016 is sponsored by:
Psychonomic Society
and
Center for Vision Research in
Brown Institute for Brain Sciences
at Brown University

CPC 2016 Meeting Overview

MORNING

8:30 – 8:50 Arrival

8:50 – 9:00 Opening Remarks

9:00 – 9:45 Keynote I: Yaoda Xu

Using fMRI pattern analysis to study the part-whole relationship in the human brain

9:45 – 9:50 Brief Pause

9:50 – 10:35 Session I

9:50 Philip J. Kellman, Susan B. Carrigan, & Gennady Erlikhman
Path Integration and Illusory Contours: Evidence for an Intermediate Representation in Visual Contour Interpolation

10:05 Nicholas Baker & Philip J. Kellman
Abstract Shape Representation

10:20 James T. Townsend
Tweedledum & Tweedledee Reloaded Redux

10:35 – 10:50 COFFEE BREAK

10:50 – 11:35 Session II

10:50 Ruth Kimchi Dina Devyatko, and Shahar Sabary
Can perceptual grouping unfold in the absence of visual consciousness?

11:05 Alex Holcombe
The role of attentional shifts in apprehending relative position

11:20 Mary A. Peterson
Probing the Role of Feedback in Familiarity Responses to Parts and Wholes

11:35 – 12:00 Morning Discussion

12:00 – 2:00 LUNCH BREAK

See last page of program for lunch options nearby

AFTERNOON

2:00 – 2:45 Keynote II: Karen B. Schloss

The role of perceptual-cognitive fit in interpreting messages from visual features

2:45 – 2:50 Brief Pause

2:50 – 3:35 Session III

2:50 Andrew Hendrickson, Chris Donkin, and Daniel J. Navarro
Modeling perceptual choice response time distributions with multiple similarity signals

3:05 Daniel Little
Further tests of a sequence-sensitive exemplar account of speeded-classification performance in a modified Garner paradigm

3:20 Daniel Algom
The Evasive Art of Modeling Garner Interference

3:35 – 3:50 COFFEE BREAK

3:50 – 4:35 Session IV

3:50 Patrick Garrigan
Relational Processing in Visual Working Memory

4:05 Joe Lappin
A Channel Capacity for Visual Awareness of Spatiotemporal Information

4:20 Boaz Ben-David
Configural Processes in the Perception of Emotions in Speech in Different Populations: The Rules for Combining Parts (Prosody and Semantics) to Create the Whole (Emotional Speech)

4:35 – 5:00 Afternoon Discussion

5:00 – 5:30 Business Meeting

6:30 Dinner at Café Jaffa

48 Gloucester Street (between Newbury St. & Boylston St.)

CPC 2016 Meeting Information

ABOUT CPC

The Configural Processing Consortium (CPC) is an annual workshop bringing together researchers in the field of configurality research. We aim to tackle deep issues underpinning perceptual organization, cognition, and action as well as the most cutting edge theoretical and experimental research on configural topics. Although vision typically dominates, our interests include all modalities. Each year, we seek to both define the major problems underlying the field of configural processing and to develop more unified ways of approaching these problems.

CPC ORGANIZING COMMITTEE

Mary Peterson University of Arizona, *CPC President*
Karen Schloss University of Wisconsin – Madison, *Local Host*
Takeo Watanabe Brown University, *Local Host*
Ami Eidels University of Newcastle
Joseph Houpt Wright State University
Leslie Blaha Pacific Northwest National Laboratory
Ruth Kimchi University of Haifa
James Townsend Indiana University Bloomington
James Pomerantz Rice University

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CPC is grateful for generous support from the Psychonomic Society and the Center for Vision Research in the Brown Institute for Brain Sciences, Brown University.

Abstracts

KEYNOTE I

Using fMRI pattern analysis to study the part-whole relationship in the human brain

Yaoda Xu
Department of Psychology, Harvard University

Past neuroscience research has focused primarily on the processing and recognition of simple shapes and single objects. Yet in everyday vision, we see not just shapes and objects, but shapes conjoining to form objects and objects interacting to form scenes. It has been well documented that neuronal firing rates and fMRI multi-voxel response patterns for two independent objects shown simultaneously can be approximated by the averaged neural responses to each object shown in isolation. This linear relationship between two independent objects in a pair has inspired us to carry out a series of studies investigating how well fMRI response patterns for isolated parts may predict those of whole objects and when a linear part-whole relationship ceases to exist. Using this approach, we have studied how familiar configurations of parts may impact object representations in the human ventral visual cortex, the relationship between objects when there is a contextual association between them and when an action is performed between two objects. We also examined whether or not a linear relationship between two unrelated objects exists in the human parietal object processing regions. Our part-whole fMRI pattern analysis approach provides a new way to investigate how simple visual representations may give rise to complex ones in the human brain.

SESSION I

Path Integration and Illusory Contours: Evidence for an Intermediate Representation in Visual Contour Interpolation

Philip J. Kellman, Susan B. Carrigan and Gennady Erlikhman
Department of Psychology, UCLA

Field, Hayes & Hess (1993) showed that certain geometric relations of spatially separated Gabor elements supported detection of the "path" from surrounding noise elements. The relation of path integration to contour interpolation, as in illusory and occluded contours, has remained unclear. The geometric conditions for path detection appear to be the same as those for contour relatability in contour interpolation, but detection of a path of Gabor elements is not accompanied by perception of illusory contours connecting the elements. We hypothesized that path detection accesses an intermediate contour-linking representation that is necessary but not sufficient for perception of interpolated contours. After early contour linking, further scene constraints determine whether interpolated contours will be perceived. We tested these ideas in a series of experiments. Illusory contour perception was studied with a magnitude estimation procedure using standard Gabor elements, modified Gabors with centers matching the background, and step-edge versions of both of these display types. We also tested path detection for these four display types using a 2IFC task; participants searched for collinear paths or paths in which elements were misaligned by varying degrees. The results showed that: 1) All 4 display types showed the same path detection performance: Path detection declined with misalignment to chance performance by about 15-20 arc min of retinal misalignment; 2) Illusory contours connecting path elements were not perceived with Gabor elements or modified "step-edge" Gabors, but were consistently perceived with Gabors whose centers were modified to match the surround; and 3) For the latter element types, illusory contour judgments showed the same function of decline with element misalignment as did path detection. These results support the idea that an intermediate contour-linking stage is shared by both path detection and illusory contour formation, but perceiving interpolated contours depends additionally on surface constraints.

Abstract Shape Representation

Nicholas Baker & Philip J. Kellman
Department of Psychology, UCLA

Shape is an abstract notion, as evidenced when we can see a closed contour figure from dots, or when a cloud appears to resemble a fish. In visual processing, abstract shape likely emerges sometime after the initial registration of visual features. We investigated the time course of the emergence of abstract shape representations. In Experiment 1, novel shapes defined by black and white dots along a virtual contour were generated and displayed on a gray background for between 30 and 400 ms, followed by a dot mask for 100 ms. A second shape was then shown, and participants performed a forced choice same-different task. "Same" shapes were defined as having the same dot-defined shape, whether the same in location, orientation and size, or across 2D transformations of translation, rotation or scaling. "Different" shapes were constructed by deforming the outline of the original shape. Participants showed chance performance at the shortest presentation time and improved monotonically up to about 110 ms. All transformation types showed similar patterns. Experiment 2 found that early visual feature registration, such as dot locations, are available during the first 30 ms after stimulus onset. Experiment 3 found that shape representations tend to dominate local feature maps when participants did a same/different task based on exact locations of dots. Taken together, these experiments provide evidence for the existence and processing of abstract shape representations. Abstract shape becomes fully available after about 100 ms of processing.

Tweedledum & Tweedledee Reloaded Redux

James T. Townsend
Department of Psychology, Indiana University

It's been known for some time that independent and perceptually separable channel dimensions can produce redundancy gains in that Performance (2 signals) > Performance (1 signal) (1) Hence, Wendell Garner's ingenious but incomplete thesis that (1) implies configurality (i.e., integral dimensions) is not quite right. (His 'Garner filtering speeded classification method did not suffer this artifact.) However, when performance is better than probability summation we call that "super capacity" with our C(t)>1. When the Miller race inequality is violated, super capacity is present but super capacity does not imply Miller's race inequality (Miller, 1982). Super capacity can be due to correlations between channel times and/or channel processing activations (e.g., Colonius, 1990; Townsend & Wenger, 2004; Eidels, Houpt, Altieri, Pei, and Townsend, 2011). Paradoxically (actually we have here an antinomy rather than a true paradox), in some cases a negative correlation causes high super capacity and in others a positive correlation does so. This talk indicates how and why, with actual dynamic systems lending nice examples.

SESSION II

Can perceptual grouping unfold in the absence of visual consciousness?

Ruth Kimchi, Dina Devyatko, and Shahar Sabary
Department of Psychology, University of Haifa

In this study, we examined whether visual consciousness is required for two perceptual grouping principles: luminance similarity and element connectedness. Participants were presented with a liminal prime consisted of dots organized into rows or columns by luminance similarity (Experiment 1) or by element connectedness (Experiment 2), followed by a clearly visible target composed of lines, the orientation of which could be congruent or incongruent with the orientation of the prime. The prime was rendered invisible using continuous flash suppression (CFS), and the prime-target SOA varied (200,400, 600, or 800 ms). On each trial participants made speeded discrimination response to the orientation of the target lines and then rated the visibility of the prime using a scale ranging from 0 to 3. Unconscious grouping of the prime was measured as the priming effect on target discrimination performance of prime-target orientation congruency, on trials in which participants reported no visibility of the prime. In both experiments, and across all prime-target SOA, there were no priming when the prime was reported invisible; significant priming was observed when the prime was reported visible. These findings suggest that perceptual grouping by luminance similarity and by element connectedness does not take place when the visual stimulus is rendered nonconscious using CFS.

The role of attentional shifts in apprehending relative position

Alex Holcombe

School of Psychology, University of Sydney

What type of mental processing is required to apprehend the relative position of, say, two colored patches? I will describe four lines of evidence that perceiving this type of configuration requires a shift of attention from one of the patches to the other. Each line of evidence is not strong enough by itself to compel the aforementioned conclusion, but together they may provide a strong case. The first line of evidence comes from visual search experiments, the second from eye movement studies, the third from ERP experiments, and the fourth from a study of attentional tracking. The potential role of shifts of attention for perceiving other configurations will be discussed.

Probing the Role of Feedback in Familiarity Responses to Parts and Wholes

Mary A. Peterson

Department of Psychology, University of Arizona

On a traditional, serial, view of visual perception parts are represented in early levels of the hierarchical visual processing stream where receptive fields are small and are subsumed into wholes in higher levels where receptive fields are larger. On this view, part responses are lost at higher levels. Recent research has shown that a traditionally high-level structure -- the perirhinal cortex (PRC) of the medial temporal lobe (MTL) – known to distinguish between familiar and novel objects, also responds differently to two types of novel objects: *Control Novel Objects*, composed of novel parts, and *Part-Rearranged Novel Objects,* constructed by rearranging the parts of a familiar object into a novel configuration. These results imply that part familiarity as well as whole familiarity is represented in the PRC. Moreover, participants with damage to the PRC treat *Part-Rearranged Novel Object*s as familiar objects. Based on this evidence, my colleagues and I suggested that feedback from the intact PRC inhibits or facilitates lower-level part-familiarity responses as a function of the familiarity of the whole. Recent fMRI evidence consistent with this hypothesis suggests a dynamic interactive conceptualization of neural responses to parts and wholes.

KEYNOTE II

The role of perceptual-cognitive fit in interpreting messages from visual features

Karen B. Schloss

Department of Psychology and Wisconsin Institute for Discovery, University of Wisconsin – Madison

Configural processing is typically discussed with respect to a single perceptual modality; visual elements organize to form contours and auditory tones organize to form melodies. Configural processing can also be discussed in terms of goodness-of-fit across different perceptual modalities; lighter colors "fit" with faster music whereas darker colors "fit" with slower music. Here, I will discuss another kind of configural processing that spans perception and cognition, called perceptual-cognitive fit. The premise is that people form conceptual associations with perceptual features, such as associating larger quantities of matter with darker colors (dark-is-more bias). As such, darker colors "fit" with larger quantities and lighter colors "fit" with smaller quantities. In the world, perceptual features are used to convey conceptual messages, such as using lightness of colors to depict quantities of some measure in colormap data visualizations. It should be easier to interpret messages from visual features when there is stronger "fit" between the percepts and concepts they depict. Therefore, we can understand the nature of perceptual-cognitive fit by determining which data visualizations are easier to interpret. Using this approach, we found that perceptual-cognitive fit between lightness and quantities is modulated by whether there is perceptual evidence for transparency. We also found that new forms of perceptual-cognitive fit can be cultivated on-the-fly while viewing a short series of lecture slides. Both studies reveal that perceptual-cognitive fit is relational, depending on perceptual relations among colors used to depict conceptual information and relations between those colors other colors in the visual scene.

SESSION III

Modeling perceptual choice response time distributions with multiple similarity signals

Andrew Hendrickson[1], Chris Donkin[2], and Daniel J. Navarro[2]

[1]School of Psychology, University of Adelaide, [2]School of Psychology, University of New South Wales

Goldstone & Medin (1994) proposed that perceptual similarity is determined at least two similarity signals: a fast signal based on feature matching and a slow signal based on aligning features. However, the evidence for these two signals relies on interpreting complex interaction effects from deadline decision tasks and qualitative model fits. In this work we replicate the Goldstone & Medin (1994) design replacing the deadline task with instructions that emphasize speed or accuracy. Using an adaptation of the Linear Ballistic Modeling framework (Brown & Heathcote, 2008), we find that no model with a single similarity signal can account for the distribution of reaction times in this task. Instead, a model with two similarity signals that drive decision making provides a good account of the data. These signals and their timing are consistent with the signals predicted by structural alignment theories of similarity (Gentner, 1983).

Further tests of a sequence-sensitive exemplar account of speeded-classification performance in a modified Garner paradigm

Daniel Little

Melbourne School of Psychological Sciences, University of Melbourne

Little, Wang & Nosofsky (2016) found that the categorization of integral dimension stimuli in their modified Garner task was marked by complex sequential dependencies. This study also found the standard response time differences between the correlated, baseline, and filtering conditions; however, these differences were largely explained by the sequential effects. For instance, the correlated condition was faster than the baseline condition due to an attenuation in the adjacent-item pulling effect. On the other hand, performance in the filtering condition was slower due to a decrease in the number of whole-item repetitions. The present talk presents results testing a prediction that follows from that work: namely, does the same patterns of sequential effects obtain in the categorization of separable dimension stimuli even if "selective attention" can effectively filter out variation on the irrelevant dimension? We test these predictions using two sets of separable dimensions: (1) brightness and saturation varying in separate spatial locations and (2) saturation of a rectangle and the location of an inset vertical line. Using a hierarchical Bayesian implementation of Little et al.'s sequence sensitive exemplar model, we demonstrate the representational differences between conditions disappear when the dimensions are separable but sequential dependencies remain and largely account for performance.

The Evasive Art of Modeling Garner Interference

Daniel Algom

School of Psychological Sciences, Tel-Aviv University

The presence of Garner interference is sometimes taken as one piece of evidence supporting configural processing. The measure documents the failure to attend fully selectively to the task-relevant aspect of stimuli engendered by random variation of an irrelevant aspect of the same stimuli. Gestalt and configural stimuli often strike the observer as an undivided single whole, so that it is difficult to attend to one part without noticing the other parts. This difficulty is what is gauged by Garner interference. However, the measure of Garner interference and the attendant Garner paradigm is naïve in many respects and it notably lacks insight on processing. This situation has naturally invited attempts at accounting for performance in the Garner design via multivariate models of perception. Two notable bids are those of the Examplar Based Random Walk (EBRW) model and of the General Recognition Theory (GRT). Careful analysis shows that neither structure is fully successful at modeling the deceptive simple measure of Garner interference.

SESSION IV

Relational Processing in Visual Working Memory

Patrick Garrigan
Department of Psychology, Saint Joseph's University

The capacity of visual working memory (VWM) is estimated at around 4 items. However, VWM is often probed under conditions specifically intended to limit relational encoding among items. Here we measured VWM fidelities and guess rates for the orientations of pairs of small objects, a more ecological paradigm for which relational encoding could be natural and automatic. We varied Set Size (the variability of objects across trials), a factor that would influence VWM encoding. We also varied Context (the presence of the not-probed object) at retrieval. Set size, but not Context affected performance, suggesting VWM encoding benefits from relational information, but retrieval processes do not. Smaller Set Size was associated with lower guess rates, but no change in fidelity, and further analysis revealed that guess rates improved gradually over the course of the experiment. The increased predictability of to-be-remembered objects in the small Set Size condition appeared to make encoding more robust, but not more precise. A final experiment showed that context does influence response selection, but does not affect performance. We hypothesize that imagery may be sufficient for reinstating context when it is not explicitly present.

A Channel Capacity for Visual Awareness of Spatiotemporal Information

Joe Lappin
Department of Psychology – Vanderbilt University and Discerning Technologies LLC

Problem: What are the capacity limitations of human vision in acquiring information about spatiotemporal patterns? How should spatiotemporal information be quantified? How should visual performance be measured? Lappin, Morse, & Seiffert (2016, AP&P) recently discovered answers to these correlated theoretical questions for certain patterns of multiple moving objects. Method: Observers responded rapidly as possible whenever one of a set of randomly moving objects initiated a non-random "pursuit" motion toward a distinctly marked "prey" object. These target motions occurred unpredictably during continuous visual monitoring periods of several minutes. The effect of the Set Size of moving objects on visual target detection was evaluated by the hazard rates for detection response times. Results: Hazard rates revealed a simple lawful relation between Set Size and detection rate. A single channel capacity (~25 bits/s) for visual awareness was invariant with Set Size (n = 1-12), response time, and length of target motion. The hazard rate for visual awareness was inversely proportional to Set Size and constant over time, invariant with mean RT. Visual motion integration, however, was directly proportional to time over a fixed integration duration (~0.5 s), invariant with Set Size. Visual awareness and motion integration operated in parallel (concurrent, independent, and functionally separable). Observed hazard rates equaled the numerical product of these two component factors.

Configural Processes in the Perception of Emotions in Speech in Different Populations: The Rules for Combining Parts (Prosody and Semantics) to Create the Whole (Emotional Speech)

Boaz Ben-David
School of Psychology – Interdisciplinary Center (IDC) Herzliya

The ability to perceive emotions in speech is at the core of communication. To identify an emotion in the speech as a Whole, one should be able to process and identify the Parts of the utterance -- semantics (lexical meaning) and the prosody (tone of speech) -- and integrate them. What rules govern the integration of the Parts in different populations? To better understand this complex interplay, we used a novel tool, Test for Rating of Emotions in Speech (T-RES). Listeners were presented with 25 spoken sentences. The emotional valence of prosody and semantics appear in different combinations from trial to trial, with five separate discreet emotions (anger, fear, happy, sad and neutral, 5*5 combinations). In the main task, listeners were asked to rate the sentence as a Whole, as if they are talking on the phone. Each spoken sentence was presented four times, rated on four emotional scales (anger, fear, happy and sad) in four separate blocks. For younger adults, the Whole mainly reflects the prosodic Part, with a small effect for semantics. Older adults appear to apply different "rules", where both dimensions contribute to the Whole. Consider the semantically happy sentence "I won the Lottery" spoken with angry prosody. Younger adults rated it as expressing mostly anger, whereas older adults as expressing both anger and happiness to a similar extent. Note, a sentence that expresses anger in both prosody and semantics was rated highest on anger. Initial data on younger adults with ADHD will be discussed.

Lunch Restaurants

PF Chang's * Chinese Prudential Tower, 800 Boylston St, Boston, MA 02199

https://www.pfchangs.com/

Summer Shack * Seafood * 50 Dalton St, Boston, MA 02115

http://www.summershackrestaurant.com/

Bukowski's Tavern * Tavern * 50 Dalton St, Boston, MA 02115

http://bukowskitavern.net/boston/

The Capital Grille * Fine Dining * John B. Hynes Veterans Memorial Convention Center, 900 Boylston St, Boston, MA 02115

http://www.thecapitalgrille.com/

Sonsie Restaurant * Bistro * 327 Newbury St, Boston, MA 02115

http://www.sonsieboston.com/home

Select Oyster Bar * Seafood * 50 Gloucester St, Boston, MA 02115

http://www.selectboston.com

Trident Booksellers & Café * Cafe * 338 Newbury St, Boston, MA 02115

http://tridentbookscafe.com

The Pour House * Grill * 907 Boylston St #21, Boston, MA 02115

http://www.pourhouseboston.com

McGreevy's Boston * Sports Bar * 911 Boylston St, Boston, MA 02115

http://www.mcgreevysboston.com

Top of the Hub * Lounge * Prudential Tower, 800 Boylston St, Boston, MA 02199

http://topofthehub.net

Thornton's Restaurant * Diner * 150 Huntington Ave, Boston, MA 02115

http://thorntonsboston.com

Pho Basil * Thai & Vietnamese * 177 Massachusetts Ave A, Boston, MA 02115

http://www.phobasil.com

Cheesecake Factory * American * 115 Huntington Ave, Boston, MA 02199

http://locations.thecheesecakefactory.com/

La Voile * French * 261 Newbury St, Boston, MA 02116

http://www.lavoileboston.net

5 Napkin Burger * Bistro * 105 Huntington Ave, Boston, MA 02199

http://5napkinburger.com/locations/back-bay/