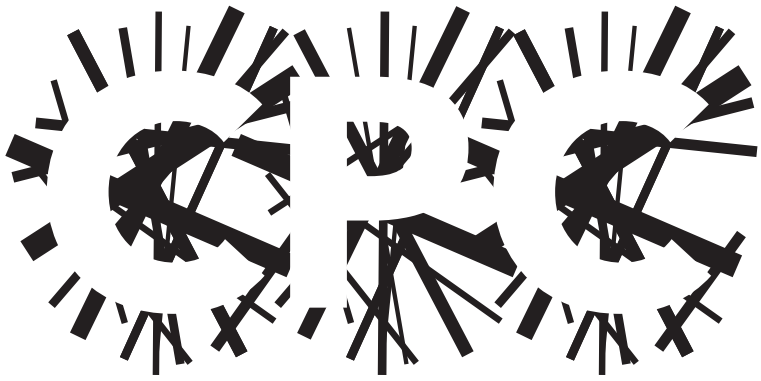
VANCOUVER CONVENTION CENTER WEST

Vancouver, British Columbia, Canada



CPC 2017

Configural Processing Consortium

www.configural.org

Wednesday, November 8, 2017

8:30 a.m. - 4:00 p.m.

Vancouver Convension Center West

Meeting Room 107-108

CPC 2017 is sponsored by:

PSYCHONOMIC SOCIETY

THE UNIVERSITY OF BRITISH COLUMBIA

Meeting Overview

MORNING

8:30 – 8:45 Arrival

Coffee and assorted baked goods

8:45 – 8:50 Opening Remarks

8:50 – 9:35 Keynote I: Jim Enns

Bottling synergy: Keeping the fizz in psychophysics

9:35 – 9:45 Q&A/Discussion/Transition

9:45 – 10:45 Session I

9:45 The Emergent Feature of Parallelism is Perceived Directly

Curtiss Chapman, Colin Noe, Jon Flynn, Yingxue Tian, & James R. Pomerantz

10:05 Unique or universal: Can holistic face perception be explained by general-purpose perceptual mechanisms?

Kim Curby

10:25 Figure-Ground Perception: Reassessing Convexity

Mary A. Peterson

10:45 – 11:00 COFFEE BREAK

11:00 – 11:20 Session II

11:00 Deep Convolutional Networks do not Classify Based on Global Object Shape

Nicholas Baker, Hongjing Lu, Gennady Erlikhman, & Philip J. Kellman

11:20 The Effect of Feature Separation on Processing Architecture

Sarah Moneer & Daniel R. Little

11:40 Limits to configurality in language

Vsevolod Kapatsinski

12:00 – 1:30 LUNCH BREAK

AFTERNOON

1:30 – 2:15 Keynote II: Joe Houpt

Quantifying Configural Perception

2:15 – 2:25 Q&A/Discussion/Transition

2:25 – 3:05 Session III

2:25 A test of the processing of composite faces using Systems Factorial Technology and Logical-rule Models

Xue Jun Cheng, Callum J. McCarthy, Tony Wang, Thomas J. Palmeri, Daniel R. Little

2:45 Perceptual Organization Modulates the Uncertainty that Drives Object-Based Attention

Adam Greenberg

3:05 – 3:30 General Discussion

3:30 – 3:45 Business Meeting

7:30 Dinner at Listel Hotel

Sculpture Gallery
1300 Robson Street
Vancouver, BC Canada V6E 1C5
www.thelistelhotel.com

Cash bar opens at 6:30pm, dinner will be served at 7:30pm

CPC 2017 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*
Jim Enns University of British Columbia, *Local Host*
Karen Schloss University of Wisconsin – Madison, *Secretary*
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Abstracts

KEYNOTE I

Bottling synergy: Keeping the fizz in psychophysics

Jim Enns
Psychology – University of British Columbia

In realms of human behavior as diverse as texture perception, visual search, speech perception, social perception, and collaborative cognition, most of the interesting aspects of human behavior seem to involve interactions that are hard to bottle (measure). In this talk, I will tell personal stories about my quest to do just that. My hope is that lessons on studying synergy at different levels of behavior will emerge.

KEYNOTE II

Quantifying Configural Perception

Joe Houpt
Psychology – Wright State University

Many studies of configural perception focus on a categorical distinction. This is due in part to the nature of the empirical designs and to the measurements applied to those designs. For example, face perception is thought to rely on configural processing mechanisms because the process is faster when faces are observed in their canonical configuration and slower in non-canonical orientations. There are cases in which there is evidence for a graded scale of configurality as well. These approaches have tended to rely on accuracy and/or response time comparisons, which are sufficient for comparing among very similar stimuli but are problematic when comparing across stimuli. In this talk I will argue for the capacity coefficient and related measures as indexes for degrees of configural perception. I will review the derivation of the measure, the theoretical motivation for its use in configural perception, and will summarize a few studies on configural perception that relied on the capacity coefficient.

SESSION I

The Emergent Feature of Parallelism is Perceived Directly

Curtiss Chapman, Colin Noe, Jon Flynn, Yingxue Tian, and James R. Pomerantz
Psychology – Rice University

Humans are highly sensitive to parallelism, but the process we use to detect it remains unknown. One could detect parallelism by registering and then comparing line slopes, but our results suggest otherwise. When the task is to detect the one oddly oriented line segment amidst three other, identically sloped lines, subjects perform better when those lines are in cardinal orientation (vertical or horizontal) rather than diagonal (the Oblique Effect, or OE). But when the task is to find the one pair of line segments that is not parallel in a field of three other, identical pairs that are parallel, the OE is greatly reduced despite there being twice as many diagonals to process. We also find a Configural Superiority Effect: we are better at discriminating line orientations when non-informative context lines are added nearby to create the emergent feature of parallelism. The results suggest we may perceive parallelism directly.

Unique or universal: Can holistic face perception be explained by general-purpose perceptual mechanisms?

Kim Curby
Psychology – Macquarie University

It is often assumed that face perception is supported by specialized or domain-specific mechanisms. However, there is growing evidence that the holistic nature of face perception may instead emerge from an interaction between experience and basic domain-general visual processing mechanisms. In this presentation, I will present a framework for understanding holistic face processing grounded in our understanding of the effects of experience on perceptual grouping mechanisms and object-based attention, and their resulting benefits for object perception more generally. I will present evidence from my own work, and also that of others, that suggests a role of domain-general mechanisms in what otherwise appears to be domain-specific holistic face perception effects. I will also connect this framework with an existing model of object-based attention to demonstrate how this framework can potentially explain holistic processing effects observed for objects of expertise.

Figure-Ground Perception: Reassessing Convexity

Mary Peterson
Psychology and Cognitive Science – University of Arizona

A classic Gestalt demonstration is that ~90% of viewers perceive convex regions as figure when shown 8-region displays with alternating black and white (B&W) convex and concave regions. As a consequence, many scientists assumed that convexity is a very powerful figural cue. Recently, we showed that convexity alone couldn't account for these responses; homogeneous fill (HF) in the concave regions is necessary. We also found that the probability of perceiving convex regions as figure is low in 2-region displays and increases with region number. Together these results led us to propose that HF in alternating regions is a background prior, and that, as the number of HF regions increases, the probability that they are visible portions of a surface behind interposed figures increases. Our analysis predicted that classic B&W 8-region displays are ambiguous because both convex and concave regions are HF and hence, are good candidates for backgrounds. Recent experiments using both monoptic and dichoptic masks support this hypothesis and suggest that early feedback is necessary to resolve ambiguity in the classic displays. Thus, the mechanisms of figure assignment are more complex than supposed based on classic Gestalt demonstrations.

SESSION II

Deep Convolutional Networks do not Classify Based on Global Object Shape

Nicholas Baker[1], Hongjing Lu[1], Gennady Erlikhman[2], Philip J. Kellman[1]
[1]*Psychology – University of California, Los Angeles*
[2]University of Nevada, Reno

Deep convolutional networks are achieving previously unseen performance in object classification raising questions about whether CNNs share similar representations with the human visual system. In biological vision, shape is arguably the most important cue for recognition. Objects that differ from their normal appearance in surface texture, high frequency contour information, or context continue to be recognizable by human observers, provided that the object's shape is preserved. We present several simulations showing that CNNs do not make classifications based on global object shape. When shape is preserved, but texture information

and context are changed, the network fails to correctly classify the object. Conversely, when shape information is perturbed by scrambling, network performance is unaffected, while human recognition suffers. Our results suggest that deep networks trained on natural images use texture information of both the target and background and local edge features for classification but have little representation of object shape information.

The Effect of Feature Separation on Processing Architecture

Sarah Moneer and Daniel R. Little
School of Psychological Sciences – The University of Melbourne

The processing of separable dimensions (i.e., dimensions that can be attended to independently) has been shown to be analytic (serial) when presented in separate locations, but more configural (parallel) when they are overlapped in the same object. We manipulated the object affiliation (i.e., same or different objects) of a pair of visual features (saturation and orientation) and the separation between them in a categorization task to investigate the relationship between the configurality of separable dimensions and feature separation. Bayesian hierarchical models and Systems Factorial Technology analyses were used to determine processing strategies. Data from all separation conditions was generally best fit by a model that allows for a mixture of serial and parallel trials. The proportion of serial trials estimated by the model varied with separation in a meaningful way that suggests a shift from configural to analytic processing as feature separation increases.

Limits to configurality in language

Vsevolod Kapatsinski
Linguistics – University of Oregon

Alternative approached to the study of language and its processing have long differed in the degree to which language is thought to be compositional vs. formulaic/configural. I have explored this question empirically by testing two hypotheses. First, if a configuration is represented separately from its parts, it can acquire associations that its parts do not have (a.k.a. unique associations). Therefore, if a linguistic unit is represented as more than the sum of its parts, then it should be easier to learn new unique associations for such a unit than for a comparable sequence that does not form a unit. Second, if a unit has a separate lexical (meaning-linked) representation, it should compete with its lexical parts during recognition. Since frequent units are, other things being equal, stronger competitors, parts that occur in frequent wholes should be harder to recognize. While we have obtained some evidence for such interactions (Kapatsinsi, 2009, Language; Kapatsinski & Radicke, 2009), configural patterns in natural languages appear to be interestingly limited to superadditive and subadditive interactions between parts, with cross-over patterns being rare or non-existent. Furthermore, there are documented cases of language change in which configurality appears to have been lost. Here, I speculate that the reason for the instability of configural patterns in language is that speech is processed incrementally, which means that the listener almost always activates one or more of a whole's parts before accessing the whole. As a result, associations of the whole transfer to its parts, making cross-over patterns unstable.

SESSION III

A test of the processing of composite faces using Systems Factorial Technology and Logical-rule Models

Xue Jun Cheng[1], Callum J. McCarthy[1], Tony S. L. Wang[2], Thomas J. Palmeri[3], and Daniel R. Little[1]
[1]*School of Psychological Sciences – The University of Melbourne*
[2]*Cogntiive, Linguistic, and Psychological Sciences – Brown University*
[3]*Psychological Sciences – Brown University*

The composite face paradigm used often in the face-processing literature suggests that upright faces are processed holistically (i.e., represented according to their whole and not their constituent parts) and inverted faces are not. Holistic processing in this paradigm is inferred from increased recognition performance for upright, aligned composite faces compared to inverted and misaligned faces. However, results obtained from the composite task can also be explained by a failure of selective attention, a phenomenon which is logically and empirically distinct from holistic processing. In a categorization task, we use the logical-rule models and Systems Factorial Technology to examine whether composite faces are processed through pooling top and bottom face halves into a single processing channel (i.e., coactive processing) which is one mechanistic definition of holistic processing. By operationalising holistic processing as the pooling of features into a single decision process in our task, we can distinguish it from other processing models such as a failure of selective attention (another common definition of holistic processing). We found performance across our four upright and inverted, aligned and misaligned face conditions is best explained by a mixture of serial and parallel processing architectures, and inconsistent with the notion of coactivity. We limit our conclusions to the processing of composite faces.

Perceptual Organization Modulates the Uncertainty that Drives Object-Based Attention

Adam Greenberg
Psychology – University of Wisconsin - Milwaukee

In everyday life, objects are the most common target of attentional resources: our memories, actions, and language all typically direct our effort toward selection of goal-relevant objects in the presence of distracter objects. Most real-world objects are opaque and, therefore, partly occlude one another. Since object-based attention depends on the perceptual organization of the visual scene, it is crucial to understand the effects of perceptual grouping on object-based attention. In a series of behavioral and neuroimaging experiments, we explored the relationship between perceptual object formation and object-based selective attention. In this talk, I'll present data that address the following questions: (a) How does object closure affect the strength of object-based attention?, (b) How does object orientation affect shifts of object-based attention?, (c) When does target-object integration modulate effects of object-based attention?, & (d) How does object-based attention change as a function of perceptual object formation cue strength? I'll discuss an emerging theory which suggests that perceptual organization plays a critical role in the strategy by which object-based attention is deployed within a visual scene. Critically, this strategic distribution of attention depends upon perceptual uncertainty caused by cues to object structure and related configural factors.

NOTES