Configural Processing Consortium (CPC) 2008: Program

Wednesday, November 12, 2008
University of Notre Dame
South Bend, Indiana

Configural Processing Consortium (CPC) is a workshop focusing on configural processing. Specifically, our goal is to define the major problems underlying the study of configural processes in humans. All presentations are open to the public.
Further information can be downloaded from our website:
http://www.indiana.edu/~psymodel/CPC2008.shtml

Organizing committee (listed alphabetically):
Leslie Blaha, Ami Eidels, Bradley Gibson, Ruth Kimchi, Mary Peterson, Jim Pomerantz, Jim Townsend.

Meeting Schedule (Hesburgh Center for International Studies, C103**):**

0:800 Central Time: Shuttle Departs Chicago Hilton Hotel

10:30 – 11:15: Arrival (coffee)
11:15 – 11:30: Welcome and Announcements (Brad Gibson)
11:30 – 12:30: Invited Talk I (Michael Wenger)
Title: Configurality and capacity: measures of brain and behavior
12:30 – 14:00: Session I with Discussion [discussants: Brad Gibson & Rutie Kimchi]
Speakers (by order of presentation): Schneider, Garrigan, Blaha
14:00 – 15:00: Lunch (Morris Inn)
15:15 – 16:15: Invited Talk II (Zygmunt Pizlo)
Title: Configurality, Simplicity, Symmetry, and Shape
16:15 – 18:00: Session II with Discussion [discussants: Jim Bartlett & Mary Peterson]
Speakers (by order of presentation): Fitousi, Palmer, Ben-David, Townsend
18:00 Closing
18:30 Reception and Banquet (Morris Inn)

20:30 Eastern Time: Shuttle Departs for Chicago Hilton Hotel (arrives 21:30 Central Time)

Participants (listed alphabetically):
Nick Altieri, Jim Bartlett, Boaz Ben-David, Leslie Blaha, Devon Burns, Danny Fitousi, Jonathan Gardner, Patrick Garrigan, Bradley Gibson, Joseph Houpt, Ruth Kimchi, Stephen Palmer, Lei Pei, Mary Peterson, Zygmunt Pizlo, Jim Pomerantz, Tadamasa Sawada, Karen Schloss, Bethany Schneider, Noah Silbert, Jim Townsend, Michael Wenger

Aging and Processing Capacity: Do older adults integrate visual stimuli differently than younger adults?

Boaz M. Ben-David[1] and Ami Eidels[2]
[1] University of Toronto [2]University of Newcastle

An overview of recent studies and pertinent theories hints at possible effects of aging on processing capacity of visual stimuli. Models of generalized cognitive slowing with age assume that an age-related reduction in processing resources contributes to impaired cognitive performance. According to the Hasher and Zacks (1988) model, there is a decrease in the efficiency of inhibiting distractors with age, which may result in an "enriched activation" of all signals. According to the information degradation hypothesis, sensory decline with age directly affects performance, but integration and processing may be unharmed (or even augmented) with age. In order to test this idea, we adopted a new approach to capacity developed by Townsend and Nozawa (1995). In this approach, capacity is considered as fine grained efficiency, rather than storage size. In recent studies, older adults performed with augmented Townsend capacity in audio-visual redundant-target task, and in a same-different judgment task of shape and color, even though their responses were slower. We are now comparing Townsend capacity for younger- and older-adults in the redundant-target design, examining the effects of distractor presence or absence with visual stimuli.

What is a unit?

Leslie Blaha
Indiana University, Bloomington

A unit is a fundamental quantity of measurement or a functional component of a larger system. A unit is a single individual or a team working with a single purpose or function. A unit is an object whose pieces are undifferentiated during cognitive processing. In perception, then, a unit serves dual roles acting both as a feature, a part of a larger object or set of things to process, and as a configural or holistic object. How and when should we draw the distinction between these roles, and how might such a distinction further our understanding of configurality? To explore this duality, I shall consider two sources of data: configural learning resulting in a unitized object percept and same-different face judgments indicating functional groupings of well-defined features. I propose that we consider a unit to be the fundamental structure that carries meaningful information, and that the aforementioned dual roles are unified by parallel exhaustive processing, consistent with Wenger and Townsend's (2001) working definition of configural processing.

Varieties of perceptual independence in the processing of facial dimensions

Daniel Fitousi and Michael J. Wenger
Pennsylvania State University

Three approaches to addressing the hypothesis of perceptual independence (Garner & Morton, 1969) were applied to the facial dimensions of identity and expression: (1) Garner's speeded classification task (Garner, 1974), (2) measures derived from systems factorial technology (SFT, Townsend and Nozawa, 1995), and (3) measures derived from general recognition theory (GRT, Ashby and Townsend, 1986). The overall goals of this effort were to (a) relate three theories of perceptual independence, and (b) provide a strong test of the dual-route hypothesis (Bruce & Young, 1980), for which independence is a central construct. Identity and expression appeared as integral dimensions in the Garner test (see also, Ganel & Goshen-Gottstein, 2004). Violations of perceptual and decisional separability, but not perceptual independence, were found in the GRT tests. A parallel, self-terminating, unlimited-to super-capacity, system with dependencies in the rates of processing was revealed in the SFT tests. Taken together, these results are provocative with respect to the conceptual relations among the theoretical perspective, and with respect to the integrity of the dual-route hypothesis.

How are relational structures learned?

Patrick Garrigan
Saint Joseph's University

Many studies of configural processing involve stimuli that are familiar and highly constrained. Faces, for example, are familiar stimuli that all have the same number of parts arranged in approximately the same way. Faces have been used to demonstrate "configural effects", suggesting that they are represented in a different way than some other objects. The configural nature of face representations is probably related to the expertise normal adults exhibit in face recognition tasks. Most objects, however, are far less familiar and regular. How does the brain learn to efficiently represent novel classes of objects with variable parts and relations? One approach to understanding this problem is to determine the best representation, given some constraints, for performing some task (e.g., recognition) on a restricted set of stimuli (e.g., 2D contours). Unfortunately, finding an "optimal" set of parts and relations is often not possible except in very restricted cases. I will suggest some assumptions the visual system might make to significantly simplify this problem and present an experimental paradigm and set of stimuli for testing theories of how novel configural representations are learned.

A Configural Shape Illusion

Stephen E. Palmer, Karen Schloss, and Francesca Fortenbaugh
University of California, Berkeley

We have very recently discovered that the aspect ratio of a rectangle is systematically distorted by an overlapping or attached element in a direction consistent with the aspect ratio of the whole configuration. We investigated the magnitude of this illusion using the method of adjustment in two experiments. In the first, the height and width of a separate rectangle was adjusted to match those of a rectangle within various configurations. In the second, the height and width of the rectangle within various configurations was adjusted to appear perfectly square. Systematic distortions were present in both cases. The results are generally consistent with the hypothesis that the illusion is stronger when the elements in the configuration are more strongly grouped by virtue of connectedness, proximity, good continuation, and various kinds of similarity (e.g., lightness, hues, and shape).

Configurality, Simplicity, Symmetry, and Shape

Zygmunt Pizlo
Purdue University

The Gestalt psychologists pointed out that the percept cannot be explained by the retinal image. The retinal image is an *unorganized* distribution of light, whereas the percept consists of regions, contours, background and objects. In Bayesian formalism, the *rules of perceptual organization* are represented by the *prior* probability distribution function that is used by the visual system to "produce" the most likely interpretation of the retinal image. The recent developments in information theory showed that the most likely interpretation is equivalent to the *simplest* interpretation, as long as simplicity is defined by *economy* of description. This fits nicely the main idea of *Prägnanz* (Prägnanz is translated as succinctness, conciseness, terseness). It follows that *configurality* can be thought of as representing the operation of a simplicity principle. I will discuss David Marr's criticism of configurality and will argue that configurality is best represented by cases in which spatially-local perceptual decisions are affected by spatially-global properties. Perception of 3D shape from a single 2D image is arguably the best example of such a case: the 2D image features are perceived as 3D features because they are part of the 3D shape percept. Clearly, the "whole is different from the sum of its parts." I will conclude by providing evidence that 3D shape perception critically depends on 3D *symmetry*, which is an *emergent* shape property.

The use of electrophysiological signatures of configural processing as a test for configurality in visual expertise.

Bethany Schneider, Dean Wyatte, Jordan DeLong, and Tom Busey
Indiana University, Bloomington

Electrophysiological studies on face processing have used the reliable N170 face inversion effect as evidence for separate and possibly configural processing mechanisms for upright faces versus inverted faces. This signature shows that upright faces produce a smaller, earlier N170 component than inverted faces. However, the addition of visual noise causes a reversal of this amplitude pattern in that upright faces now have a larger N170 amplitude than their inverted counterparts. We argue that this crossover interaction is due to configural mechanisms which remain relatively immune to the effects of noise and provide this interaction as an additional signature of configural processing. In addition, we employ the 1) original N170 face inversion effect as well as our 2) cross-over interaction as two signatures which can be used to test for configurality in other non-face visual expertise stimuli, specifically fingerprints. Finally, we show these signatures for fingerprints in fingerprint experts.

An Outline of Proposed Mathematical Definitions of Visual Psychological Objects, Parts, Features, and Dimensions

James T. Townsend and Lei Pei
Indiana University, Bloomington

We will offer what appear to us to be appropriate, if somewhat rough, mathematical definitions/descriptions of psychological dimensions, parts, and features. In several ways, these agree with other qualitative accounts such as James Pomerantz's on Configiwiki, in others not. We are pretty sure our approaches are reasonably cogent, intuitive, and rigorous (he said modestly). However, science (as opposed to pure math) definitions are subject to convention and hence must ultimately be agreed to by a majority of the participating scientists, so we'll see—looking forward to the sure-to-ensue debates! Apologies for the lack of detail here, but then there wouldn't be a surprise! Stay posted for the incredibly imposing "configurality"—one challenge is to render a structural definition that is consonant with, and generalizes, the earlier Townsend & Wenger processing definition.

Configurality and capacity: measures of brain and behavior

Michael Wenger
Pennsylvania State University

In a range of studies aimed at assessing very general characteristics of processing associated configural percepts, measures of capacity show patterned variations across levels of stimulus organization and perceptual expertise. In addition, measures of capacity have shown pronounced sensitivity to the quality of configural, with large reductions in capacity for "bad" stimulus organizations (relative to a baseline) and increases in capacity for "good" stimulus organizations. Working from these regularities, and some simple assumptions regarding energy expenditures in the brain, a set of questions are outlined with respect to the types of neural measures that might be most useful in developing an understanding of the brain mechanisms that support capacity changes in perceptual organization.

Interested in continuing today's discussion? Check out the Configiwiki online at http://configiwiki.wikispaces.com/

Driving Directions to Hesburgh Center for International Studies, University of Notre Dame, South Bend, Indiana

From the Jameson Inn:

215 S Dixie Way, South Bend, IN 46637
Turn right out of Jameson Inn parking lot onto Indiana 933/US 31. Take this to Angela Blvd. and turn left (sign for Notre Dame will be on that corner). Make a left at the first stop light (Notre Dame Avenue). At stop sign turn right on Holy Cross Ave. Visitor parking is past the next street, on the right.

After parking, walk back on Holy Cross Ave toward Notre Dame Ave. At the corner of Holy Cross Ave/Notre Dame Ave., you will see the Hesburgh Center for International Studies on the right side. Go into this building and follow signs to room C103.

From the east/west:

The University is located just south of the Indiana Toll road (Interstate 80/90). Exit Interstate 80/90 at exit 77 and turn right onto Indiana 933/US 31. Make a left at the 4th stop light (Angela Boulevard). Make a left at the first stop light (Notre Dame Avenue). At stop sign turn right on Holy Cross Ave. Visitor parking is past the next street, on the right.

After parking, walk back on Holy Cross Ave toward Notre Dame Ave. At the corner of Holy Cross Ave/Notre Dame Ave., you will see the Hesburgh Center for International Studies on the right side. Go into this building and follow signs to room C103.

From the north/south:

Take US 31 north which becomes Indiana 933 just south of South Bend. Stay on Indiana 933 to Angela Boulevard which is the second stop light north of the St. Joseph River. Turn right onto Angela Boulevard then left at the first stop light onto Notre Dame Avenue. At stop sign turn right on Holy Cross Ave. Visitor parking is past the next street, on the right.

After parking, walk back on Holy Cross Ave toward Notre Dame Ave. At the corner of Holy Cross Ave/Notre Dame Ave., you will see the Hesburgh Center for International Studies on the right side. Go into this building and follow signs to room C103.