Introduction

Visual system can utilize distinct modes of visual processing\(^{1,2}\) for different objects.
- **Holistic**: Global shape, outlines, Gestalt; lateral occipital cortex (LOC)\(^{3,4}\)
- **Configural/Analytic**: Local features, details, parts; perhaps intraparietal sulcus (IPS)\(^{5,6}\)

Number of visual parts present within a stimulus influences the type of processing used\(^{7}\).
- Fewer parts = more holistic
- Many parts = more configural

**Visual Crowding**: Naturally occurring effect that disrupts recognition of closely-spaced objects presented in the peripheral field\(^{8,9}\).
- Crowding also occurs within objects such that those with more component parts experience more crowding and vice versa\(^{7,8}\).

**The BOSS** - Assessments of holistic/analytic modes will make more sense in the context of the covariance structure of the many possible object features.
- The BOSS dataset includes normative ratings of numerous high-level features, which can complement analyses based on local image features.

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<th>Goal</th>
<th>Description</th>
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<tr>
<td>1. Identify cortical regions associated with crowding-based behavioral measure</td>
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<td>2. Identify cortical regions correlated with key BOSS ratings</td>
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<td>3. Assess the correlation of the crowding-based measure with BOSS ratings</td>
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Stimuli

- Bank of Standardized Stimuli (BOSS)\(^{10}\)
- High-resolution photographs of real-world objects
- Includes normalized data with ratings of semantic and higher-level visual properties (e.g., familiarity, category, complexity)

Method

**Preprocessing**

- 27 Images with frontal-parallel viewpoint
- Converted to grayscale
- Normalized for contrast and luminance using SHINE toolbox\(^{11}\)
- Tasks presented using MATLAB and Psychophysics Toolbox

**Neuroimaging Task**

- 16 participants (9 female, 7 male)
- Objects presented at fixation (TR = 2.26 s)
- Visual angle \(= 4.29^\circ\)

**Behavioral Task**

- Same participants, post-scan
- Visual angle \(= 7.33^\circ\)
- Labels entered for all objects

Results

**Behavioral**

- 2. Incorrect: Image moved 75 px (3.7°) closer to fixation when it next appeared on same side of screen
- Correct: Location on screen recorded as critical eccentricity

- Objects correctly identified on both sides of screen before being removed from the set

Discussion

**Behavioral**

- Familiarity inversely correlated with critical eccentricity

**Limitations**

- Critical eccentricity contrast restricted to mutually exclusive activation, i.e. betas reflect correlation with entire range
- Small number of items compared to total BOSS (27), although representative sample

**Future directions**

- Hemispheric effects
- Principal components regressions

References


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