

VSS 2015

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Title: Concurrent fMRI analysis of part-whole structure and subjective object norms for items from the BOSS (Bank of Standardized Stimuli) data set.

Session Name: Object Recognition: Mechanisms (Poster session)

Session Date and Time: **Sunday, May 17, 2:45 pm - 6:45 pm**

Location: Banyan Breezeway

Abstract: Introduction: The perceived part-whole structure of common objects is strongly influenced by image features, but it also exists in the context of multiple cognitive processes that act on object knowledge, including familiarity and categorization. Methods: We investigated these relationships using whole-brain fMRI during passive viewing of photographs of common objects and behavioral measures of object properties. 20 participants viewed 27 diverse items from the Bank of Standardized Stimuli (BOSS; Brodeur et al., 2010) while undergoing fMRI and during a post-scan behavioral test. The BOSS provides norms for subjective ratings of the objects: we considered familiarity; visual complexity; manipulability; and category, object and viewpoint agreement. During every TR of scanning a luminance/contrast normalized grayscale image was displayed centrally for 1.5 s while participants performed a demanding fixation task. Stimuli were presented in a Type 1, Index 1 event-related sequence (Aguirre, 2007). Afterwards participants verbally identified the objects, displayed initially at high eccentricity (42°; 150 ms duration) and moved incrementally closer to fixation until correctly identified in both hemifields. Resulting critical eccentricities (CEs) were taken to reflect the number of parts perceived in each object, based on work by Pelli and colleagues (e.g. VSS 2004). CEs were consistent across participants and spanned a continuous range across objects. CEs and BOSS norms were included as orthogonal regressors (modeled as parametric modulations) in the same SPM8 analysis. Results: Right lateral fusiform activation was linked to holism (negative correlation with CE: high for one-part objects, low for many parts) and normative familiarity. We also present detailed whole-brain maps to compare the effects of the numerous behavioral measures. Conclusion: We identified holistic object perception networks while simultaneously controlling for potentially related cognitive factors. These included right hemisphere fusiform gyrus and inferior parietal lobule. Fusiform face-related cortex was selectively activated by (non-face) holistic and familiar objects.

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