Emergence of perceptual Gestalts in the human visual cortex: The case of the configural superiority effect

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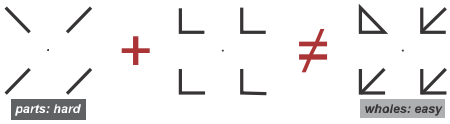
Introduction

Where is **global structure** represented?

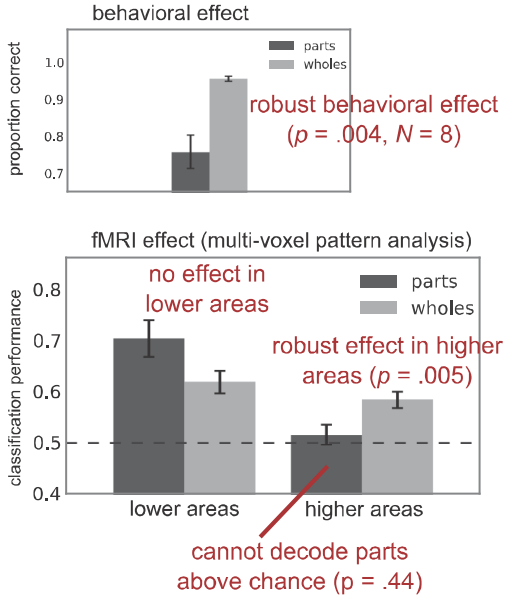
Higher visual areas
bottom-up emergence
e.g., full shape selectivity observed in IT/LOC only

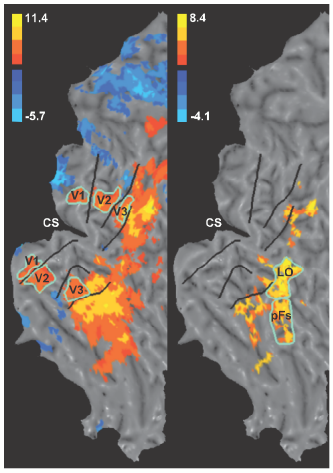
Lower and higher visual areas
interplay between regions
e.g., computational models require feedback/lateral connections; some Gestalt effects reported in early visual areas; early regions have the capacity to contain high-level shape representations

Case study: Configural superiority effect



Results



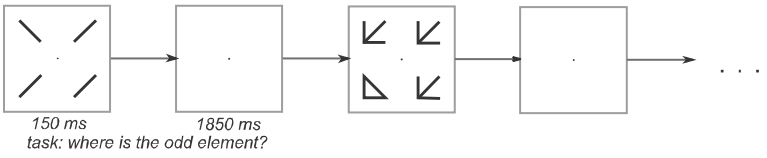


Results are averaged for lower-level visual areas (V1, V2, V3) and for higher-level shape-selective areas (LOC and pFs).

Method

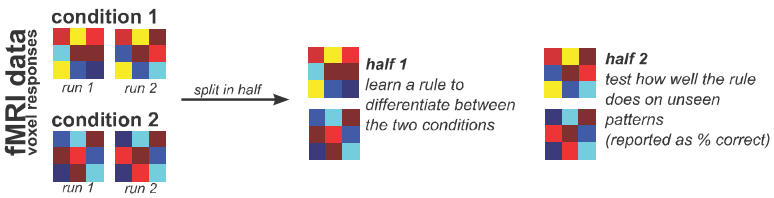
1. Localization of retinotopic (V1, V2, V3) and shape-selective regions (LO, pFs)

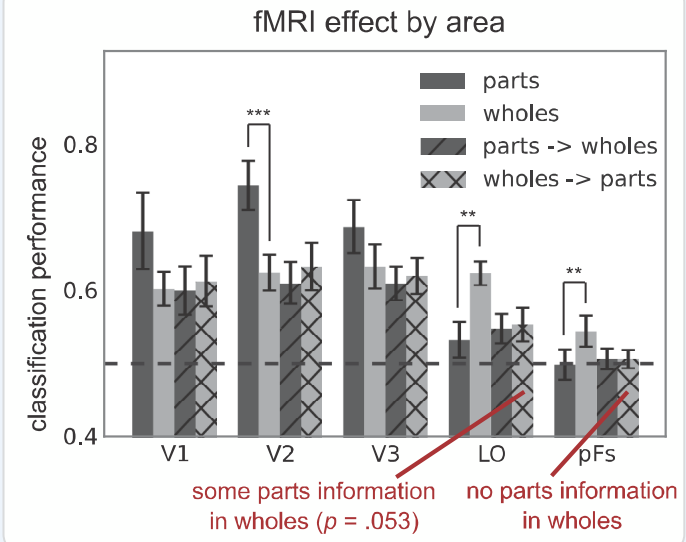
2. Event-related fMRI paradigm to obtain neural responses to 8 conditions:
(parts, wholes) × (4 quadrants where the odd element could be)



3. Multi-voxel pattern analysis (MVPA) using a support vector machine (SVM) to look for the neural configural superiority effect: a better discrimination between those conditions that are behaviorally easier

Multi-voxel pattern analysis





Conclusion

Configural superiority effect **gradually emerges** throughout the visual hierarchy and is consistent with the **feed-forward** visual processing.
We propose that this method allows developing a taxonomy of Gestalt phenomena:

bottom-up – e.g., configural superiority effect
top-down – e.g., size-constancy illusion

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www.gestaltrevision.be