

High-level processing at play in Ponzo-like size illusions

Ecem Altan
University of Auckland, NZ

Huseyin Boyaci
Bilkent University, Turkey
JL Gießen University, Germany

Steven C. Dakin
University of Auckland, NZ
University College London

D. Samuel Schwarzkopf
University of Auckland, NZ
University College London



SCAN FOR MORE!

Summary

We compared upright and 180° rotated illusory stimuli to find out the involvement of high-level processing in this illusion.

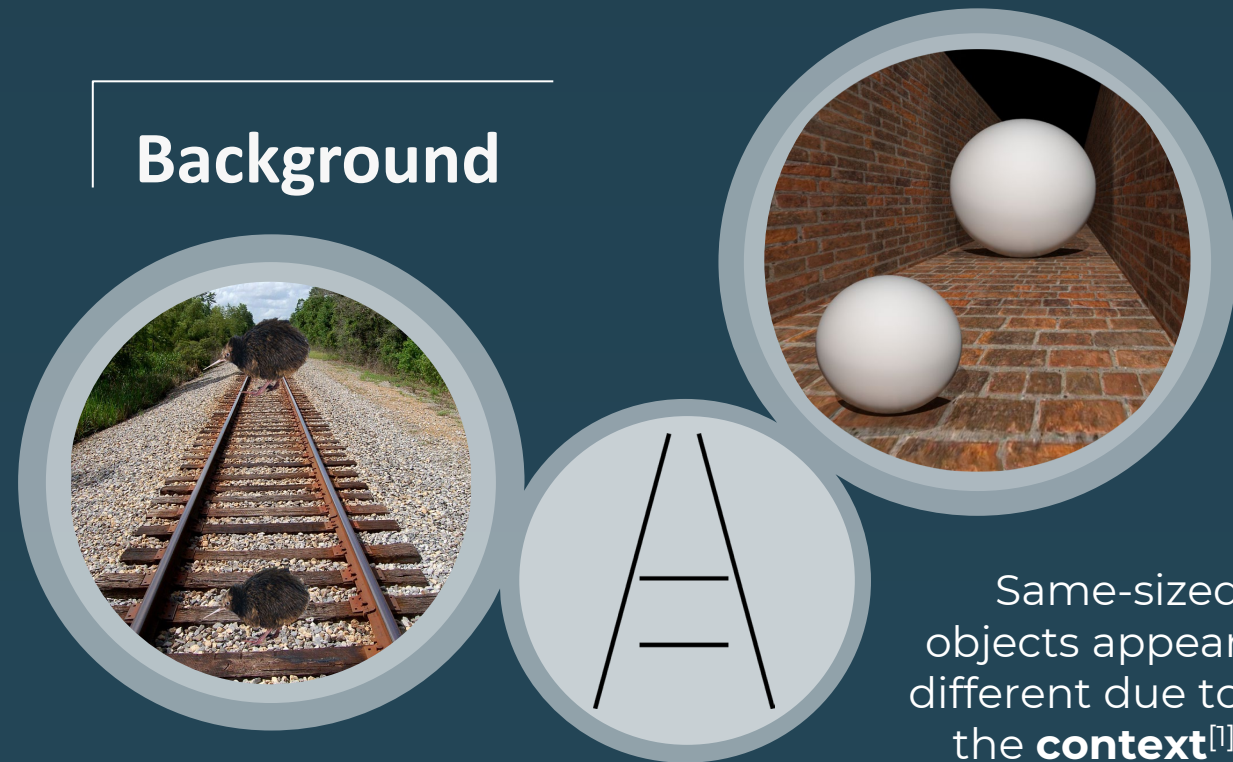
Results showed a significantly weaker perceptual effect, and a smaller extent of activation for the inverted version as compared to the upright.

Our findings provides evidence for an involvement of high-level visual processing.

References

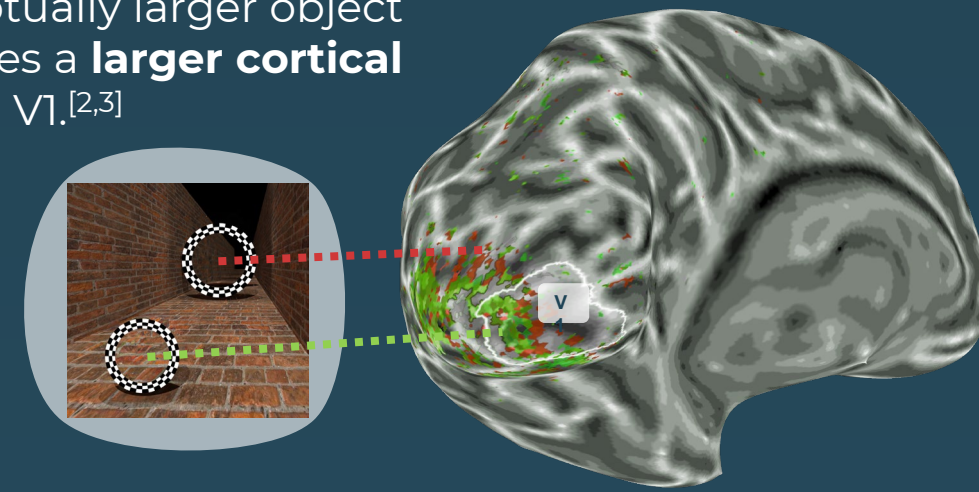
- [1] Ponzo, M. (1910). *Intorno ad alcune illusioni nel campo delle sensazioni tattili, sull'illusione di Aristotele e fenomeni analoghi*. Leipzig, Germany: Wilhelm Engelmann.
- [2] Murray, S. O., Boyaci, H., & Kersten, D. (2006). The representation of perceived angular size in human primary visual cortex. *Nature Neuroscience*, 9(3), 429–434.
- [3] Fang, F., Boyaci, H., Kersten, D., & Murray, S. O. (2008). Attention-Dependent Representation of a Size Illusion in Human V1. *Current Biology*, 18(21), 1707–1712.
- [4] Dumoulin, S. O., & Wandell, B. A. (2008). Population receptive field estimates in human visual cortex. *NeuroImage*, 39(2), 647–660.

Background



Same-sized objects appear different due to the **context**^[1].

Perceptually larger object activates a **larger cortical area** in V1.^[2,3]



Question

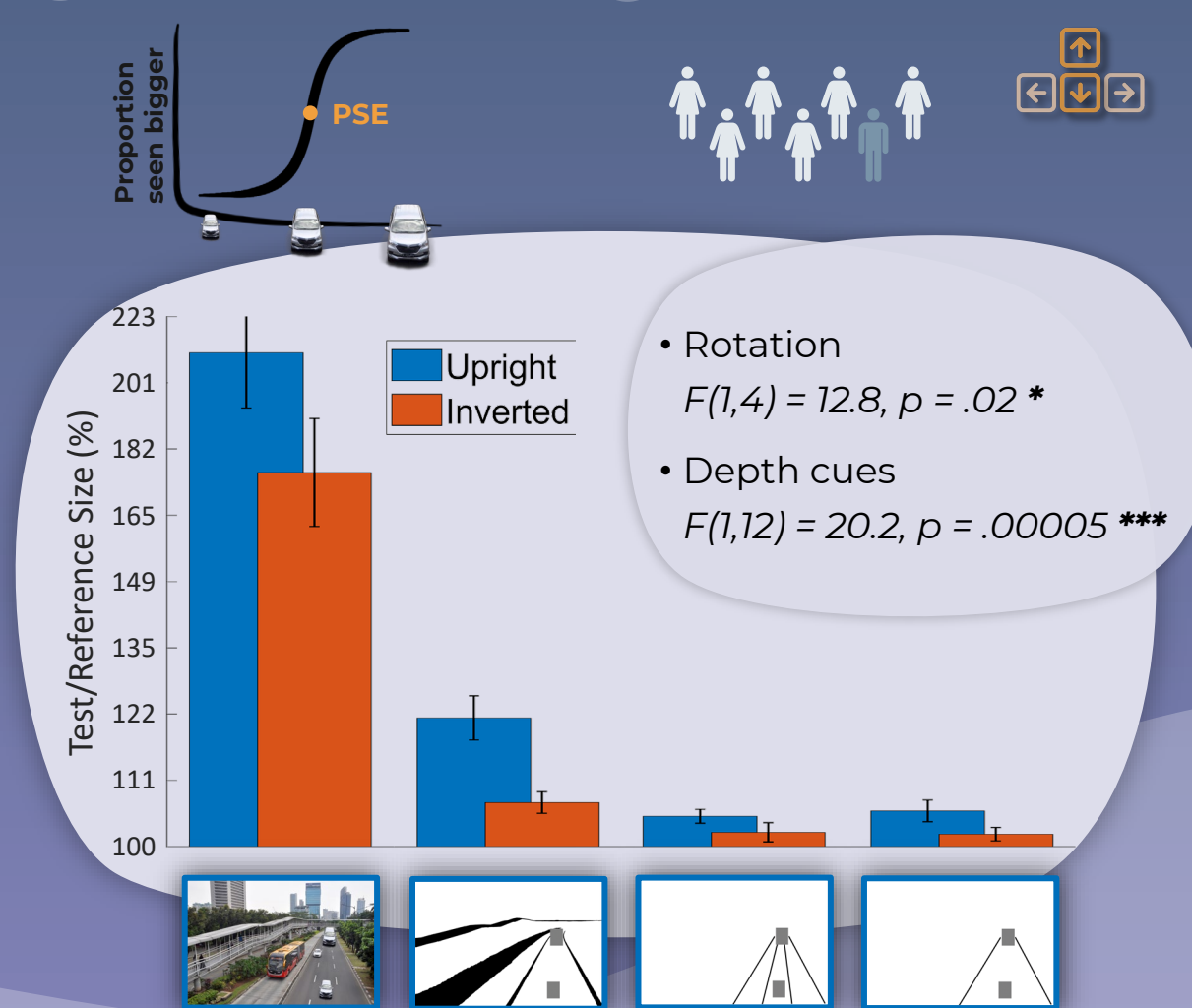
What is the role of high-level processing?



Would turning the image **upside-down** change
I. perceptual effect?
II. cortical activation in V1?

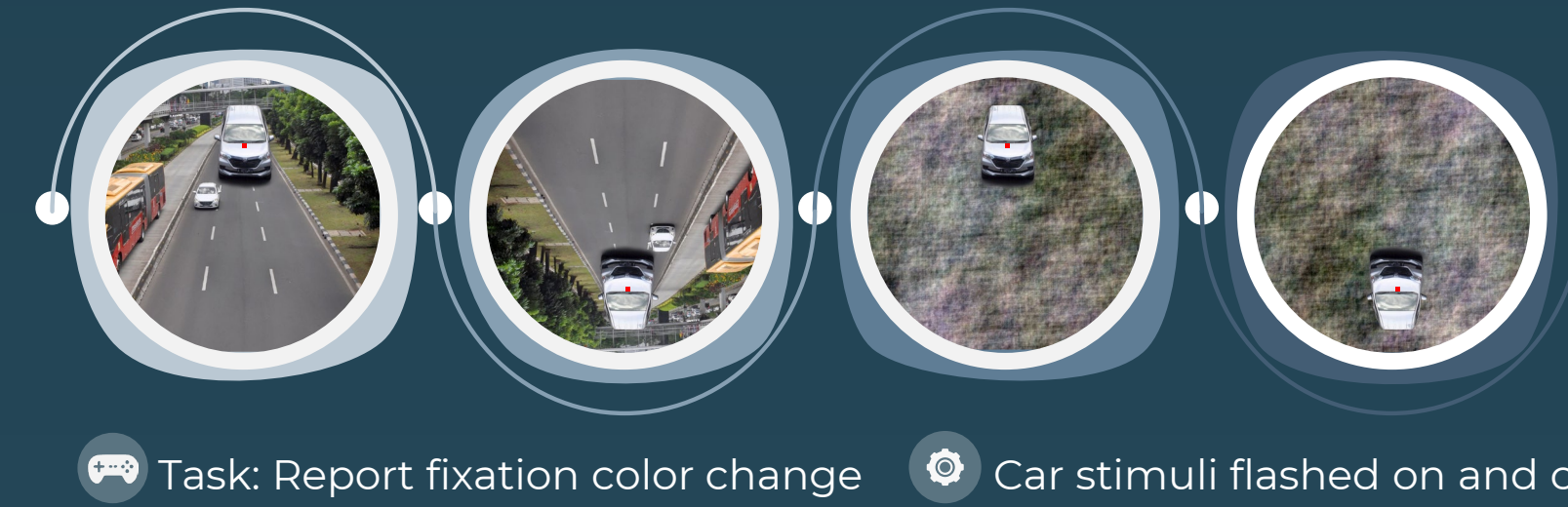
Exp I : Psychophysics

Adaptive staircase Which car is larger?

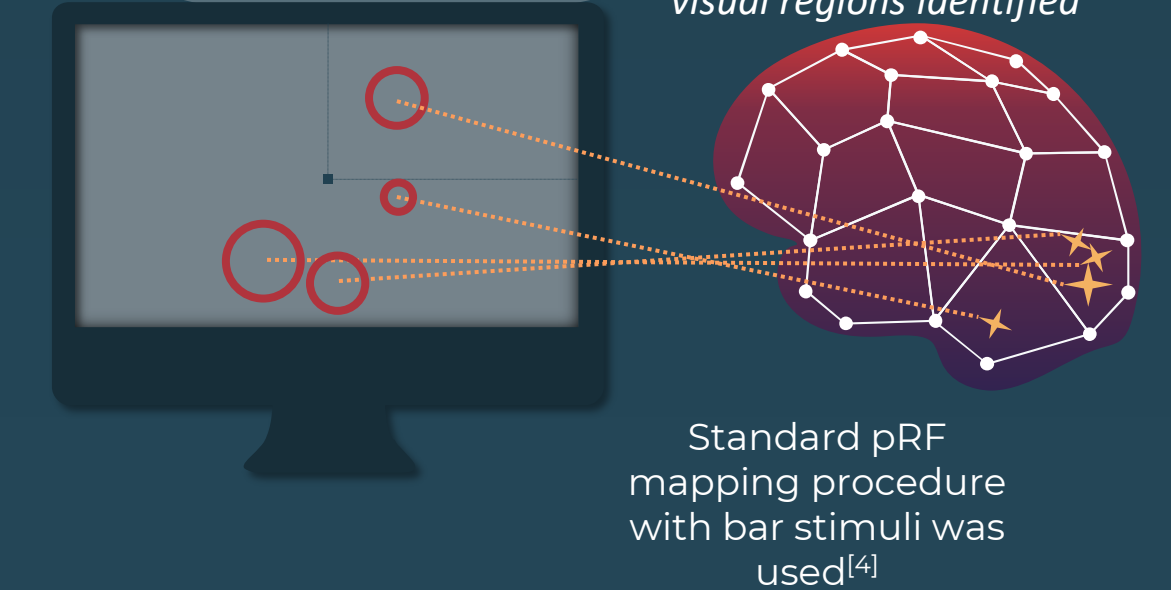


Exp II : fMRI methods

Response to illusion

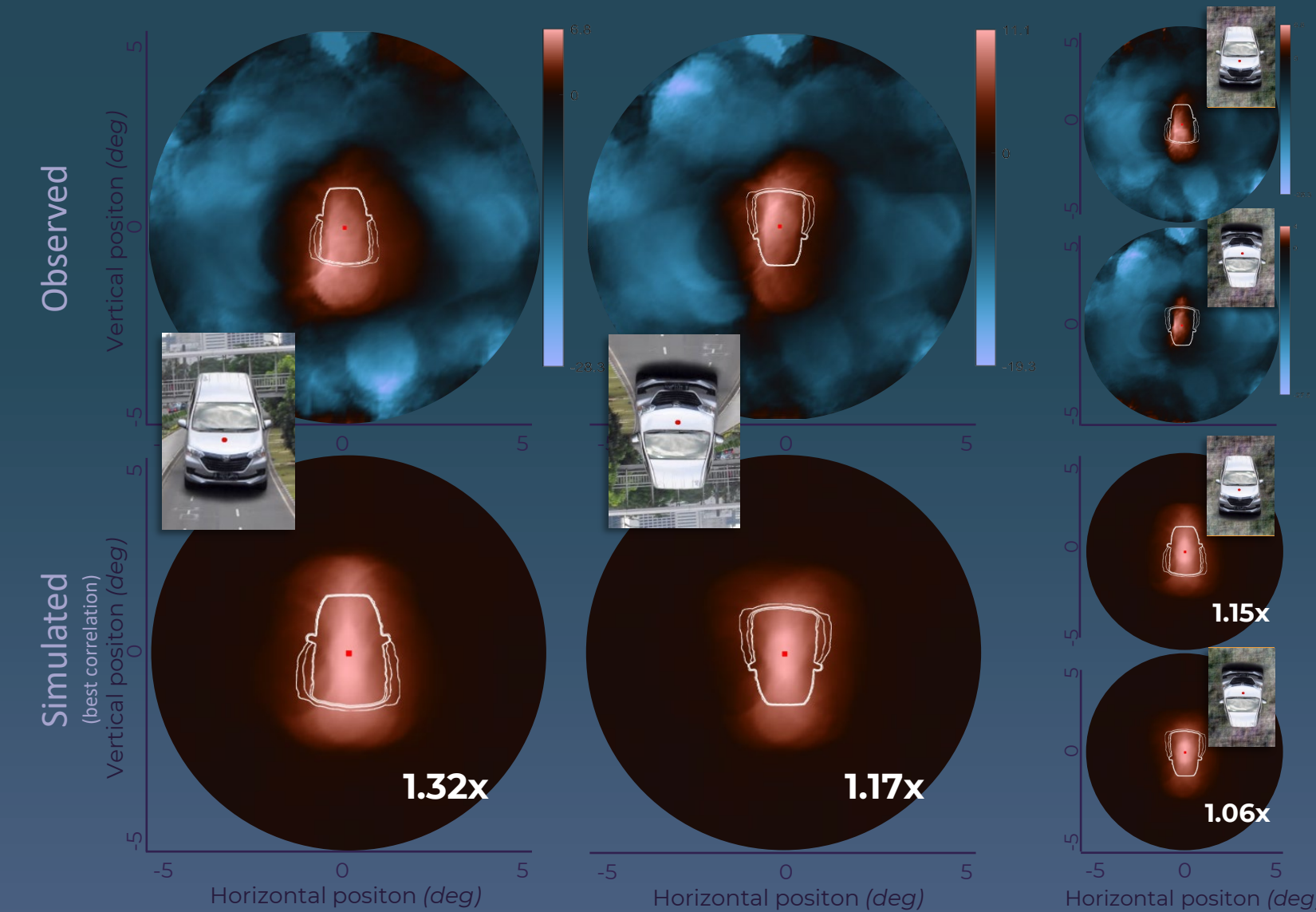


pRF mapping: Visual field mapped into the cortex & early visual regions identified

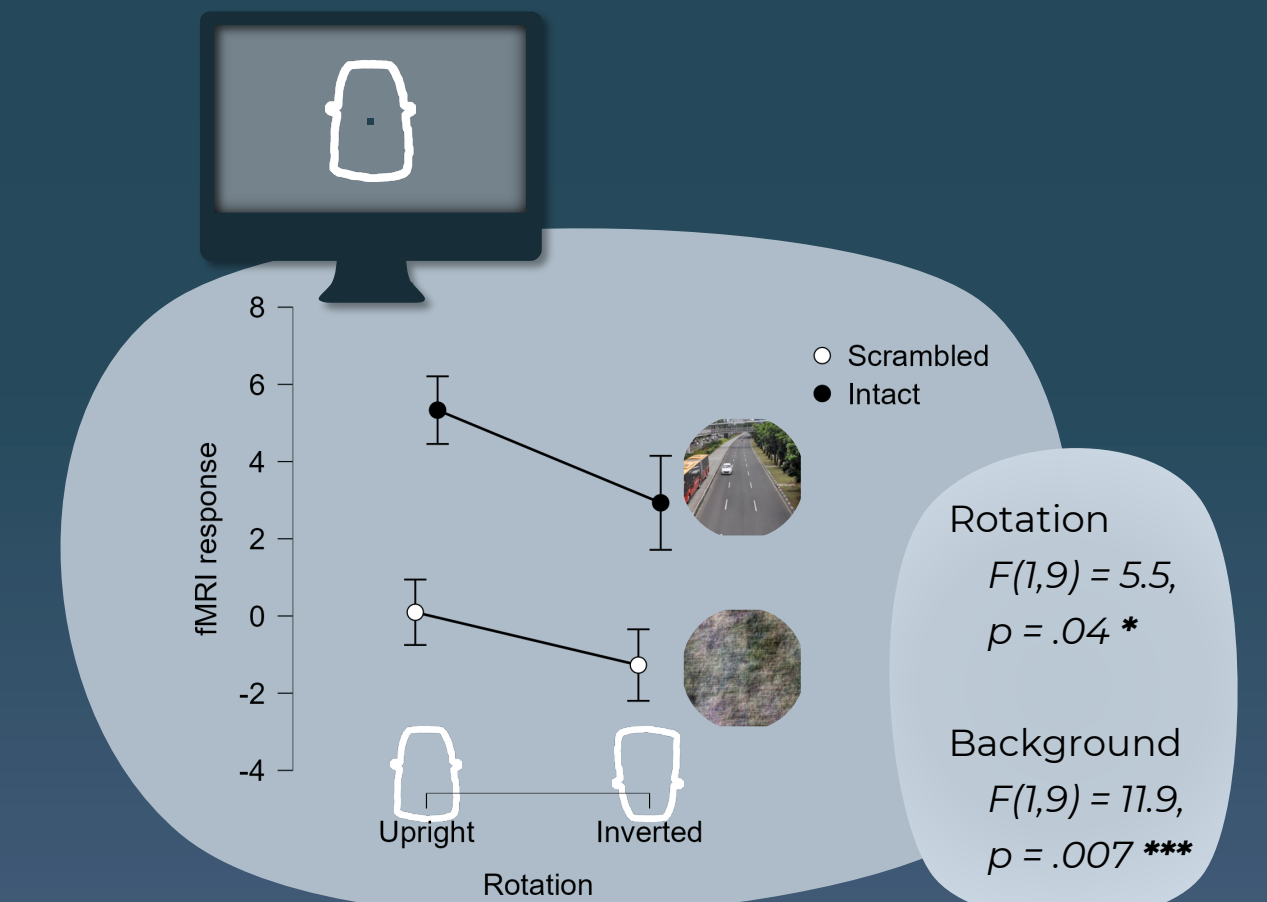


Exp II : fMRI results

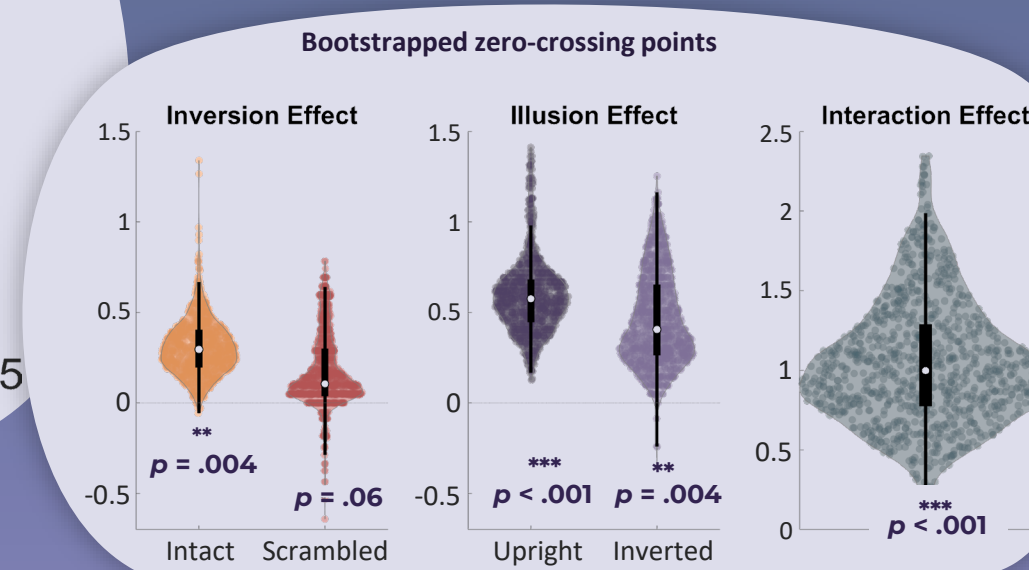
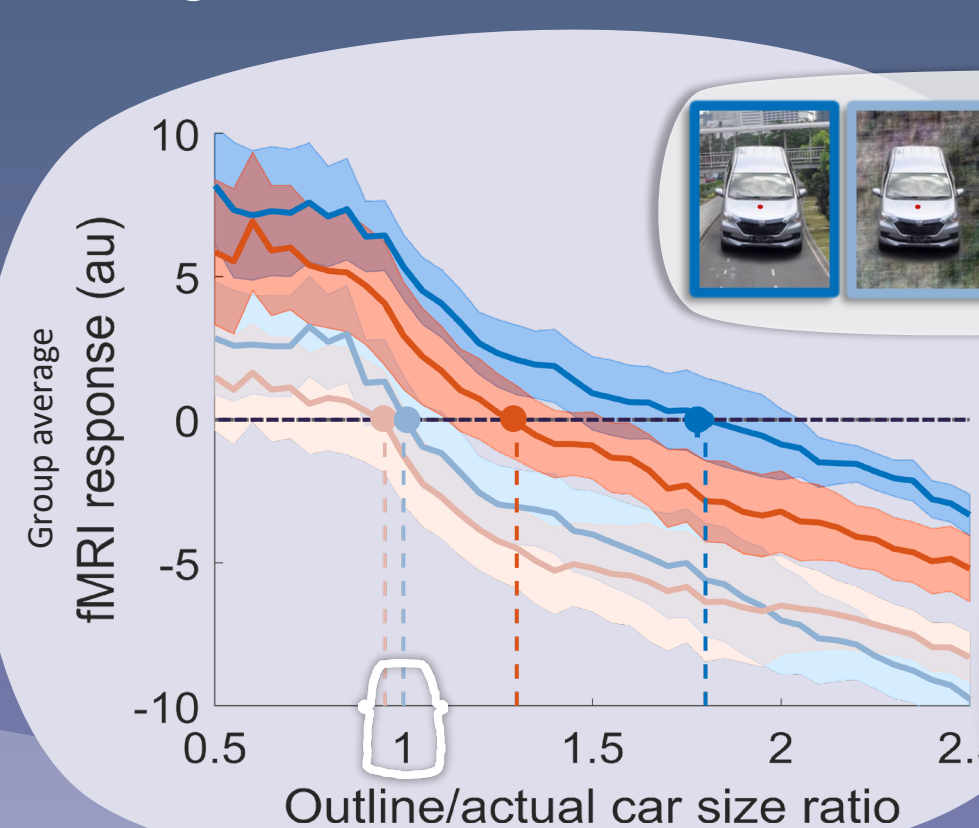
Back projection: Activation in V1 reconstructed in visual field



ROI analysis: Compared activation around the actual car size



Sliding window: Extent of activation



Adjustment: Behavioral measurement (in scanner)

