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Submillimeter 7 Tesla fMRI in Primary Visual Cortex during monocular stimulation

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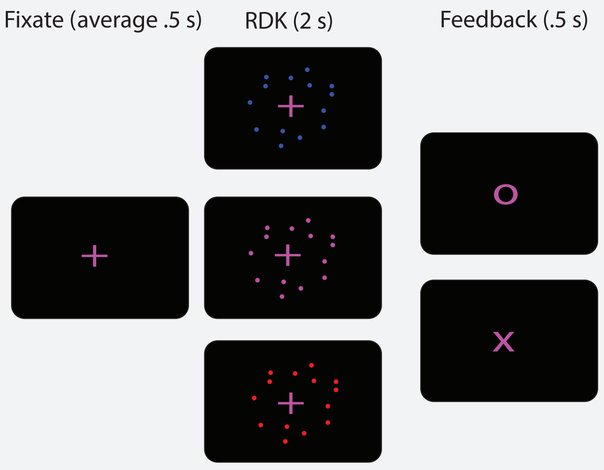
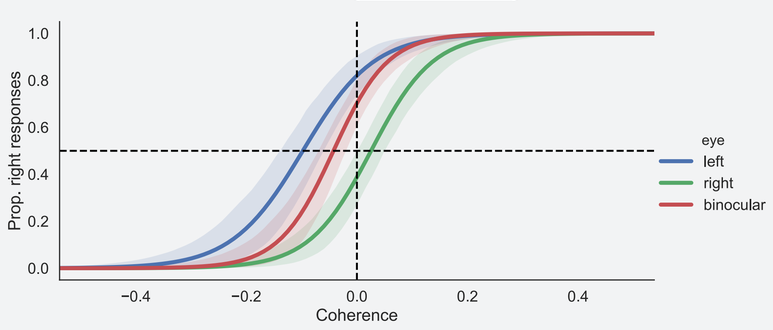
Laminar fMRI and perceptual decision-making

- Visual cortex shows well-defined functional organization at a (sub)-millimeter scale. For example, ocular dominance columns (ODCs; ~ 1mm in width) in primary visual cortex (V1).
- 7 Tesla fMRI could potentially resolve this organization in humans, in vivo .
- Here we present preliminary data using a paradigm using anaglyph glasses that allow for exclusive monocular visual stimulation to outline the ODCs in V1.
- This paradigm could potentially be used to further investigate various perceptual processes, for example binocular rivalry.

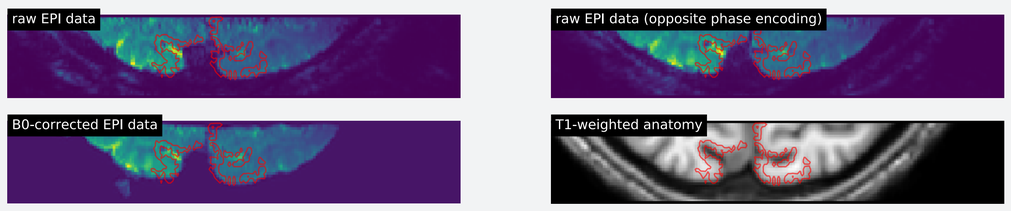
Binocular Random Dot Motion Task



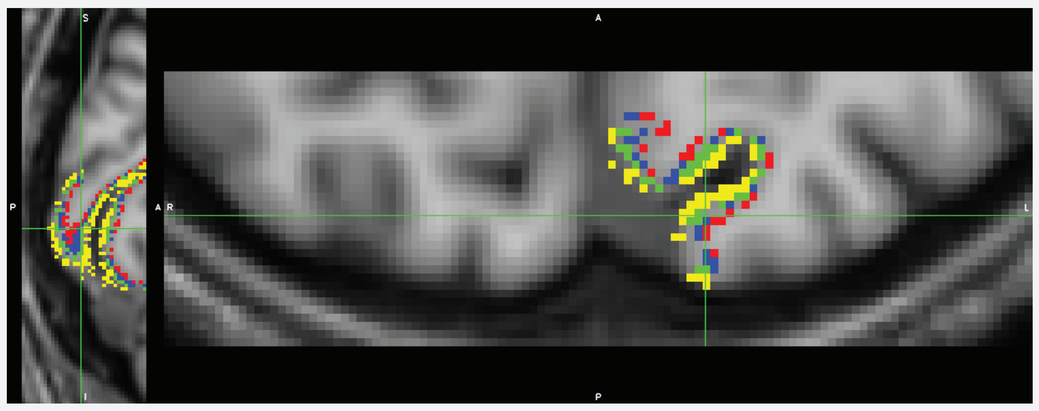


- One subject, 8 runs of 5 minutes, containing 24s blocks of 5-6 trials
- 500 trials in total
- 0.7 mm isotropic voxels, 3D EPI; TR 4 s; FOV 130x130x23.8 mm

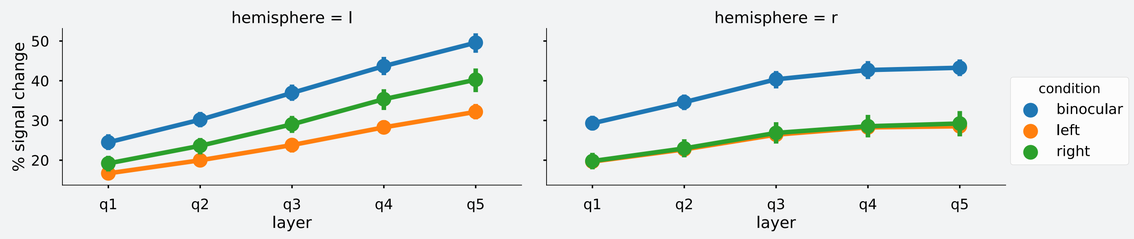
EPI with opposite phase-encoding was used for B0 distortion correction



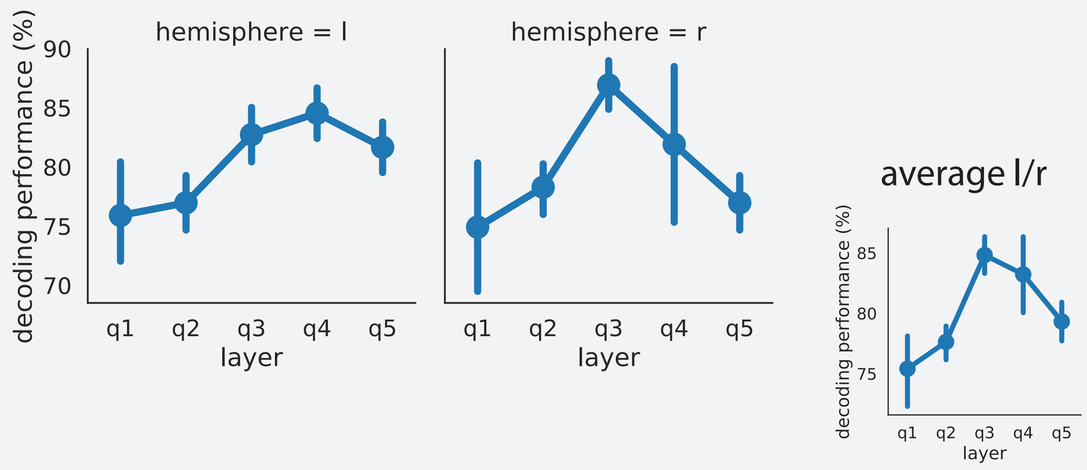
Freesurfer was used for fitting cortical surfaces at different pial distances



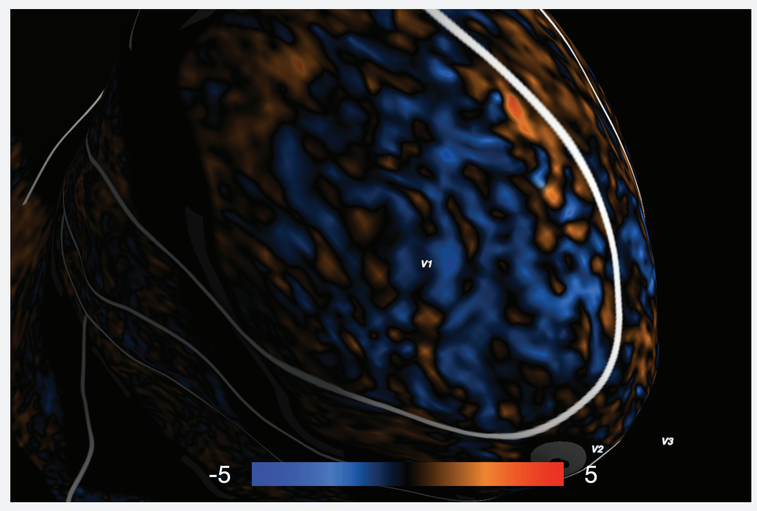
Draining vein dominance: signal increase towards outside layers

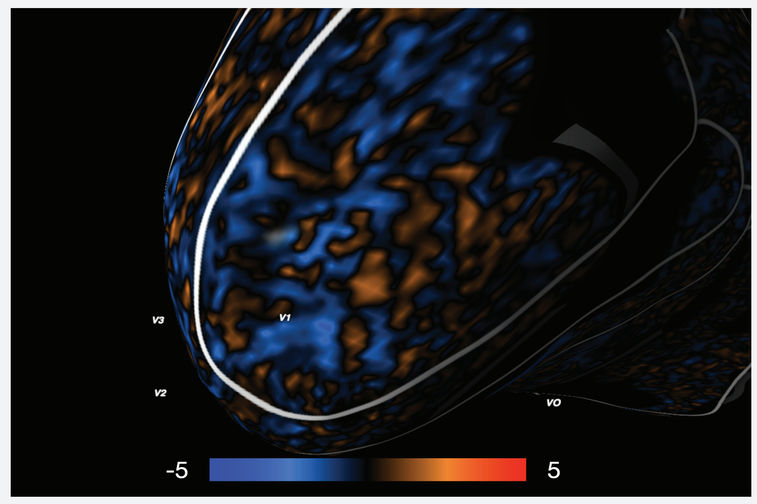


Support Vector Machine Can Decode Eye stimulation on block-by block basis



Monocular dominance voxels in V1 are noisy but consistent across runs

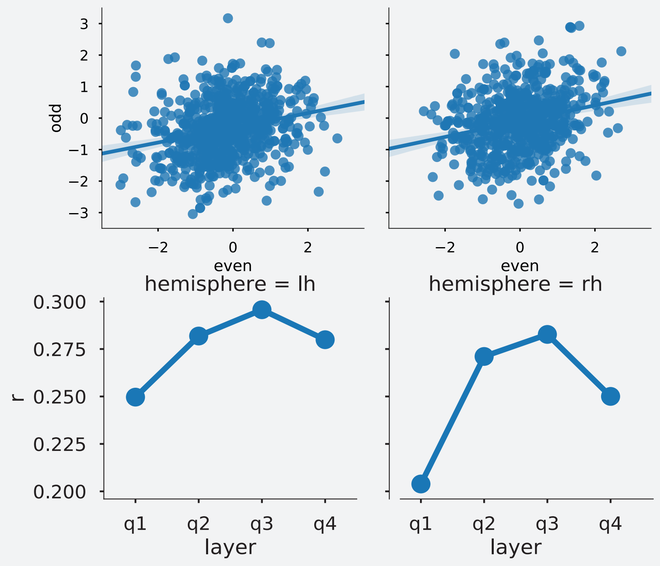




preference for left eye stimulation
preference for right eye stimulation

Evidence for consistency: Z-values correlate across odd and even runs

Correlation is highest in "middle" (input) layers



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