



Locally-Optimized Inter-Subject Alignment of Functional Cortical Regions

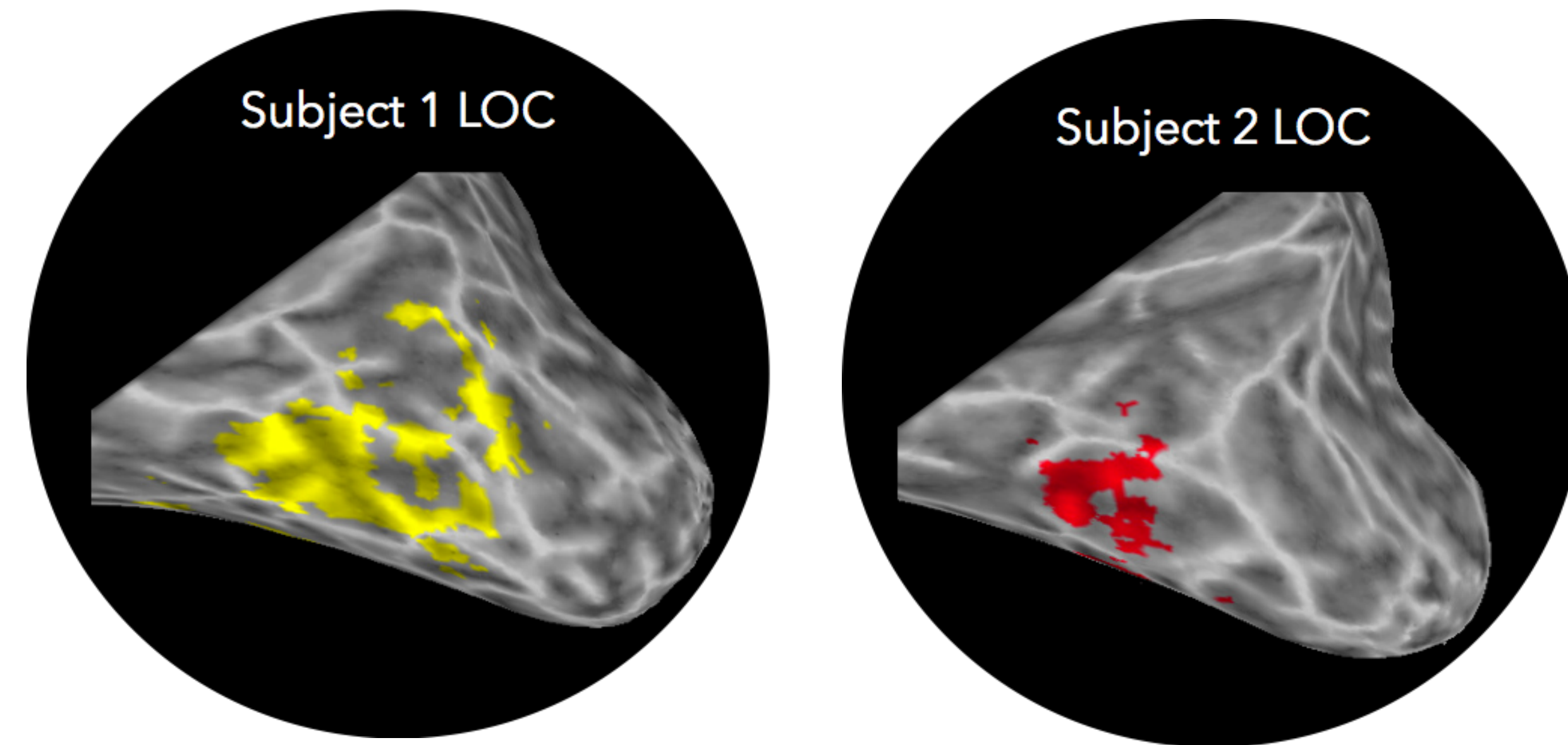


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Cortical Variability of Functional Brain Regions

Lateral Occipital Complex (LOC) defined as greater activation for objects > phase-scrambled objects



same localizer experiment ♦ same scanner ♦ same analysis pipeline

Key Questions

Contrast Peak ↔ Anatomy

LOC: poorly understood due to high variability

Contrast Peak ↔ Computation

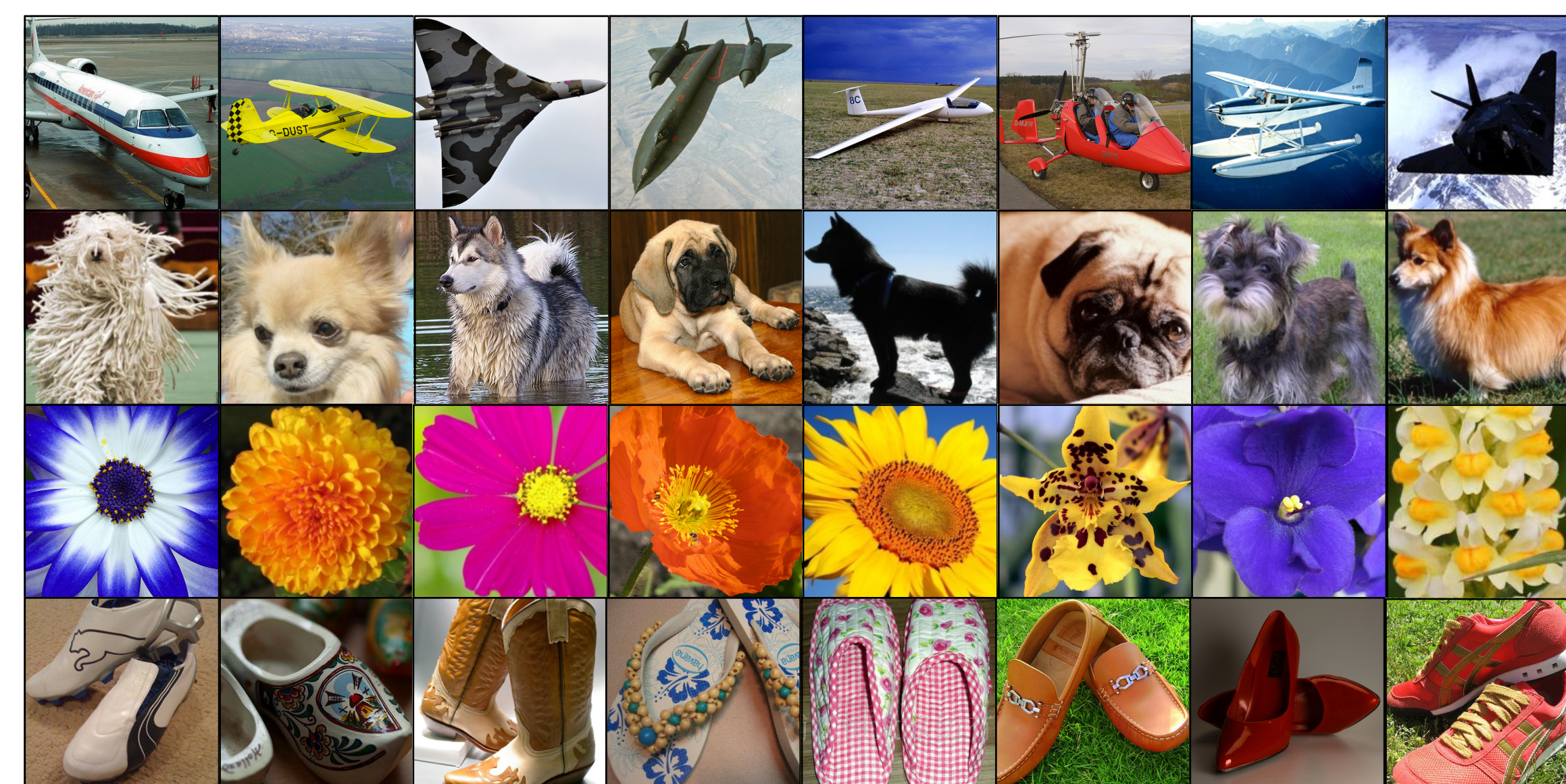
LOC: objects vs. phase-scrambled objects contrast across population

Other Functionally-Equivalent Correspondences

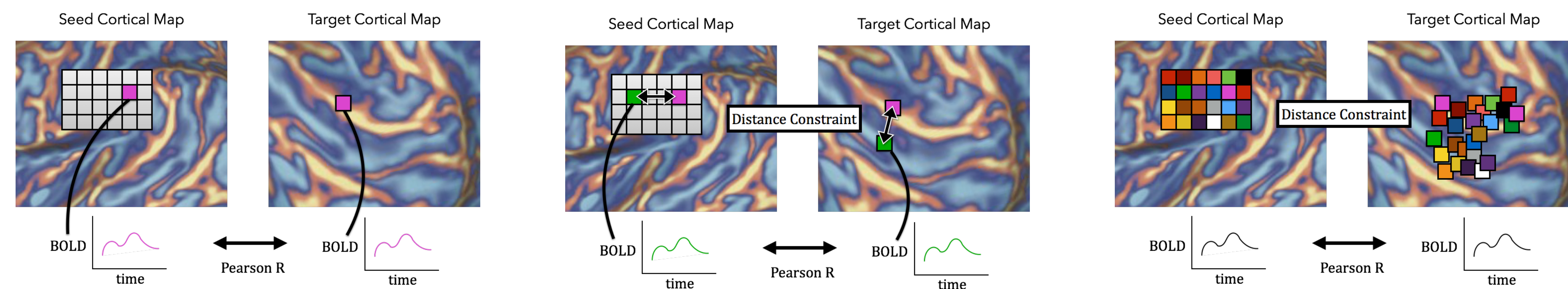
Beyond "Regions of Interest (ROI)" analysis

fMRI Experiment Data

32 object categories
 32 images per category
 block design
 image-level 1-back task
 16 TRs per category
 512 total experimental TRs
 17m 4s data / subject



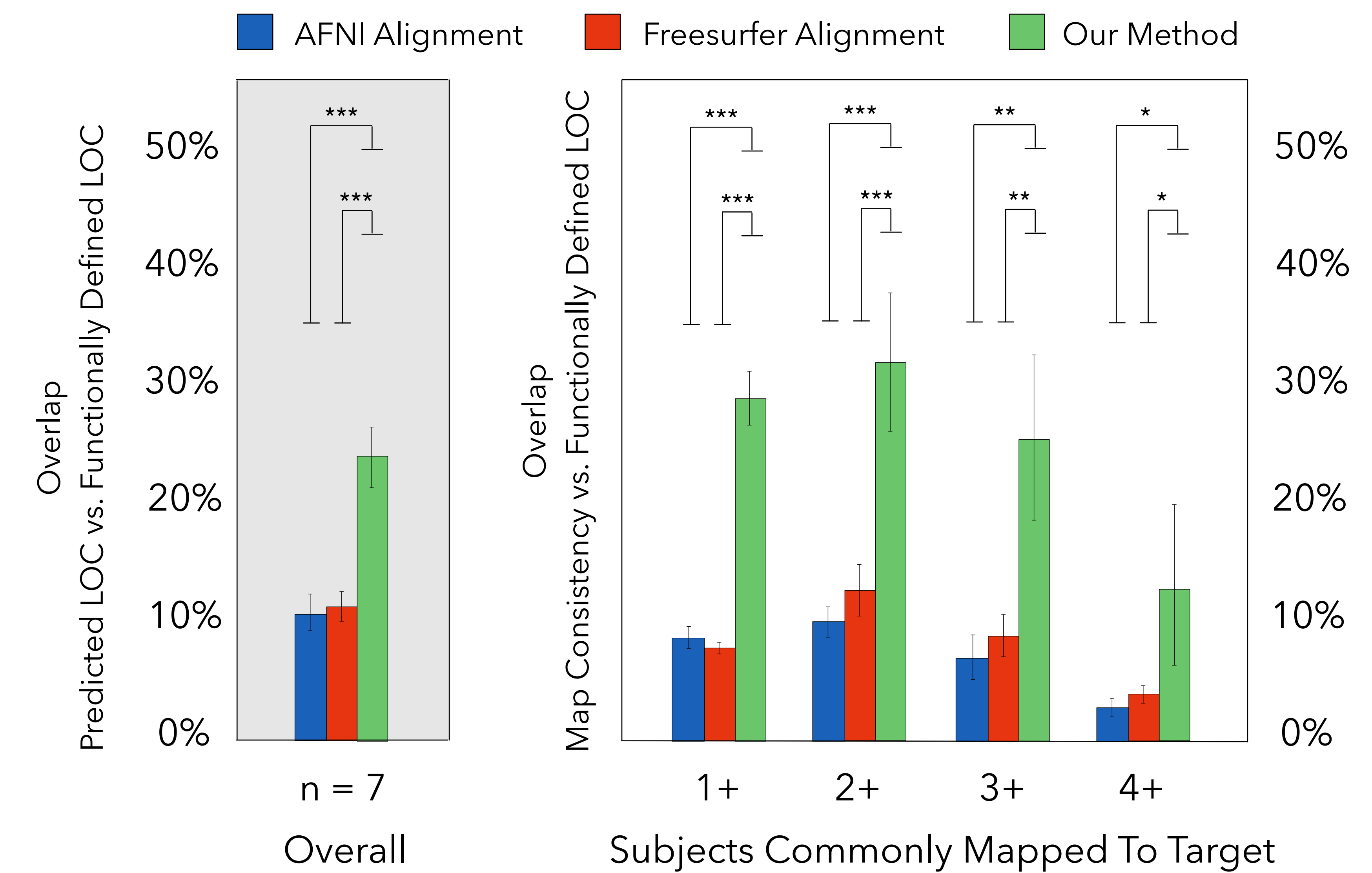
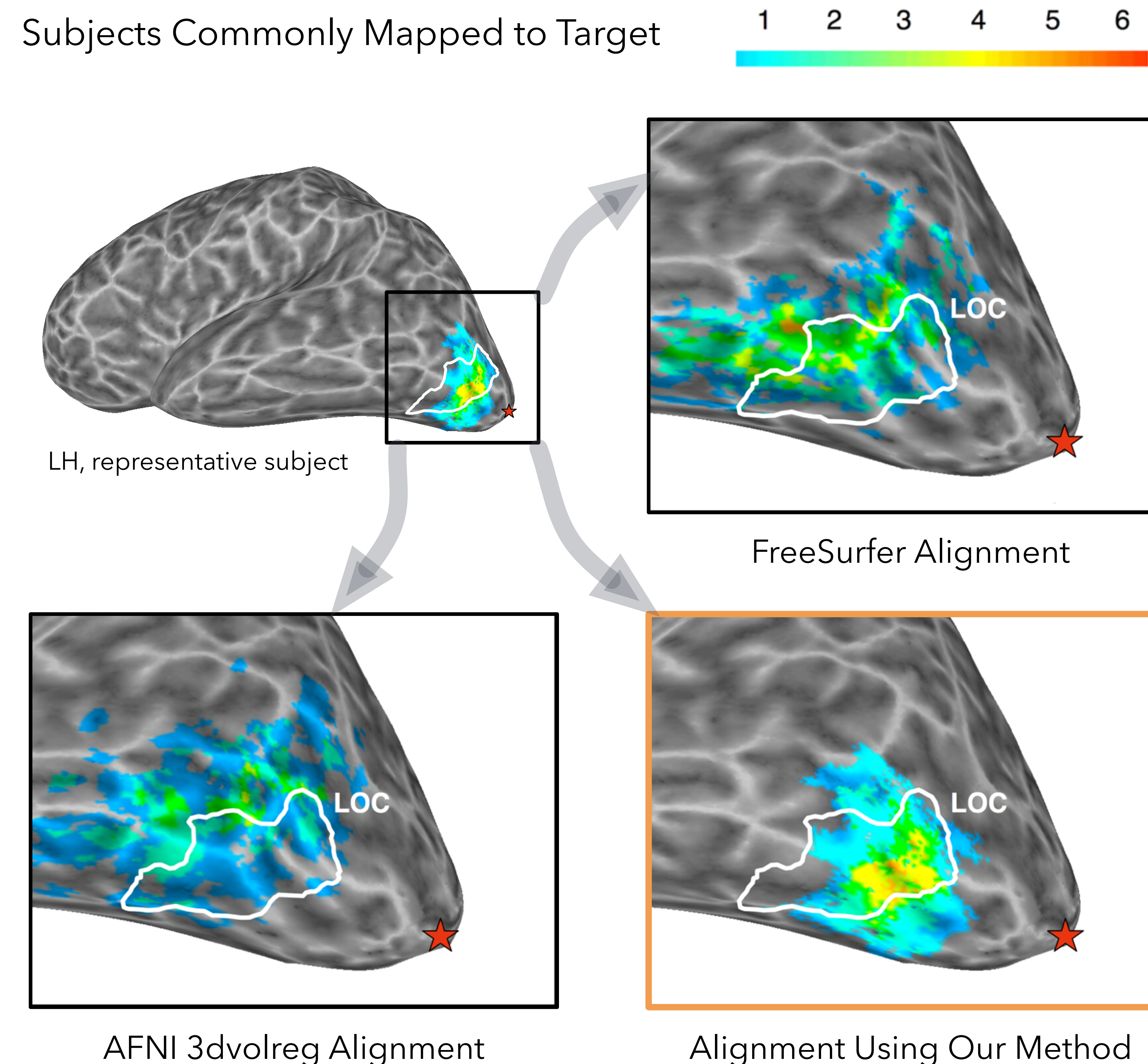
General-Purpose Method for Between-Subject Functional Region Prediction: Algorithm and Description



$$\begin{aligned} & \text{minimize}_M \sum_i d_F(F_i, F_{m_i}) \\ & \text{subject to } d_s(p_{m_i}, p_{m_j}) \leq \rho \end{aligned}$$

$M = (i, m_i)$ correspondence pair between patch (i) and patch (m)
 F_i features of patch i: fMRI responses
 d_F feature distance function (1 - Pearson r)
 p_i position of patch i on cortical surface
 d_s cortical distance function (Euclidean)
 ρ maximum allowable distance shift between maps

Improved Accuracy and Consistency for Between-Subject Functional Area Prediction



Selected References

Sabuncu et al. (2010) Cerebral Cortex ♦ Yeo et al. (2011) J. Neurophysiol. ♦ Haxby et al. (2011) Neuron
 Duchenne et al. (2011) ICCV ♦ Conroy et al. (2013) NeuroImage ♦ Iordan et al. (2015) JOCN

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