

Laminar specific fMRI reveals directed interactions in distributed networks during language processing

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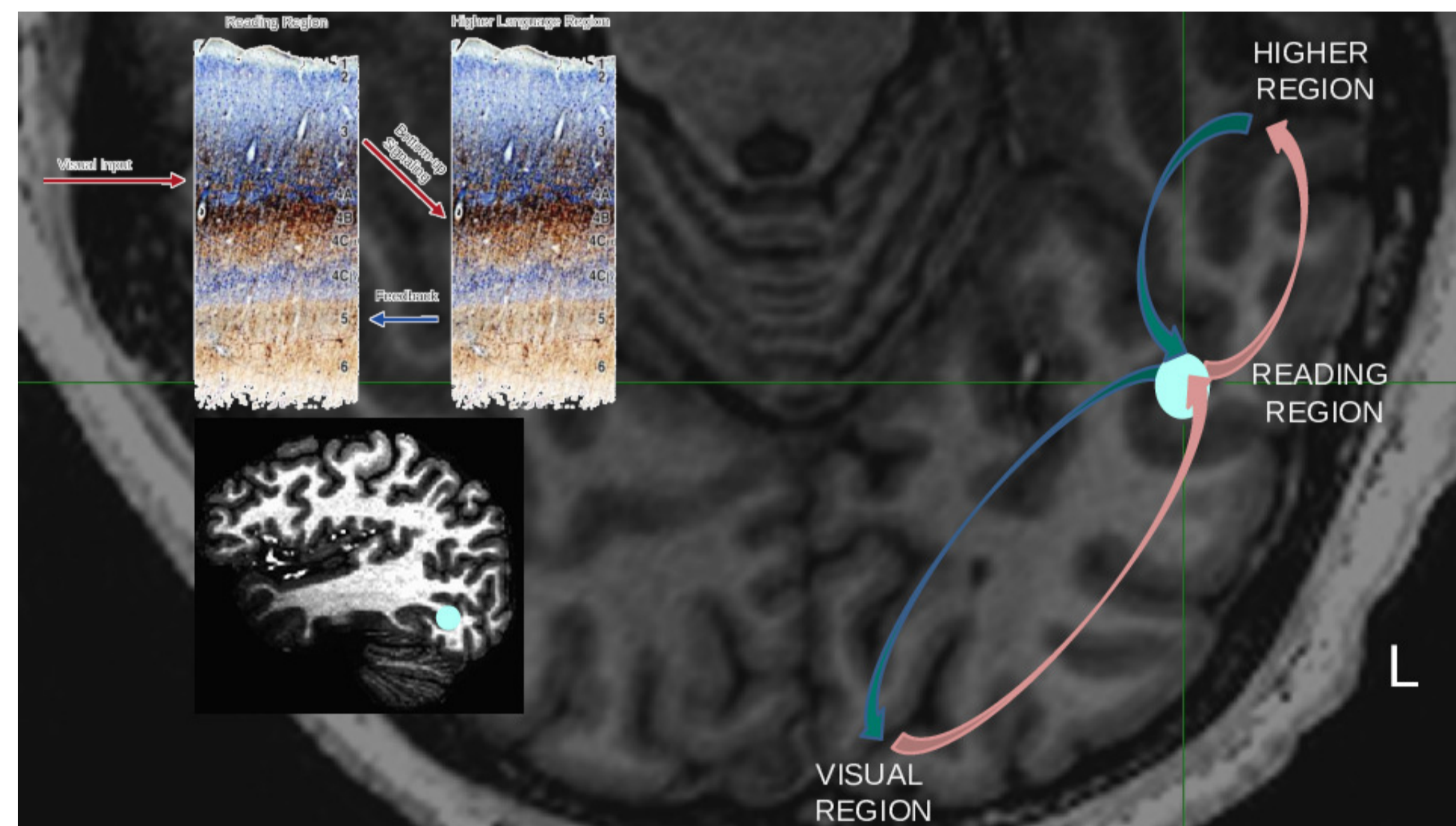
Depth-Dependent BOLD as a Measure of Directed Connectivity During Language Processing

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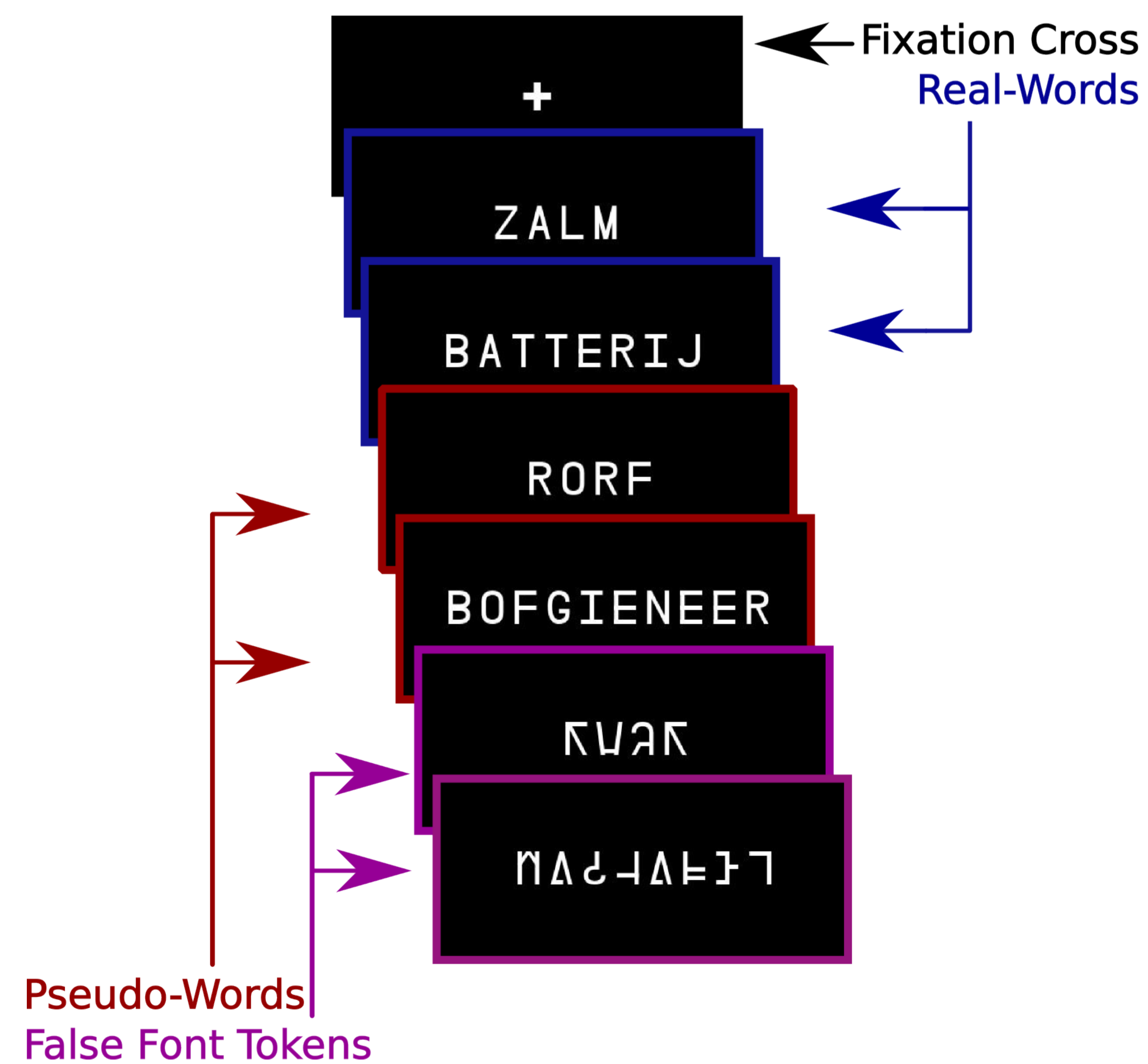
Introduction

- The input/output topology of neocortical circuits is known to be organized with respect to cortical laminae,⁴ and blood supply has been shown to be regulated at this level^{1,8}
- A growing body of evidence suggests high-field MRI is capable of resolving laminar specific BOLD responses^{5,6,8,9}
- This work demonstrates whole brain, laminar connectivity during a reading task.
- Noninvasively disentangles directed information streams through the brain during reading, on the basis of cortical depth dependent BOLD in the ventral occipital sulcus (vOT)



Sample Stimuli

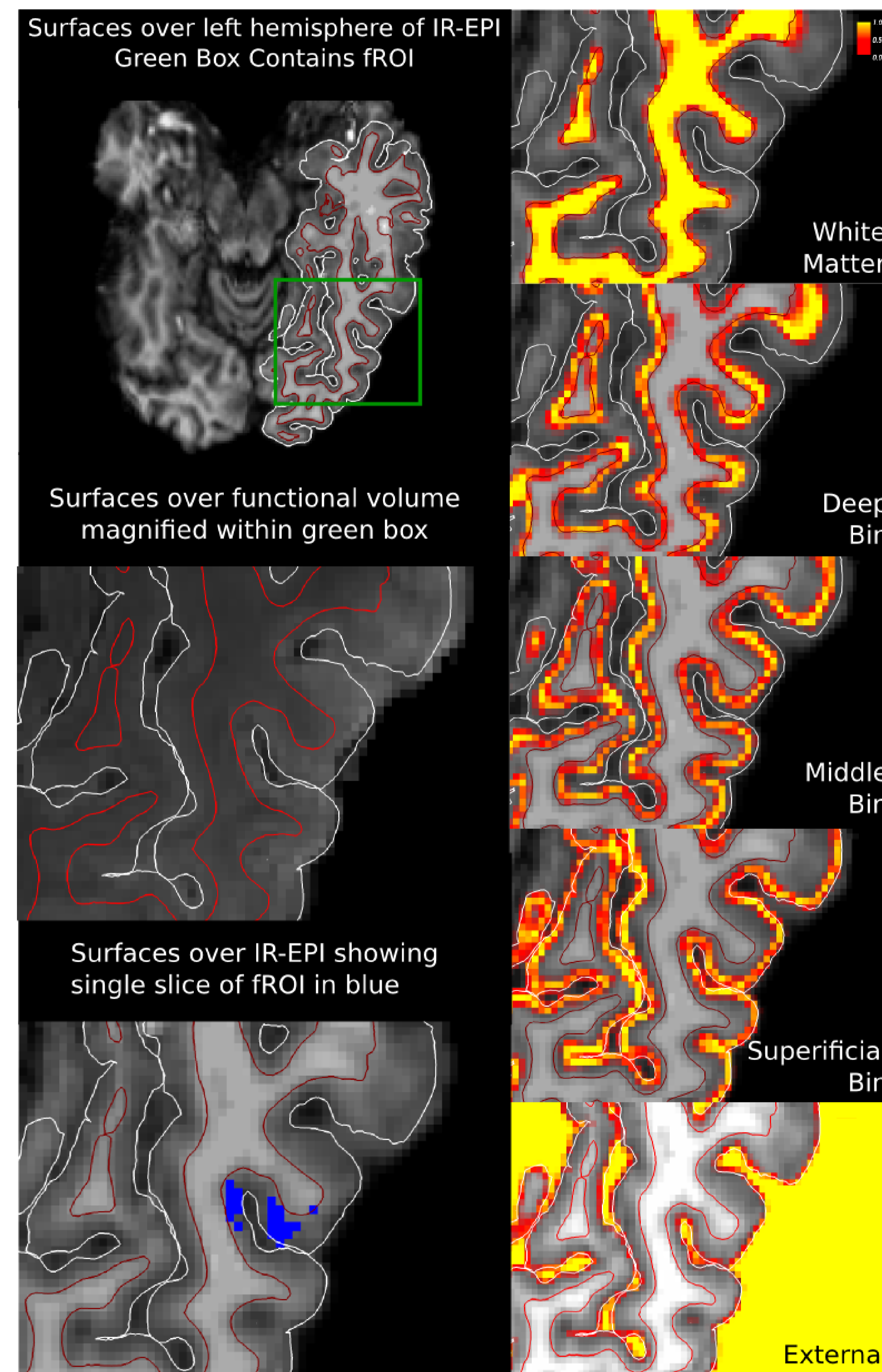
Task Procedure



Pseudo-Words
False Font Tokens



Acquisition and Analysis Procedure

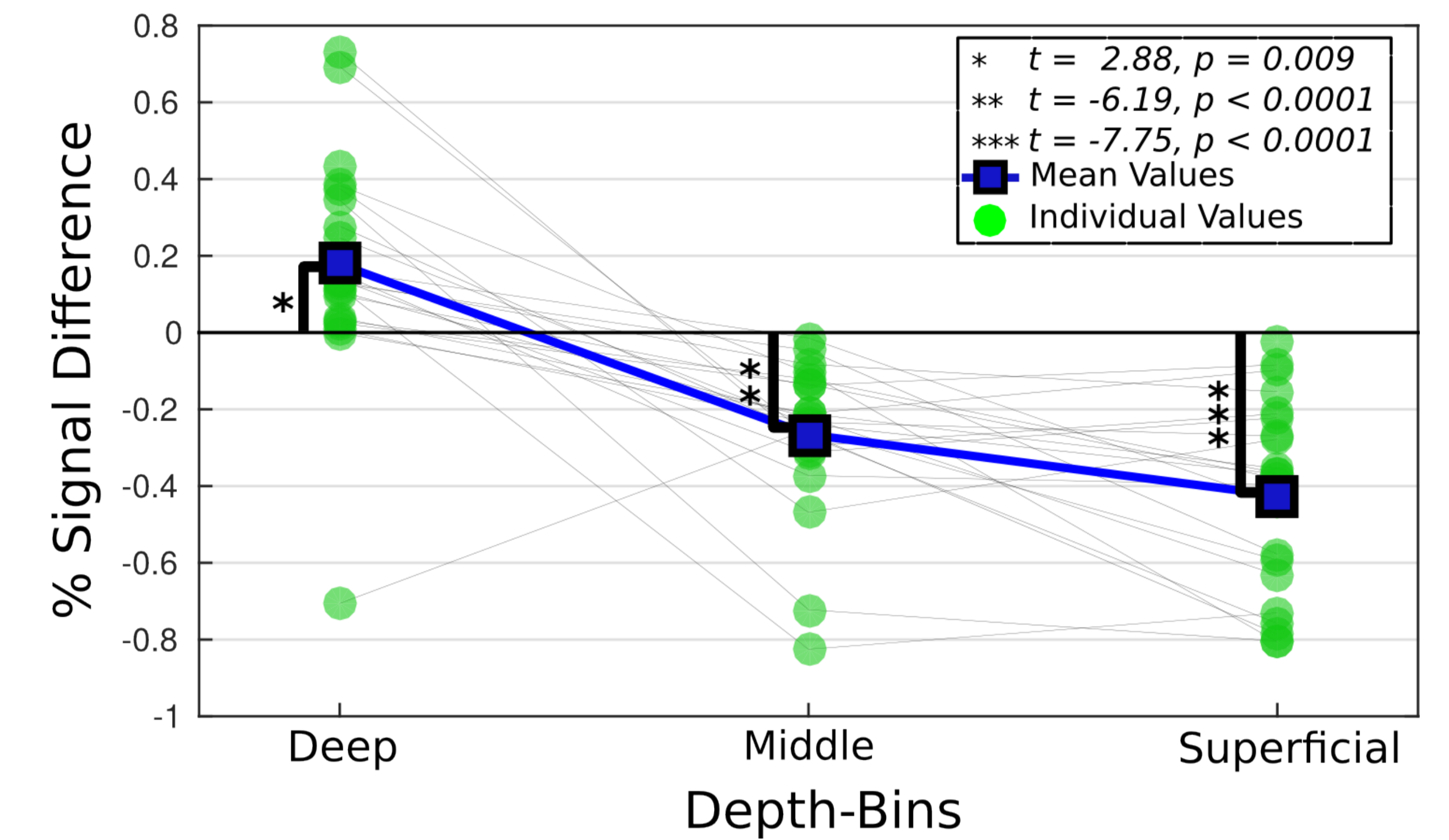


Layering shown over different acquisitions for a single subject.

- Data acquired on Siemens 7T scanner at Erwin L. Hahn Institute
- Segmentation and depth parcellation performed on IR-EPI
- Depth parcellation follows level-set method of Waehnert et al.^{10,11}
- Single subject laminar signal extracted using spatial GLM on fROIs¹⁰
- Individual fROIs selected by weighted contrast of T-scores for words and pseudowords against false fonts

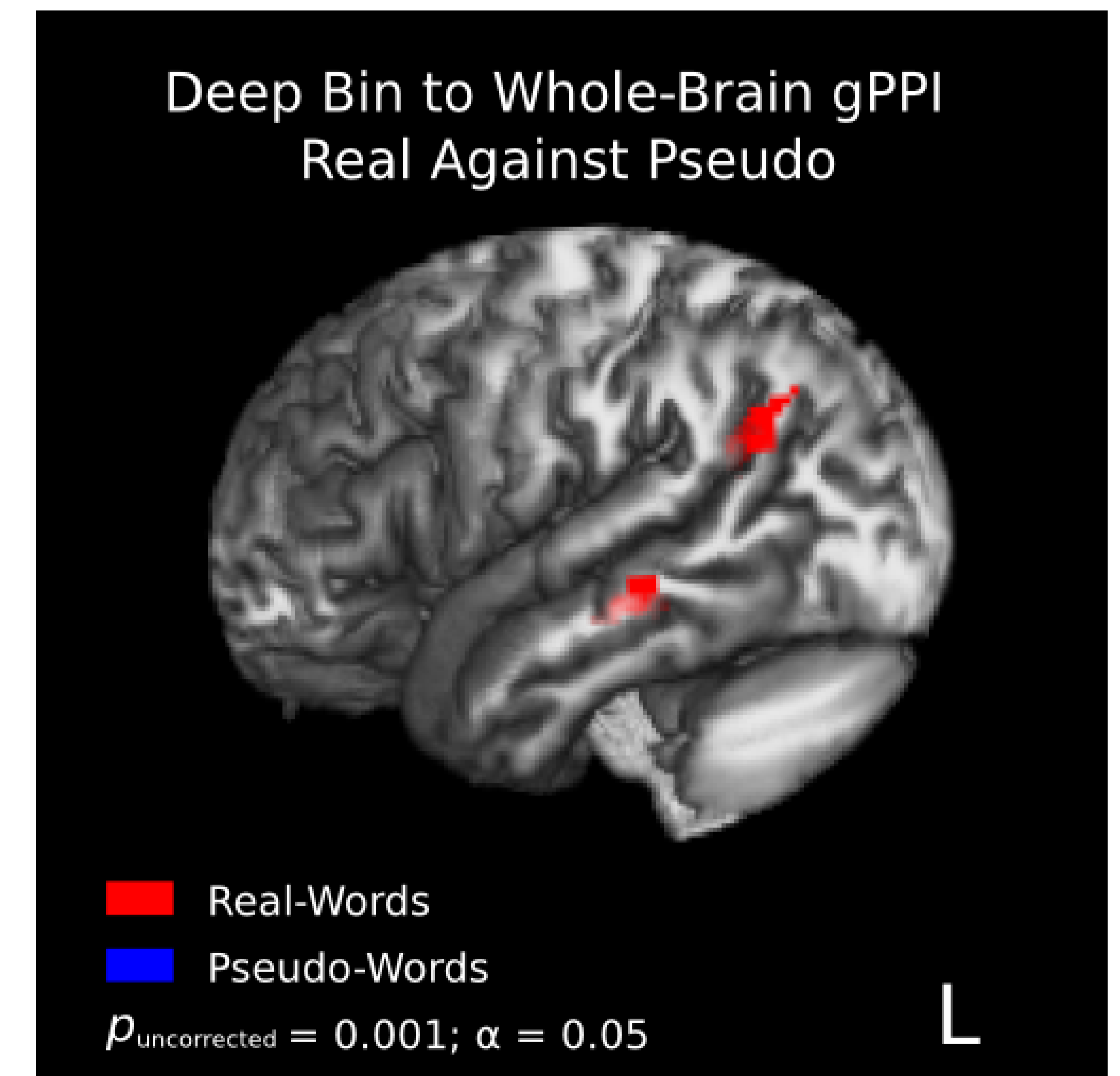


Depth-dependent task responses



Real - Pseudo Group T-Scores Visualized on IR-EPI Volume $p=0.076$ at $t=2.0$

Depth-dependent connectivity during task



Whole brain gPPI connectivity seeding from the deep bin of vOT. No significant finding for the middle bin.

References

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