
VOXEL-WISE FUNCTION-STRUCTURE COUPLING WITH DIFFUSION-WEIGHTED AND FUNCTIONAL MRI

A PREPRINT

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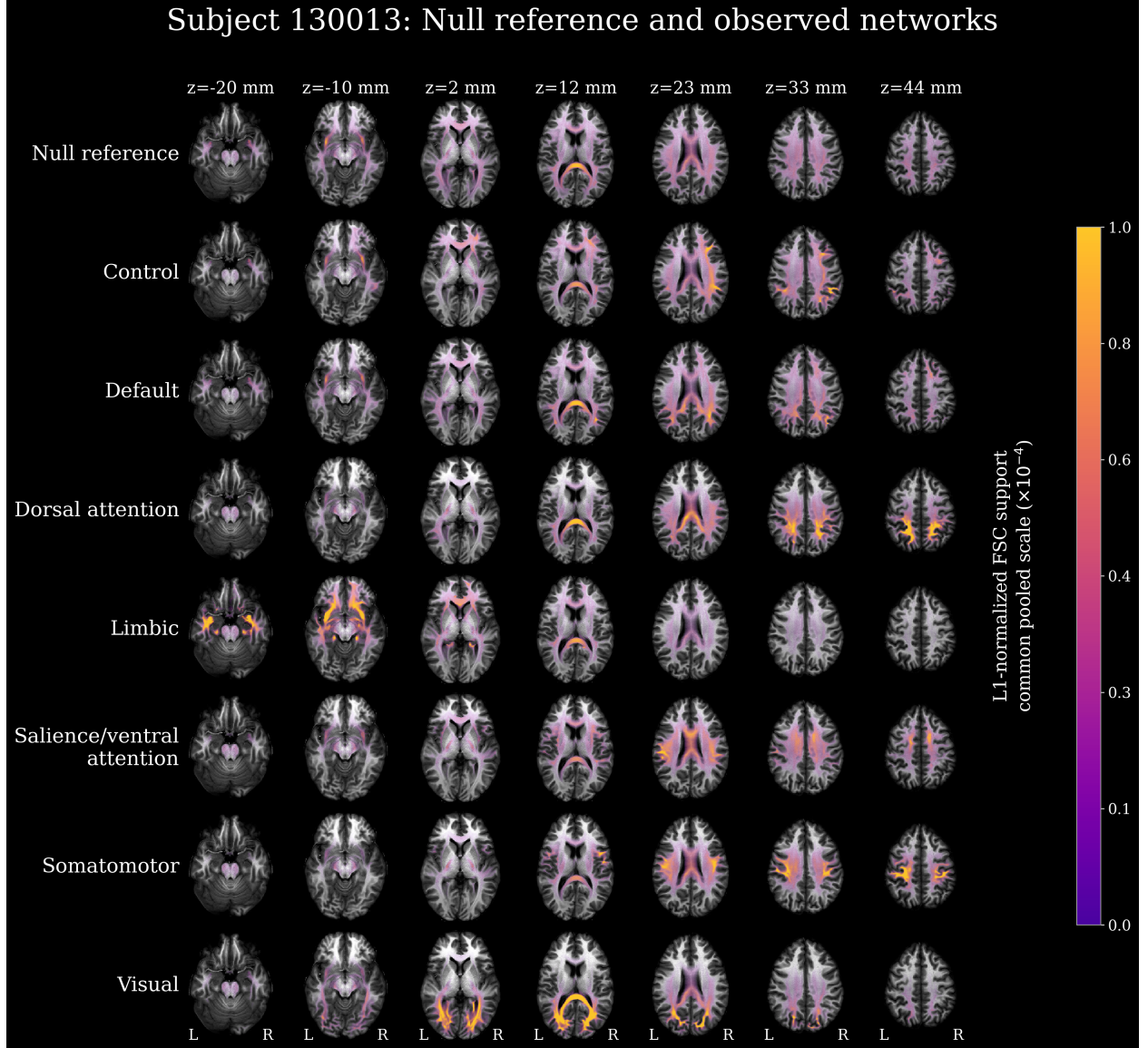


Figure 1: Null reference and observed voxel-wise FSC support maps for the seven Schaefer200/Yeo networks in HCP subject 130013. The top row shows the expected support distribution under unrestricted FC-pair reassignment, and the remaining rows show the observed network maps. Each complete three-dimensional map was L1-normalized by its total positive support, and all rows use one subject-specific nonlinear pooled colour scale. The labelled z coordinates are in native diffusion space, not MNI space. Parts of the deep white matter are shared among networks, but each network shows a different spatial allocation of support relative to the null reference. The figure is descriptive and does not establish anatomical network specificity.

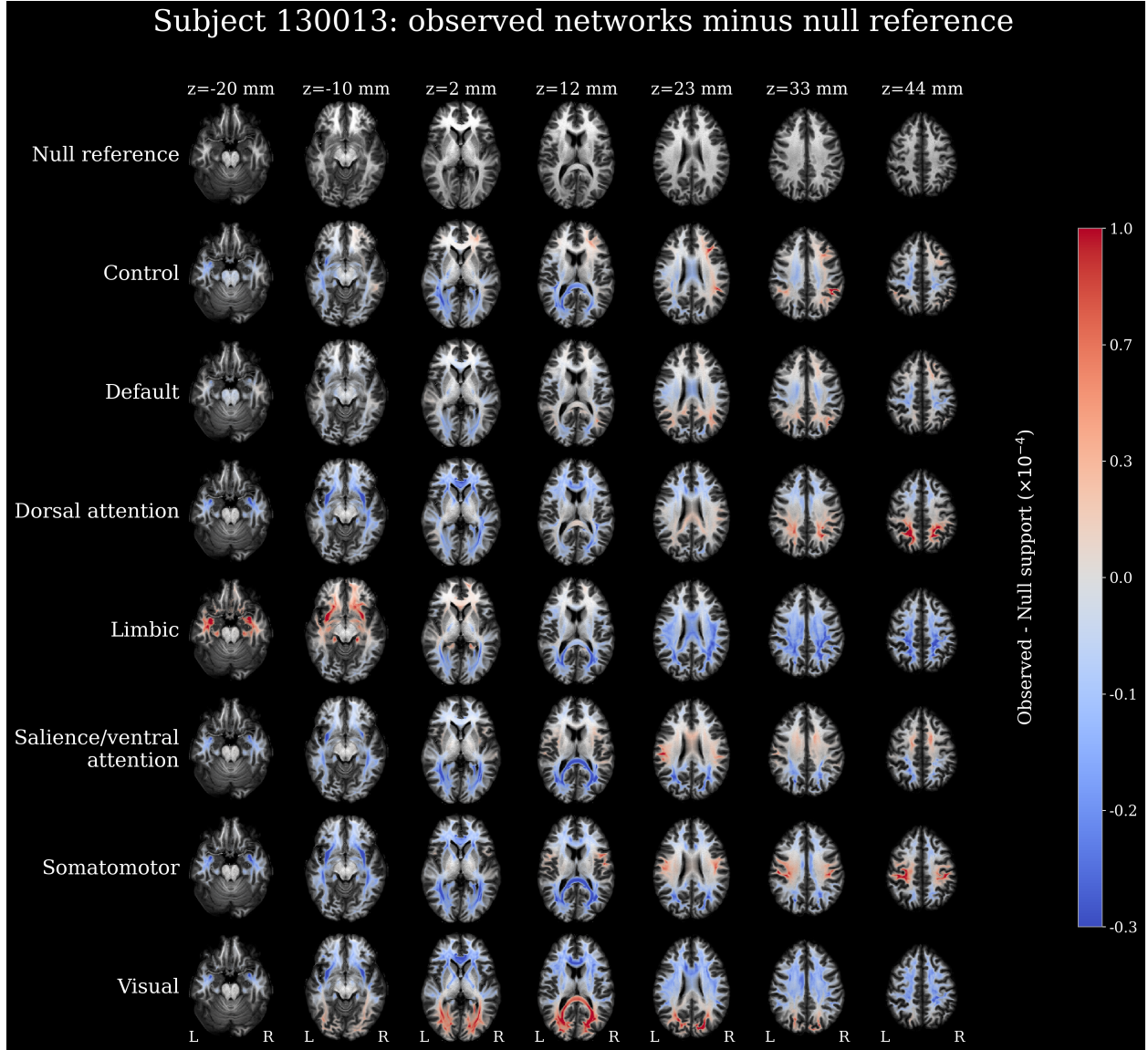


Figure 2: Residual support after subtracting the L1-normalized unrestricted-null reference from each L1-normalized observed network map in HCP subject 130013. The top row represents zero residual. Red indicates a larger fraction of total support than the null reference and blue indicates a smaller fraction. All rows use one subject-specific zero-centred diverging scale, with the negative and positive ranges scaled separately. Colour-bar values use the multiplier shown beside the scale. The labelled z coordinates are in native diffusion space. This illustrates that the null reference does not represent any of the networks completely.

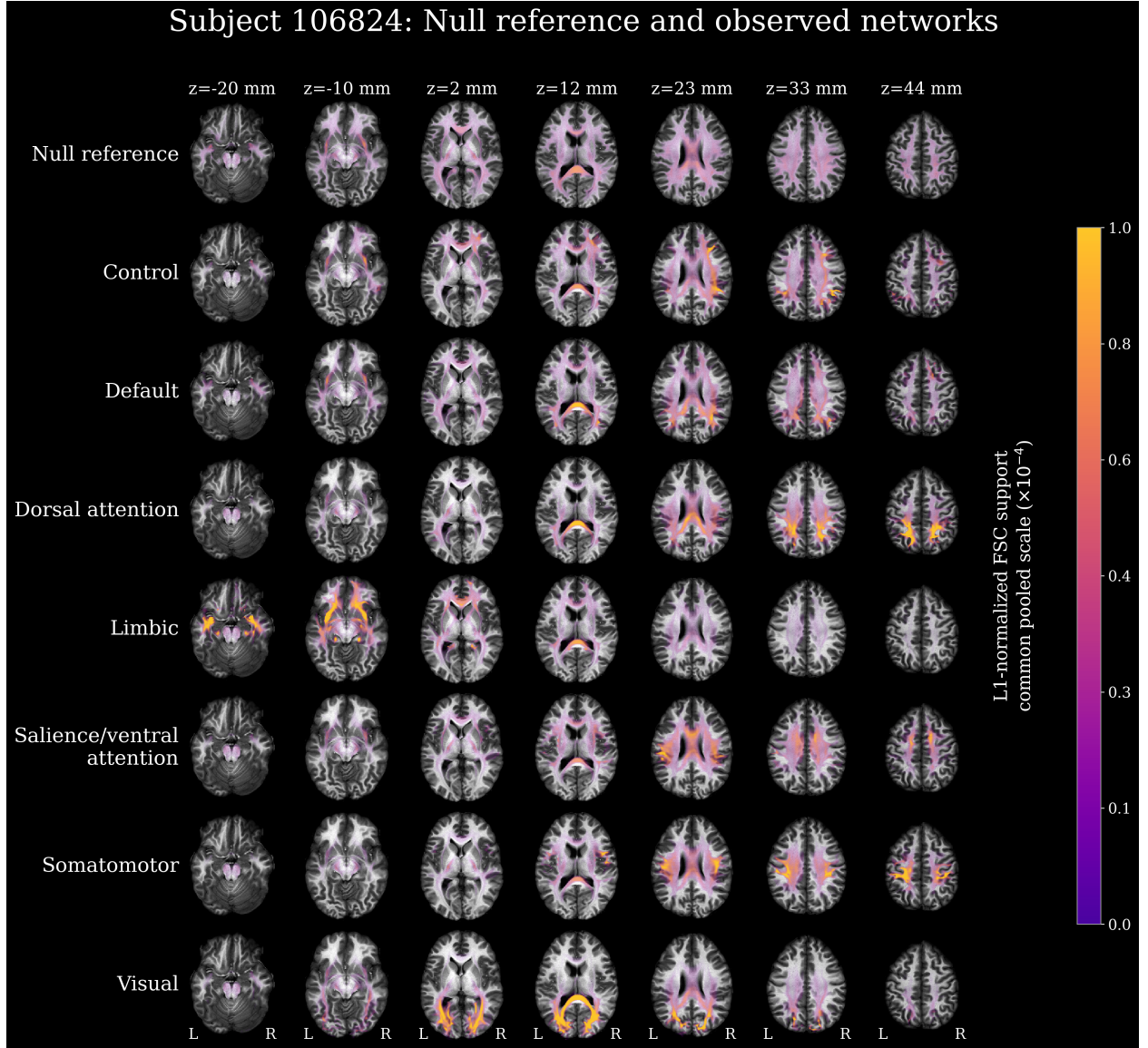


Figure 3: Null reference and observed voxel-wise FSC support maps for the seven Schaefer200/Yeo networks in HCP subject 106824. The top row shows the expected support distribution under unrestricted FC-pair reassignment, and the remaining rows show the observed network maps. Each complete three-dimensional map was L1-normalized by its total positive support, and all rows use one subject-specific nonlinear pooled colour scale. The labelled z coordinates are in native diffusion space, not MNI space. Parts of the deep white matter are shared among networks, but each network shows a different spatial allocation of support relative to the null reference. The figure is descriptive and does not establish anatomical network specificity.

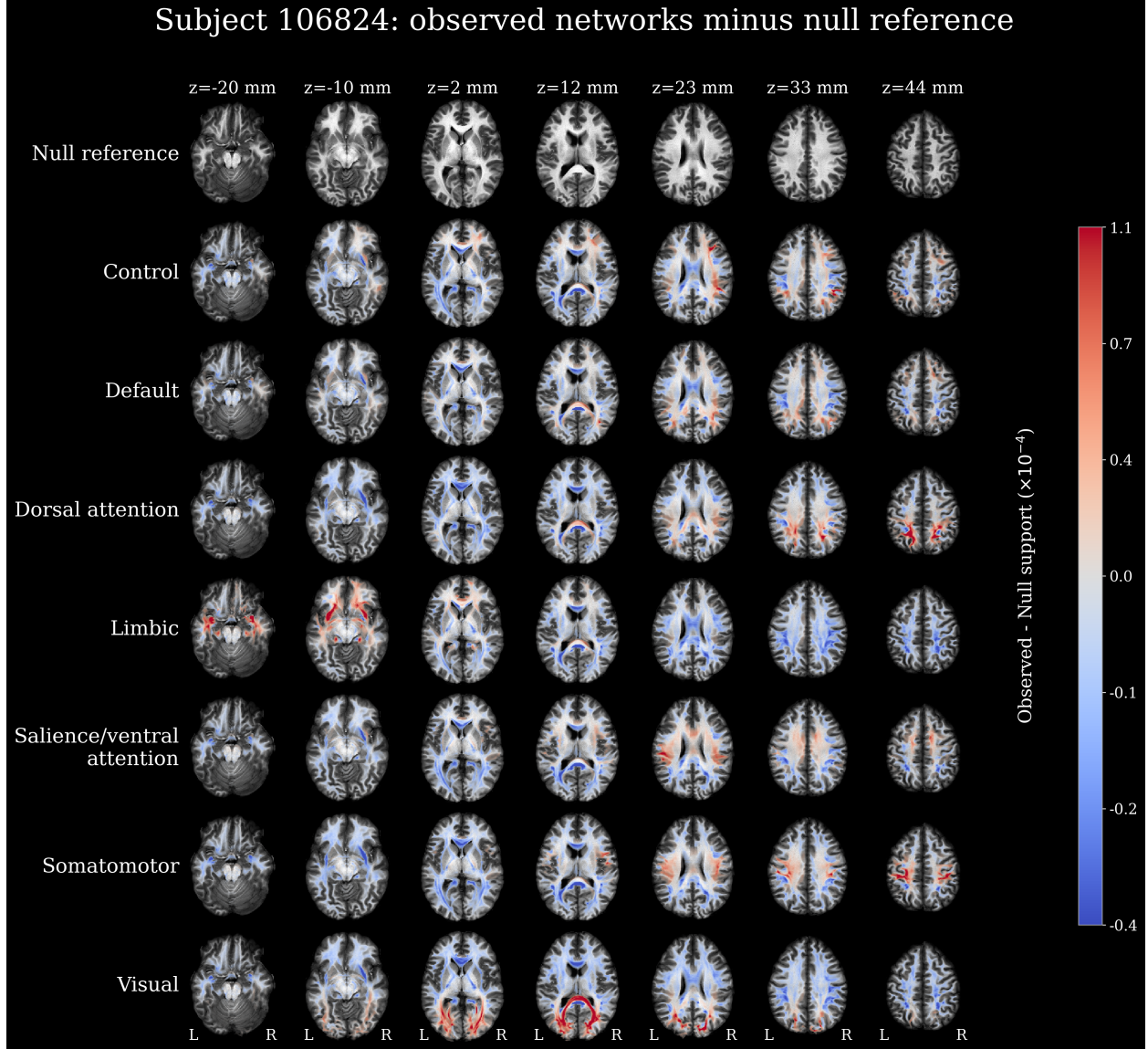


Figure 4: Residual support after subtracting the L1-normalized unrestricted-null reference from each L1-normalized observed network map in HCP subject 106824. The top row represents zero residual. Red indicates a larger fraction of total support than the null reference and blue indicates a smaller fraction. All rows use one subject-specific zero-centred diverging scale, with the negative and positive ranges scaled separately. Colour-bar values use the multiplier shown beside the scale. The labelled z coordinates are in native diffusion space. This illustrates that the null reference does not represent any of the networks completely.

Schaefer multiscale reproducibility

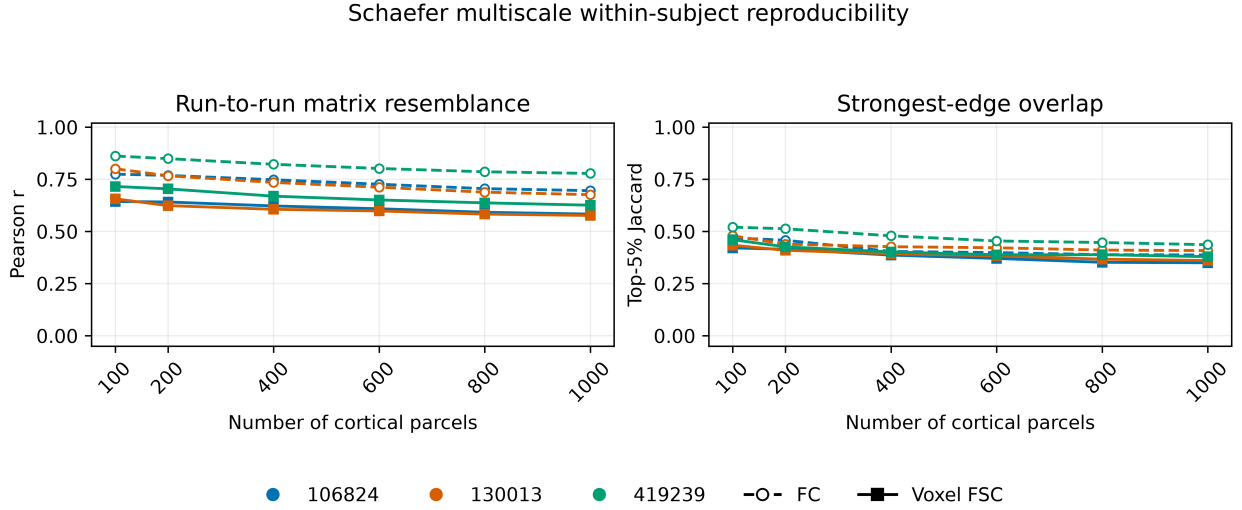


Figure 5: Within-subject reproducibility across Schaefer2018 parcellation scales. Reproducibility of FC matrices and voxel-wise FSC source-current matrices was evaluated at 100, 200, 400, 600, 800, and 1000 cortical parcels. Colours identify subjects. Dashed lines with open circles show FC, and solid lines with filled squares show voxel-wise FSC. Each point is the median of the REST1_LR–REST2_LR and REST1_RL–REST2_RL comparisons for one subject. Left: Pearson correlation between upper-triangular matrix elements. Right: Jaccard overlap of the strongest positive 5% of edges. Both measures decrease gradually with increasing parcel count, and the parallel FC and voxel-wise FSC trends indicate that much of the scale dependence is already present in the functional input. These results are descriptive and do not provide population-level inference.