Supplemental Table 1: Summary of K-S tests for individual subjects

Each entry is the ratio of the number of subjects that illustrated significantly larger fMRI-A for the preferred category relative to a non-preferred category. Significance was determined by a K-S test on the distribution of fMRI-A values on each subject's data from an ROI. For each experiment, the *p*-value was Bonferroni corrected (SL: $p < .01$; LL: $p < .0167$). The total number of subjects per ROI (e.g. the denominator) reflects the number of subjects that a given ROI was able to be detected in the independent localizer scans.

Short-Lagged						
ROI	**faces**	**limbs**	**cars**	**houses**	**flowers**	**guitars**
Limb-selective ITG	6/9	-	6/9	6/9	4/9	7/9
Limb-selective OTS	4/8	-	7/8	6/8	6/8	6/8
Face-selective mFus	-	6/8	7/8	7/8	7/8	7/8
Face-selective pFus	-	4/7	5/7	5/7	5/7	6/7
House-selective CoS	5/9	6/9	9/9	-	7/9	8/9
Long-Lagged						
ROI	**faces**	**limbs**	**cars**	**houses**		
Limb-selective ITG	8/8	-	6/8	7/8		
Limb-selective OTS	7/9	-	6/9	8/9		
Face-selective mFus	-	5/9	5/9	7/9		
Face-selective pFus	-	5/7	7/7	5/7		
House-selective CoS	4/9	3/9	1/9*	-		

* For the 8 subjects that did not illustrate the largest fMRI-A for houses in the CoS in the LL paradigm, 5 illustrated the most fMRI-A for cars, 2 illustrated the most fMRI-A for faces, and the 1 remaining subject had the same amount of fMRI-A for cars and houses.

Supplemental Table 2: Comparison of mean fMRI-A ratios and split-half ratios in each category-selective ROI

Each entry is the ratio ± SEM across subjects. $\text{fMRI - A ratio} = \frac{\text{repeated}}{\text{nonrepeated}}$;

$Split\text{-}half\ ratio = \frac{nonrepeated\ even}{nonrepeated\ odd}$. Response amplitudes were estimated for each voxel, and were estimated separately for all the data (nonrepeated/repeated conditions) and for each independent half of the data (odd/even runs). Ratios were calculated separately for each category based on the average response amplitude across voxels in each ROI. Data in the table are averaged across subjects and categories. Bold entries indicate that the value is significantly less than 1 ($p < .003$). Split-half ratios are not significantly less than one, indicating that our measurements are consistent across odd and even runs. In contrast, fMRI-A ratios are less than 1.

	Short-lagged		Long-lagged	
ROI	**fMRI-A**	**Split-half**	**fMRI-A**	**Split-Half**
Limb-selective ITG	**.81 ± .06**	.86 ± .12	.67 ± .24	1.01 ± .12
Limb-selective OTS	**.80 ± .17**	1.25 ± .23	**.43 ± .17**	.90 ± .35
Face-selective mFus	**.58 ± .09**	1.30 ± .15	**.62 ± .11**	.96 ± .09
Face-selective pFus	**.75 ± .10**	1.04 ± .12	**.72 ± .08**	.94 ± .06
House-selective CoS	**.46 ± .09**	.99 ± .19	**.46 ± .08**	.78 ± .21

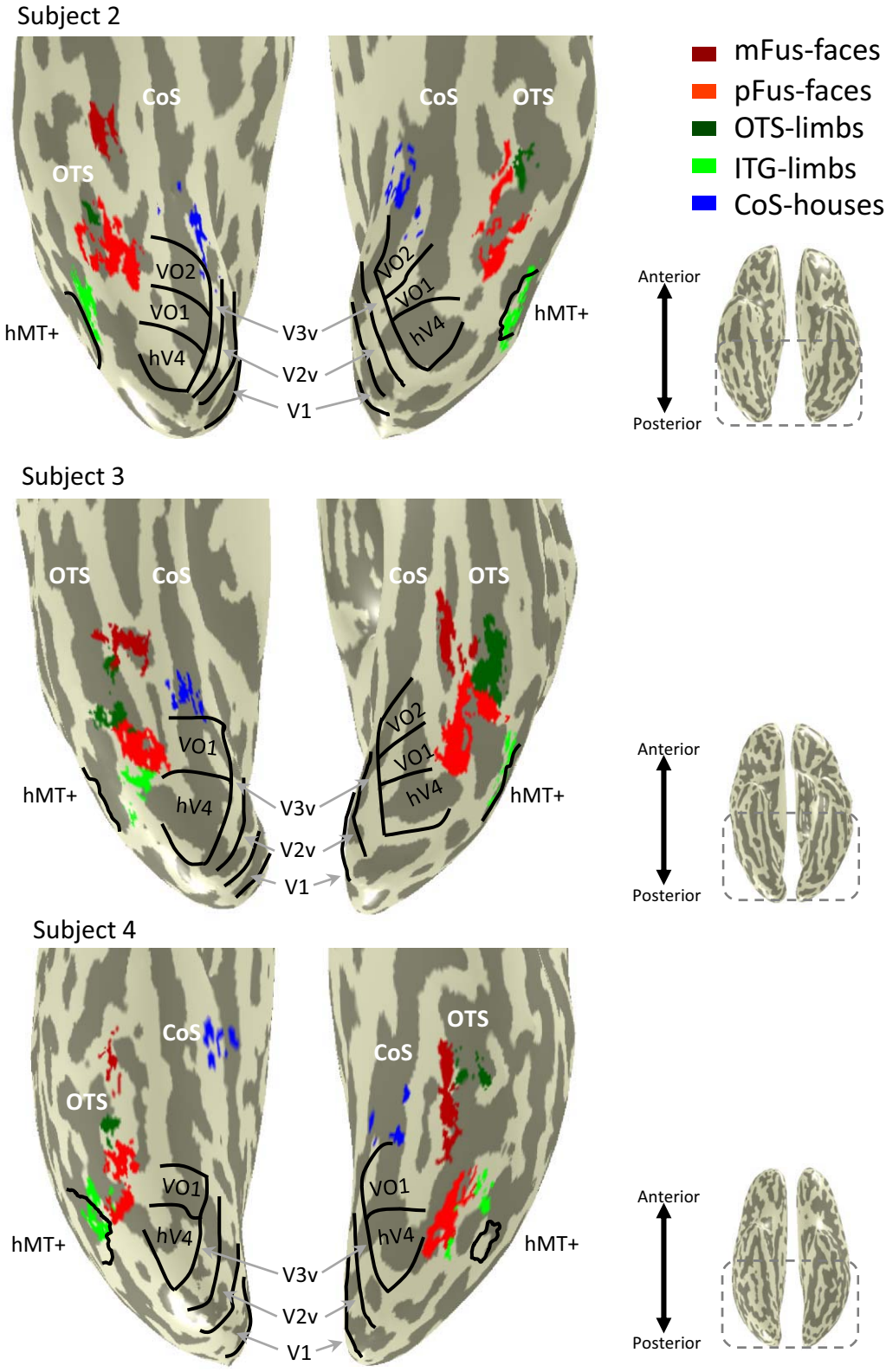
Supplemental Results

Split-Half Analysis

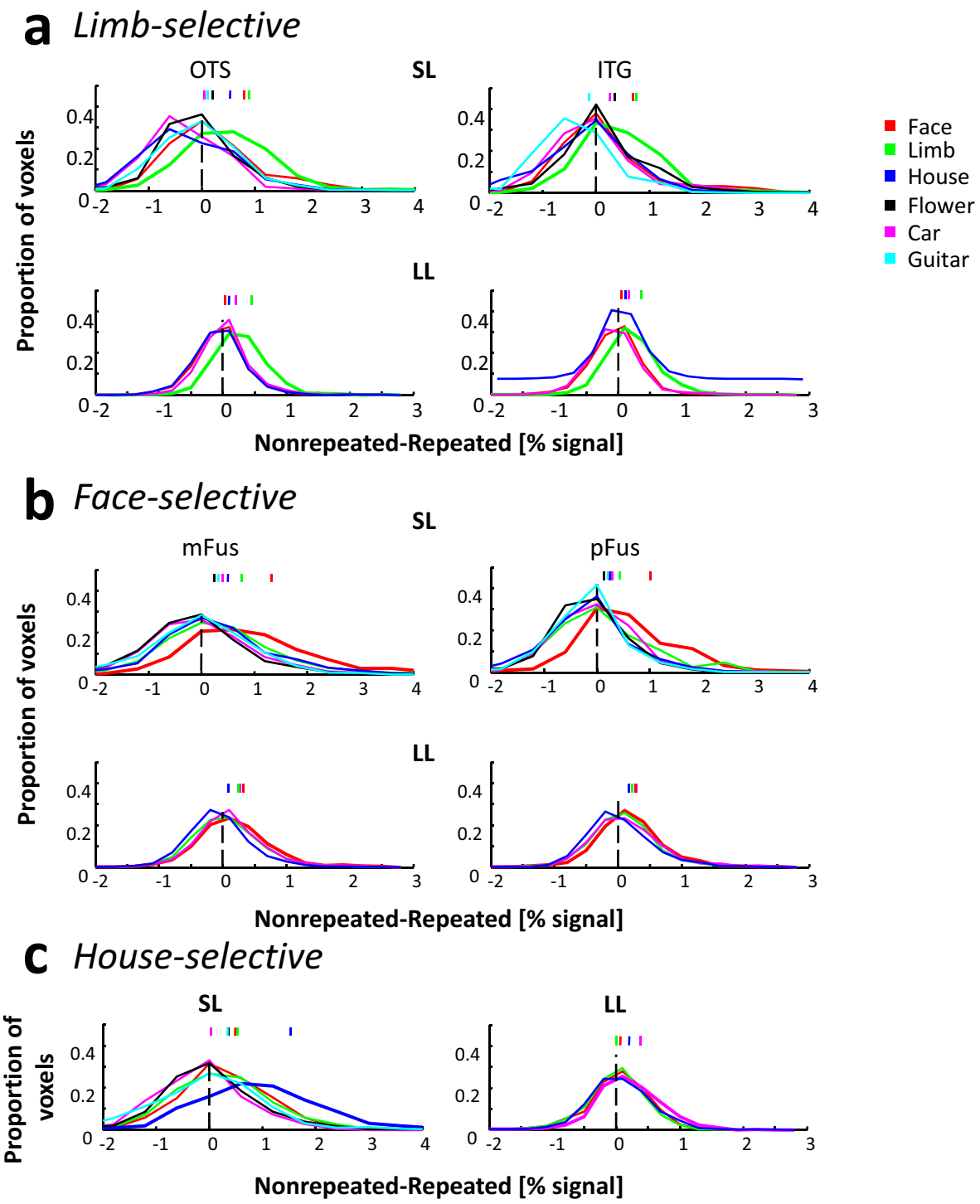
One aspect of the distributed responses to object categories changed with repetition: within-category correlations between localizer data and repeated conditions were less positive than the correlations between localizer data and nonrepeated conditions (SL: mean localizer and nonrepeated within-category correlation=.29±.03, localizer and repeated correlation = 0.19±.02, $t(8)=8.48$, $p < 10^{-5}$, paired, two-tailed; LL: mean localizer and nonrepeated within-category correlation: 0.44 ±0.04; localizer and repeated: 0.37 ±0.04, t(8)=3.58, p<0.01, paired, two-tailed). Also, between-category correlations were less negative in the SL experiment (mean localizer and nonrepeated between-category correlation = -0.07±0.007; localizer and repeated, =-0.03±0.005, $t(8)=3.79$, $p <$ .005, paired, two-tailed). There was no significant difference in the LL experiment (mean localizer and nonrepeated between-category correlation = -0.12±.01; localizer and repeated, =-0.10±0.01, $t(8)=1.96$, $p = .09$, paired, two-tailed).

What is the source of this lower correlation? One possibility is that the distributed response to repeated images is somewhat different than the distributed response to nonrepeated images. This would result in a change in the distributed response pattern to repeated images and lower within category correlations. Alternatively, the lower correlation may occur because of lower signal to noise ratio for repeated images. To test these alternatives we conducted a split-half analysis of distributed responses in the anatomical ROIs by dividing our data into even and odd runs and calculating the cross-correlation within and across categories for three different comparisons: nonrepeated odd runs to nonrepeated even runs, nonrepeated odd runs to repeated even runs, and repeated

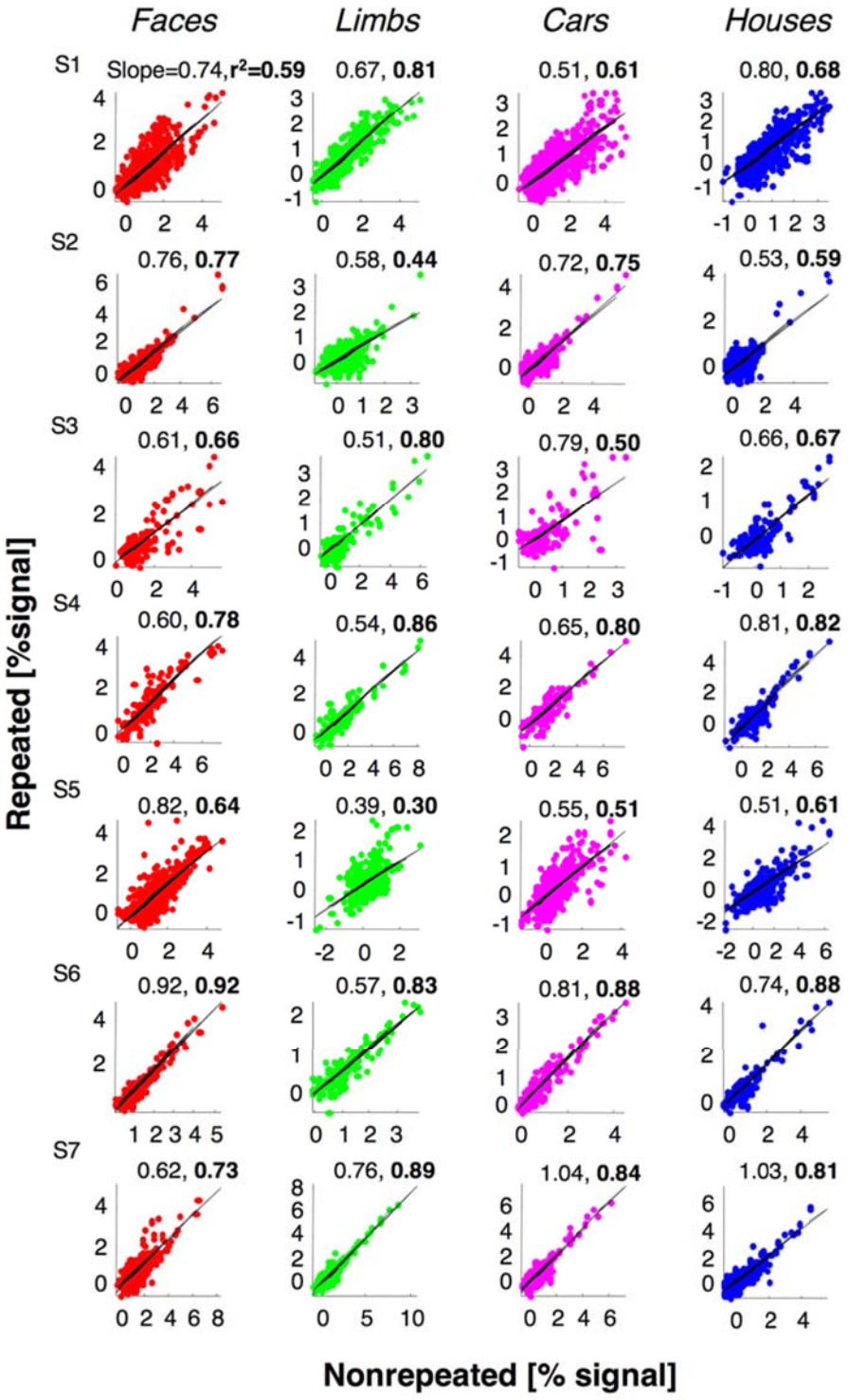
odd runs to repeated even runs. We reasoned that if lower correlations were driven by lower signals in the repeated trials, then the reproducibility of responses in the split-half analysis will be lower for repeated compared to nonrepeated conditions. Further, we reasoned that the difference should be more pronounced in the SL experiment where the magnitude of fMRI-A was larger than in the LL experiment. Indeed, the within-category correlations across odd and even runs for nonrepeated conditions were significantly greater than for the within-category correlations across nonrepeated odd runs/repeated even runs and repeated odd runs/repeated even runs in the SL experiment (**Supplemental Figure 6a;** $ts(8) > 4.08$, $ps < 10^{-3}$, paired, two-tailed) and in the LL experiment (**Supplemental Figure 6b**; $ts(8) = 2.84$, $p < .02$, paired, two-tailed). Further the WTA classifier performance was better for nonrepeated odd/nonrepeated even conditions than for repeated odd/repeated even conditions in the SL experiment (**Supplemental Figure 6a**, right: $t(8) = 4.67$, $p < .002$, paired, two-tailed) with no difference in the LL experiment (**Supplemental Figure 6b**, right: $t(8) = .86$, $p = .42$, paired, two-tailed). There was no difference in classifier performance for nonrepeated odd/nonrepeated even vs. nonrepeated odd /repeated even. These analyses indicate that reduced within-category correlation between localizer and repeated data relative to localizer and nonrepeated data is likely because of lower reproducibility in the repeated trials rather than a change in the distributed activations upon repetition.



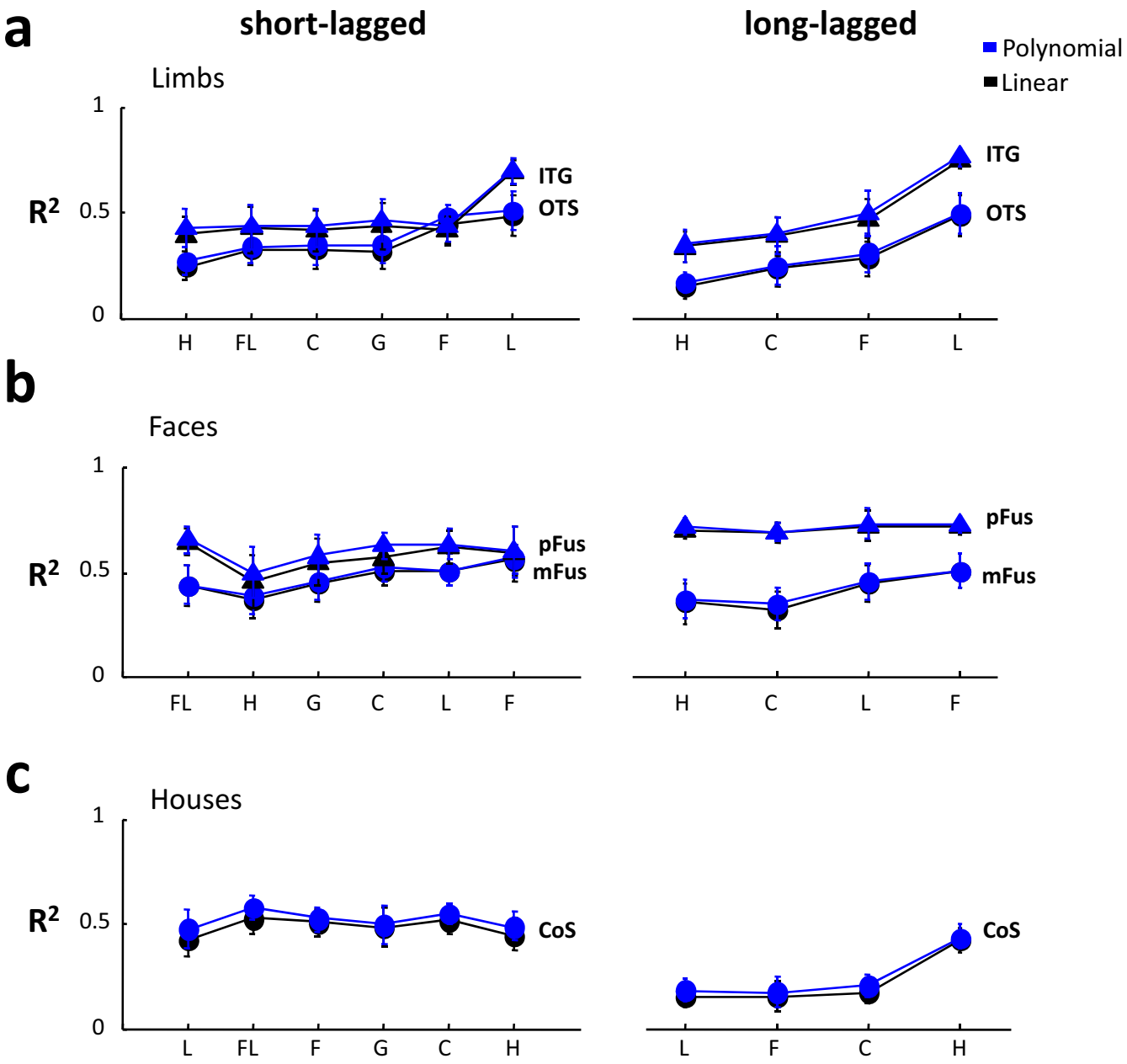
Supplemental Figure 1: Visualization of functional ROIs in three subjects (S2-S4). Inflated brains of three subjects zoomed on the ventral aspect (see inset indicating the zoomed region for each subject) showing regions of interest from three different statistical comparisons: face-selective (red: faces > limbs, flowers, cars, guitars and houses), limb-selective (green: limbs > faces, flowers, cars, guitars and houses), and house-selective (blue: houses > faces, limbs, flowers, cars and guitars). All ROIs were defined using a threshold of $t > 3$, voxel level. The outline of retinotopic areas V1-hV4, VO-1/2, as well as hMT+ are illustrated in black and defined from retinotopy scans and a separate hMT+ localizer scan, respectively. Acronyms: CoS: collateral sulcus; OTS: occipito-temporal sulcus. pFus: posterior fusiform; mFus: mid-fusiform; ITG: inferotemporal gyrus.



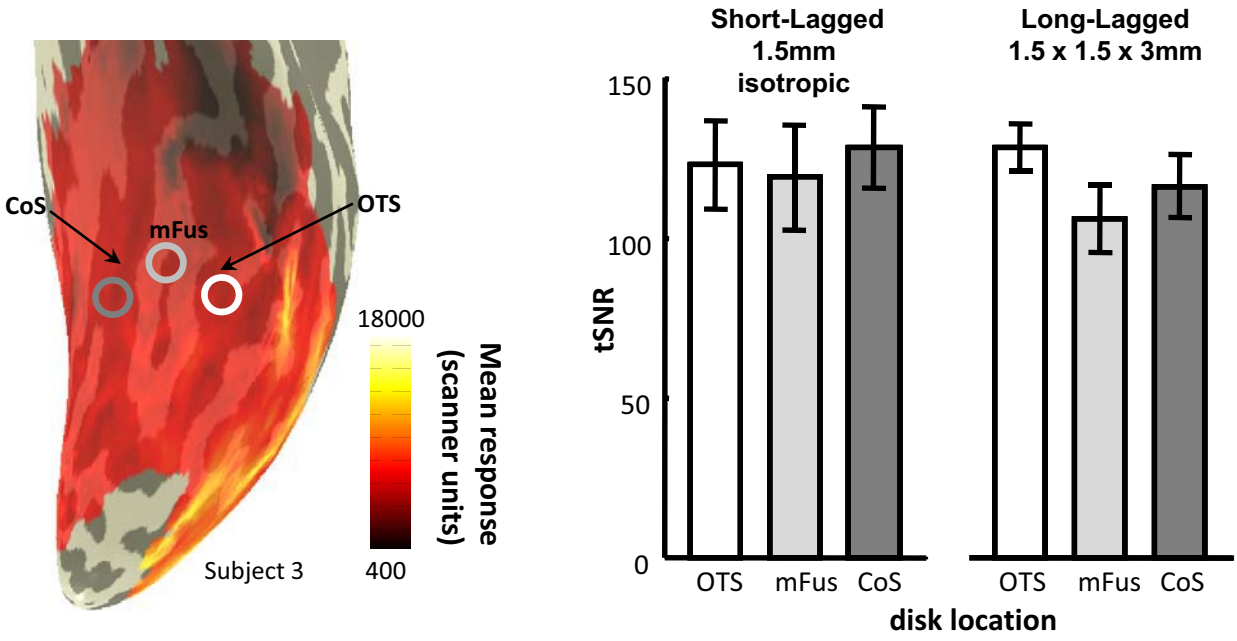
Supplemental Figure 2. Distribution of fMRI-A magnitudes in face- and limb-selective ROIs: Largest fMRI-A for preferred category. Same format as Figure 4 and 6, except now represented as the mean proportion of voxels across subjects rather than the aggregate distribution across subjects illustrating that the results in Figures 4 and 6 are not driven by a subset of subjects. (a-c) Distribution of fMRI-A values across subjects. The y-axis represents the proportion of voxels and the x-axis represents the magnitude of fMRI-A (nonrepeated-repeated measured in percentage signal change). Each curve represents the distribution of fMRI-A values for one category (see legend); The vertical dashed line indicates no fMRI-A and short vertical lines above the distributions indicate the mean fMRI-A magnitude for each category. Positive values indicate lower responses for repeated than nonrepeated conditions. In each ROI, the thick line indicates the category illustrating the most fMRI-A. First row: Short-lagged (SL) paradigm. Second row: Long-lagged (LL) paradigm. (a) Limb-selective ROIs. Limbs (green) elicit the most fMRI-A. (b) Face-selective ROIs. Faces (red) elicit the most fMRI-A across paradigms. (c) House-selective CoS. Houses (blue) elicit the most fMRI-A in the SL paradigm, while a nonpreferred category (cars) elicits the most fMRI-A in the LL paradigm.



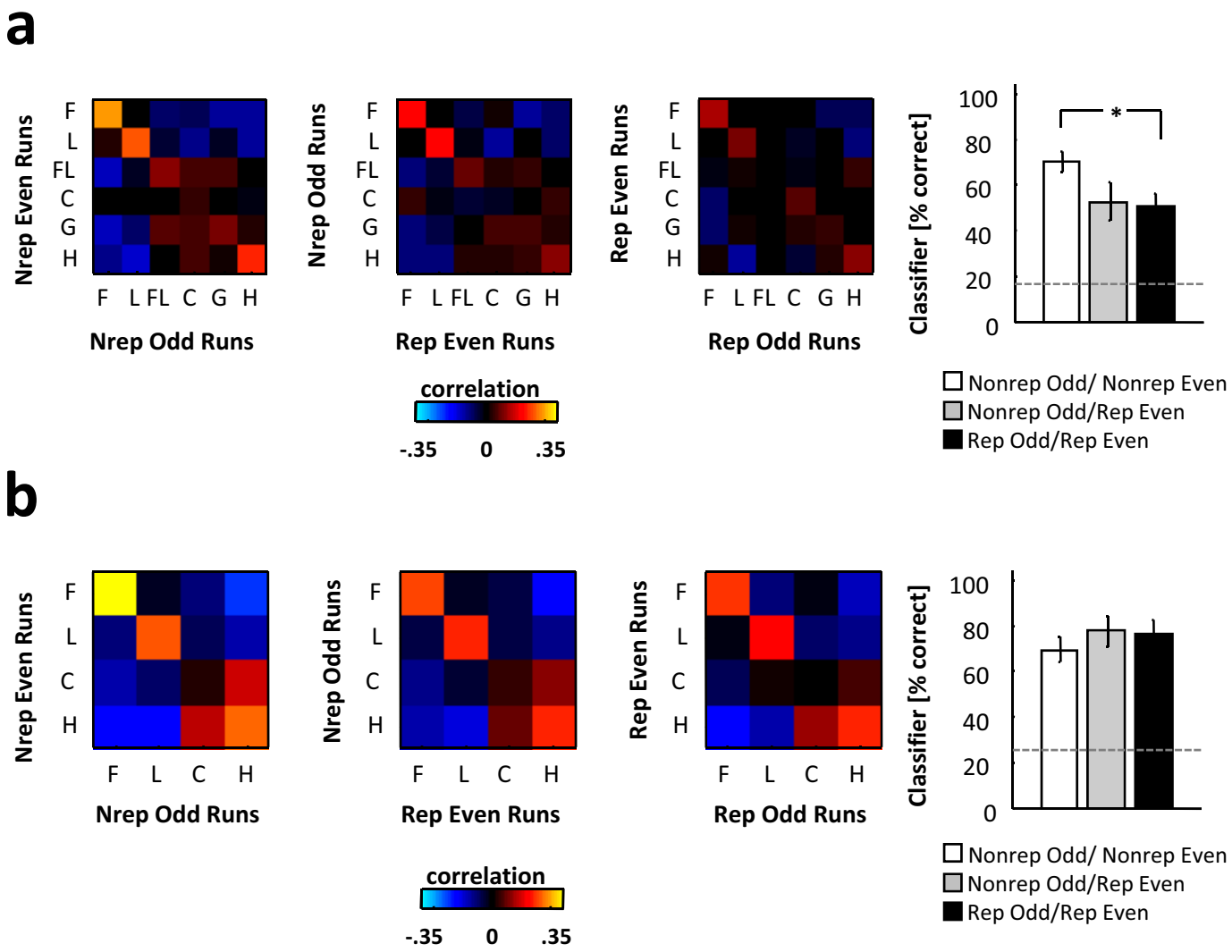
Supplemental Figure 3: Voxel-based regressions of repeated vs. nonrepeated amplitudes in face-selective pFus in the LL paradigm. Each row represents data from a different subject and each column represents data from a different category. In each panel, each point represents one voxel's response for repeated and nonrepeated stimuli from one category. From left to right: faces (red), limbs (green), cars (magenta), and houses (blue). The solid black line is the regression line of repeated vs. nonrepeated amplitudes. The slope of this regression line, which we refer to as the fMRI-adaptation ratio in the main text and in Figures 5b-c and 7b, is the first number listed above each plot. The second number listed above each plot is the R^2 value, which is bolded as all regressions were significant ($p < 10^{-20}$). The data in the first row, S1, is illustrated in Figure 5a.



Supplemental Figure 4: Comparison of the variance explained by linear and nonlinear fits relating responses to nonrepeated vs. repeated stimuli for each category in category-selective ROIs. The y-axis represents the variance explained and the x-axis denotes the category ranking generated from the independent localizer scans. (a) Limb-selective regions. There is no difference between linear and nonlinear fits in either paradigm, while limbs explain more variance relative to the nonpreferred categories in the LL paradigm ($p < 10^{-5}$). Also, more variance is explained in the posterior ITG (triangles) relative to the more anterior OTS (circles) in the LL paradigm ($p < 10^{-5}$). (b) Face-selective regions. There is no difference between linear and nonlinear fits and no difference across categories in either paradigm. Like the limb-selective regions, more variance is explained in the posterior region (pFus; triangles) relative to the more anterior region (mFus; circles) in the LL paradigm ($p < 10^{-5}$), illustrating a consistent anterior-posterior effect independent of category preference. (c) house-selective CoS. There is no difference between linear and nonlinear fits in either paradigm and no category differences in the SL paradigm. In the LL paradigm, however, there is significantly more variance explained for houses relative to the variance explained for the nonpreferred categories ($p < .002$), indicating that the linear relationship between repeated and nonrepeated responses is much stronger for the preferred category in the LL paradigm. *Left:* SL paradigm; *Right:* LL paradigm; blue: Polynomial; black: Linear; F: faces; L: limbs; FL: flowers; C: cars; G: guitars; H: houses.



Supplemental Figure 5: tSNR measurements: Same signal intensity in lateral and medial VTC in both experiments. (a) Mean map illustrating the extent of activation in raw scanner units on the inflated cortical surface of a representative subject's right hemisphere zoomed on the fusiform gyrus. Colored disks illustrate the location of the three disk ROIs. Disks were centered on the limb-selective OTS (OTS), face-selective mFus (mFus), and house-selective activations (CoS). (b) tSNR measurements averaged across hemispheres and subjects. An ANOVA with factors experiment (SL/LL) and disk location (OTS/Fus/CoS) found no effect of disk location ($F(2,48)=.71$, $p=.50$), no effect of experiment ($F(1,48)=.49$, $p=.49$) and no interaction ($F(2,48)=.40$, $p=.67$). *Left:* 1.5mm isotropic measurements from Short-lagged experiment. *Right*: 1.5 x 1.5 x 3mm measurements from Long-lagged experiment. Errorbars: SEMs across subjects. *OTS*: Occipitotemporal sulcus; *CoS*: Collateral sulcus



Supplemental Figure 6: Split-half analysis of distributed response patterns to object categories in a VTC anatomical ROI. (a) Short lagged experiment. *Left:* Mean cross-correlation matrices across hemispheres and subjects. Cross-correlations between nonrepeated (Nrep) odd runs/nonrepeated even runs (left), nonrepeated odd runs/repeated (Rep) even runs (middle), and repeated odd runs/repeated even runs (right). *Right:* Winner-take-all (WTA) classifier performance averaged across hemispheres, subjects, and categories. Error bars: between subjects SEMs. *White:* nonrepeated odd/nonrepeated even; *Gray*: nonrepeated odd/repeated even; *Black*: repeated odd/repeated even. Dashed line indicates chance level performance. Asterisks indicate significantly different performance ($p < 0.05$). (b) Long-lagged experiment. Same convention as (a).