Training humans to categorize monkey calls: Auditory feature- and category-selective neural tuning changes

Supplementary Materials

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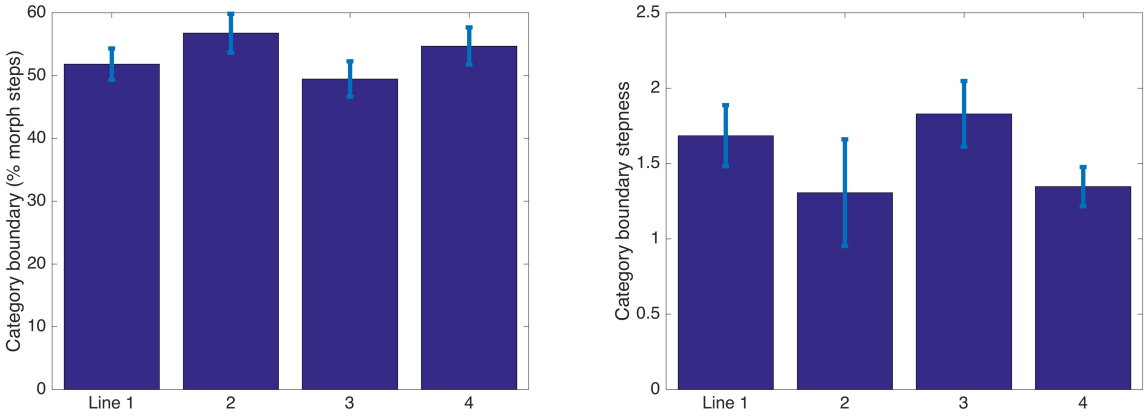
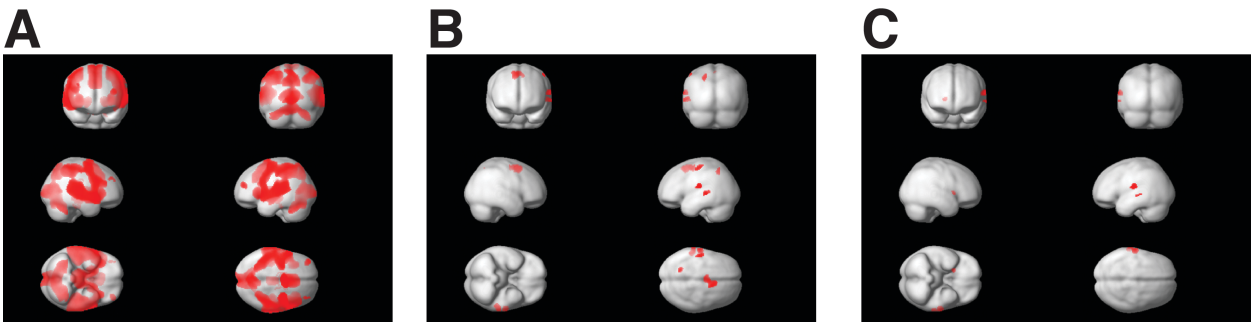
Running Title: Neural plasticity in auditory and frontal cortices



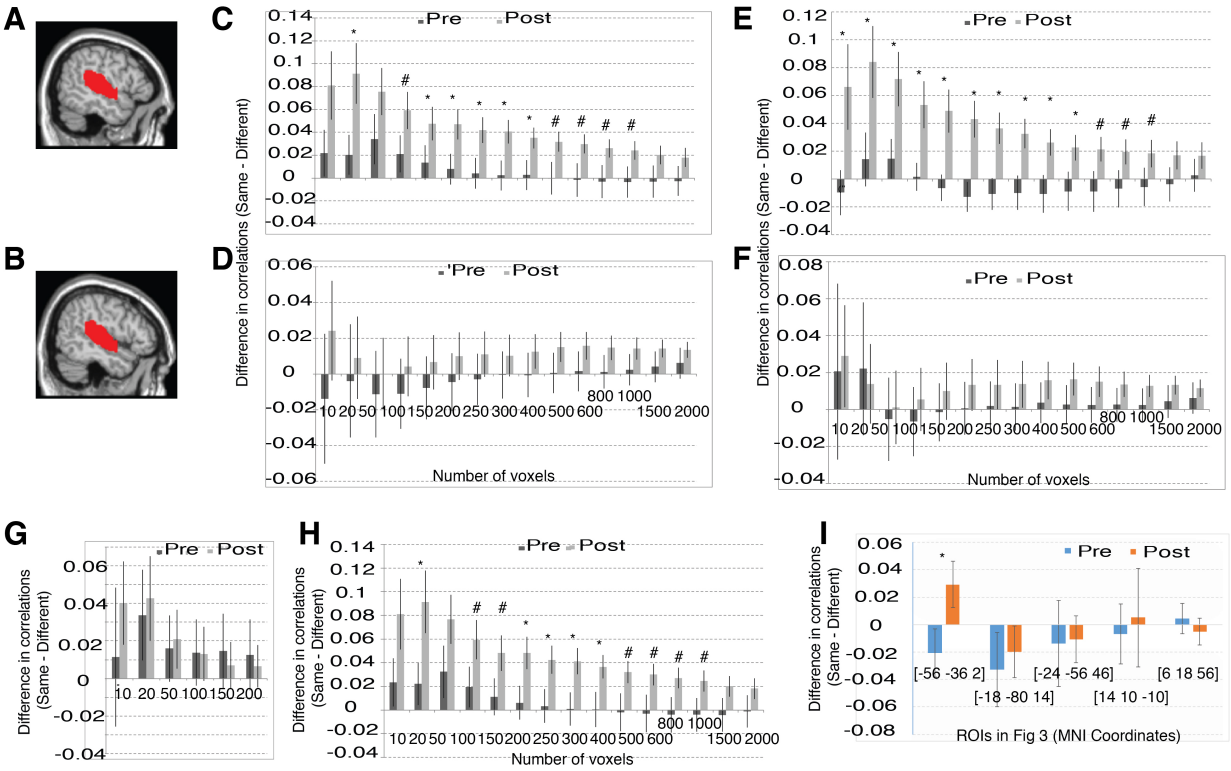
Supplementary Figure 1. Category boundary location and steepness along the four morph lines. Related to Figure 2.

(Left) Category boundary location; (Right) Steepness of category boundary, obtained by fitting subject behavior to Equation 1 in the main paper. Repeated-measure ANOVAs revealed no significant effects between the four morph lines, for neither the category steepness, $F(3,45)=1.377$, $p=0.268$, nor the category boundary, $F(3,45)=2.466$, $p=0.104$. Error bars represent SEM.



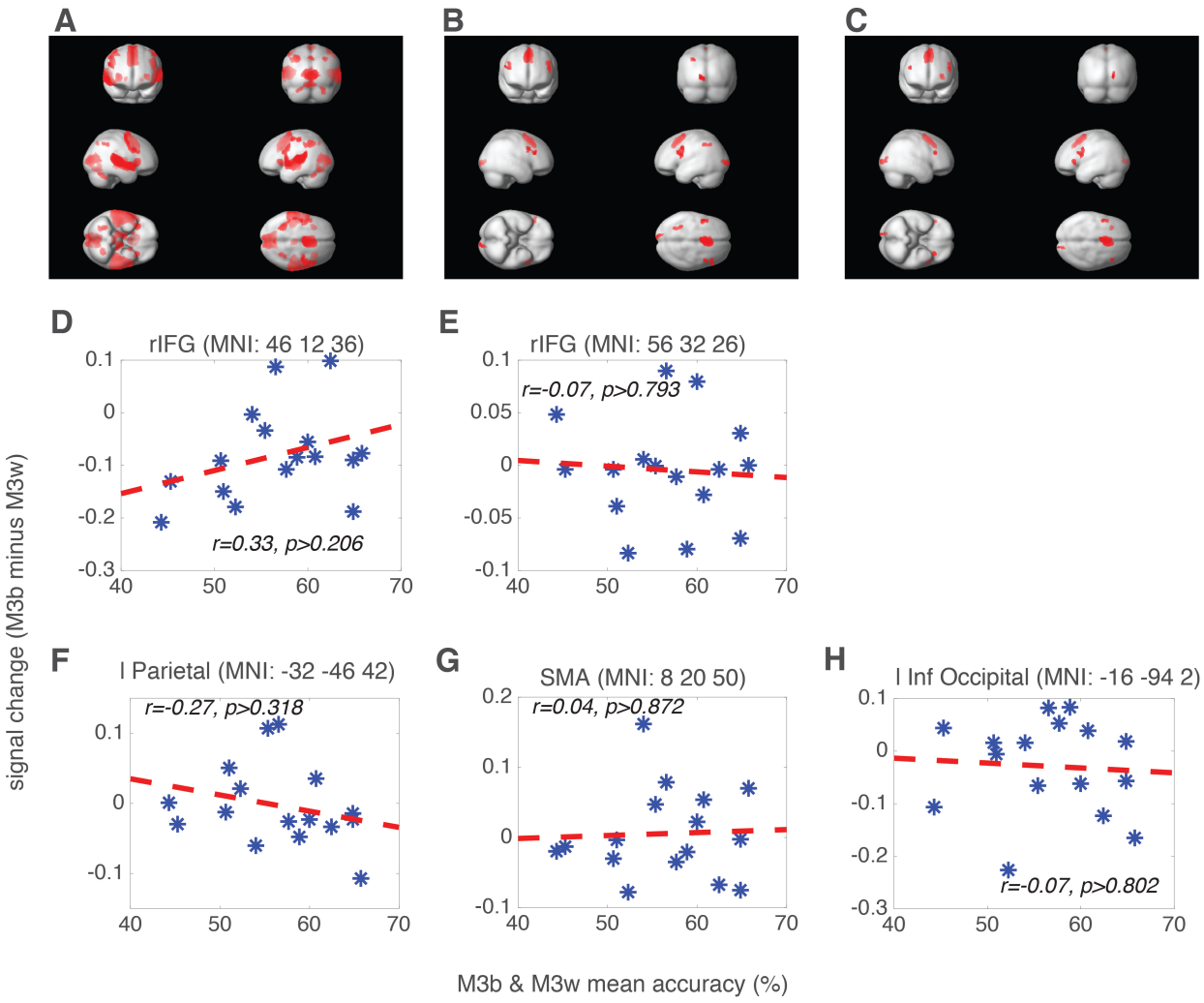
Supplementary Figure 2. FMRI responses during the pre- and post-training bottom-up scans (combined). Related to Figure 3 and Table 1.

(A) Contrast, Auditory stimuli > Silence (pre- and post-training scans collapsed), at a threshold of $p<0.001$, uncorrected. (B) Contrast, M6>M0 & Post- > Pre-training, at a threshold of $p<0.01$, uncorrected, at least 50 contiguous voxels, masked by Auditory Stimuli > Silence ($p<0.001$, uncorrected). (C) Contrast, $M6\&M3_{between}\&M3_{within}$ > M0 & Post > Pre-training, at a threshold of $p<0.01$, uncorrected, at least 20 contiguous voxels, masked by Auditory Stimuli > Silence ($p<0.001$, uncorrected).



Supplementary Figure 3. MVPA analysis of pre- and post-training bottom-up scans. Related to Figure 4.

(A) The left and (B) right auditory sensory ROIs used in the MVPA and functional connectivity analyses. (C) and (D), MVPA results with 10 20, 50, 100, 200, 250, 300, 400, 500, 600, 800, 1000, 1500, and 2000 voxels, in the same (C) left and (D) right auditory ROIs. Using anatomically defined left and right superior temporal cortex (including Heschl's gyri) (AAL atlas, Tzourio-Mazoyer et al, Neuroimage, 2002), similar results were observed in the (E) left and (F) right ROIs. The changes in the left primary auditory cortex (G) and left non-primary auditory cortex (H) (after excluding A1 from ROI in (A)). (I) The changes in the five ROIs identified via the contrast of M6>M0 in Figure 3A. #, p<0.1 *, p<0.05 (two-sample t-test). Error-bars represent SEM.



Supplementary Figure 4. FMRI responses during the categorization scan (Experiment 3). Related to Figure 5 and Table 2.

(A) Contrast, Stimuli > Silence, at a threshold of p<0.001, uncorrected, at least 50 contiguous voxels. (B) Contrast, M6 > M0, at a threshold of p<0.001, uncorrected, at least 50 contiguous voxels, masked by Stimuli > Silence, p<0.005, uncorrected. (C) Contrast, M6&$M3_{between}$ > M0&$M3_{within}$, at a threshold of p<0.005, uncorrected, at least 50 contiguous voxels, masked by Stimuli > Silence, p<0.005, uncorrected. (D-H) The correlations between fMRI adaptation and category judgment. The ROIs were identified in the M6 > M0 (see B and Table 2). In contrast to the left IFG ROI (shown in Figure 5), there was no significant correlation between the magnitude of category-selective fMRI adaptation (the difference between $M3_{between}$ and $M3_{within}$) and the mean behavioral performance in the $M3_{between}$ and $M3_{within}$ conditions, with only a weak trend in right IFG.