Joint neuronal tuning for object form and position in the human lateral occipital complex

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Supplemental Information

Supplemental Results

EVC Localization

We observed no significant sensitivity of patterns in EVC to changes in pair content, conflicting with work demonstrating selectivity for object category among EVC patterns (Cox and Savoy, 2003). One possible explanation for the absence of content sensitivity in EVC was our choice of localizer, which defined EVC from localizer scans as voxels with significantly higher responses to scrambled objects than to intact objects. Because all stimuli were presented at screen center during localizer scans, it is possible that this contrast failed to adequately capture portions of EVC with receptive fields at the relatively peripheral stimulus positions used during experimental scans.

To test whether the absence of content-sensitivity in EVC resulted from this potential mislocalization, for each subject in Experiment 1 we defined three position-specific EVC ROIs as voxels with significantly higher responses during stimulus events at one of the three pair positions versus during null events in the main experimental scans. These new EVC ROIs excluded any voxels that coincided with our definition of LOC based on the localizer scans. We then computed between- and within-category correlation differentials for pairs at each screen position using patterns drawn from the ROI for that position only. Voxel rankings contributing to the generation of child ROIs were based on t-values from the same position-specific contrasts.

As can be seen in Figure S2, we observed no significant differences between between- and within-category pattern correlations at the position-specific ROIs, consistent with the results of our original analysis. We note that the absence of category-sensitivity in EVC is consistent with previous studies that have used relatively small images presented outside central fixation (Sayres and Grill-Spector, 2008; Schwarzlose et al., 2008).

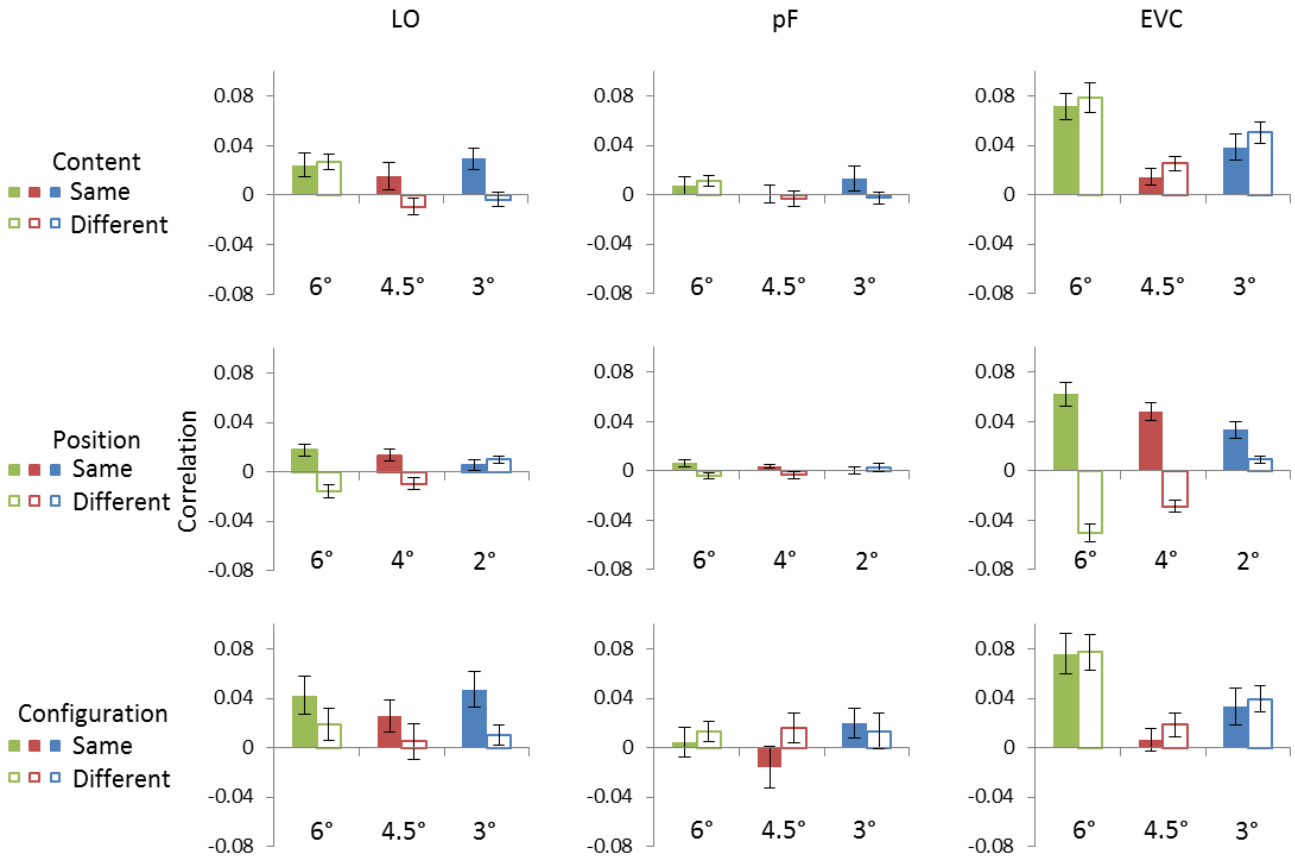

Figure S1. Direct comparisons of between-half correlations for pairs with the same content/position/configuration versus those that differed along each of those dimensions, for each parent ROI. Data correspond to the 20th child ROI in Figure 3; differences between each filled/unfilled pair in this figure match 20th value of the trace with the corresponding color in the corresponding panel of Figure 3. Horizontal axis labels for content and configuration comparisons (first and third rows, respectively) denote overall pair position in terms of between-object spacing (see Figure 1); horizontal axis labels for position comparisons (middle row) denote summed magnitude of position change for each comparison. Correlations are between patterns composed of standardized voxel values (see Methods). Error bars are s.e.m. For results of statistical tests which include these data, please refer to Figure 3.

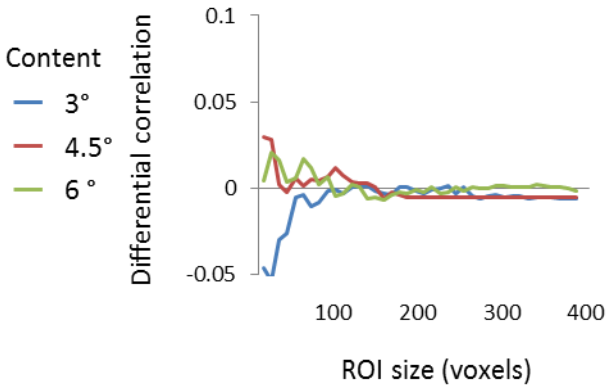

Figure S2. Content sensitivity of position-specific EVC ROIs. As in Figure 3, each trace represents the correlation between patterns evoked by the exact same object pair in each data half minus the correlation between patterns evoked by object pairs differing in pair content, as a function of child ROI size. The three traces correspond to pattern sensitivity for pairs at each of the three pair positions defined by the color-coded between-object spacings. Unlike in Figure 3 however, each trace is derived from an ROI defined by significantly higher responses to stimulus versus null events at that position only (but excluding voxels falling within the definition of LOC). Despite retinotopically tailoring ROIs in this fashion, we still observed no child ROIs showing significant sensitivity to pair content. The flattening of the right end of the 4.5° trace reflects the relatively small size of position-specific ROIs: no ROI exceeding approximately 200 voxels in size was defined for this pair position, and the final value is carried to the right end of the horizontal axis.

References

Cox, D.D., Savoy, R.L., 2003. Functional magnetic resonance imaging (fmri) "brain reading": Detecting and classifying distributed patterns of fmri activity in human visual cortex. Neuroimage 19, 261-270.

Sayres, R., Grill-Spector, K., 2008. Relating retinotopic and object-selective responses in human lateral occipital cortex. J Neurophysiol 100, 249-267.

Schwarzlose, R.F., Swisher, J.D., Dang, S., Kanwisher, N., 2008. The distribution of category and location information across object-selective regions in human visual cortex. Proc Natl Acad Sci U S A 105, 4447-4452.