Neural correlates of morphological decomposition during visual word recognition

Brian T. Gold[1], & Kathleen Rastle[2]

These results demonstrate that lowercase strings could not be consciously perceived in the present design, even when attention was directed to those strings.

fMRI Study

Participants

Eighteen volunteers who were not involved in the pilot study participated in the fMRI study. Two participant's fMRI data were not analyzed due to within-run movement

Morphological decomposition

used 10^4 trials. Ultimately, a voxel-level threshold of $p < 10^{-4}$ and a minimum cluster size of 8 contiguous active voxels was chosen to achieve a corrected significance level of $p < .05$. Within this distributed system involved in visual word recognition, voxels were then characterized by their response to different components of visual word recognition (as reflected by *decreased* BOLD response in each priming condition compared to the

recognition. Below we describe the priming effects associated with each condition, and then discuss the implications of our findings for models of visual word recognition.

Lexical-semantic priming was observed in a portion of left middle temporal gyrus (MTG; ~BA 21). This result is consistent with neuropsychological and functional neuroimaging studies, both of which have demonstrated a role for the MTG in lexical-semantic processing. For example, damage to MTG is associated with poor recovery of comprehension (Naeser et al., 1987). MTG is activated during a range of different lexical-semantic tasks (Vandenberge et al.,

voxels that showed unique morphological priming effects within each of these two regions. However, these morphological effects consisted of voxel clusters that were spatially contiguous with orthographic priming effects. To be conservative, these spatially contiguous clusters are reported as a single cluster, common to orthographic and morphological priming (see Table 1). The finding that morphological priming did not overlap lexical-semantic priming but did show substantial overlap with orthographic priming provides direct functional neuroanatomic evidence supporting the existence of a morphological segmentation mechanism that occurs independently of lexical-semantic processes, at an early structural level (Longtin et al., 2003; Rastle & Davis, 2003; Rastle et al., 2004). In addition, results also provide evidence that this early morphological decomposition process cannot be explained on the basis of orthographic (letter) similarity alone, because there was one region that showed priming unique to the morphological condition.

Unique morphological priming was observe

Figure 2