A role for the left inferotemporal region in lexical selection: Evidence from fMRI and semantic interference

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INTRO: The left inferotemporal region (IT) is implicated in visual naming by lesion and functional imaging studies, but it is unclear which processes it supports. We probed the role of IT in lexical processing using a picture-word interference paradigm, in which a semantic interference effect arises from a lexical processing conflict.

METHODS: Six normal RH (rH>90) subjects named photographs of concrete entities (animals, manmade objects) while ignoring simultaneous auditory distractors during event-related BOLD fMRI at 1.5T. For each picture (e.g. CHICKEN) there were five distractor conditions: SEMANTIC (e.g. "pheasant"); CATEGORICAL (e.g. "octopus"); UNRELATED (e.g. "bus"); PSEUDOWORD, and NO DISTRACTOR. Condition order was random and distractors were counterbalanced over five runs. Distractors were balanced for frequency and word length. Subjects' spoken responses were recorded and latencies calculated after appropriate filtering (Mehta et al, 2004). Analysis was with multiple regression using the general linear model. Results were thresholded using the false discovery rate, and analyzed as overlapping activation in Talairach space.

RESULTS: Significant semantic interference was observed. Relative to NO DISTRACTOR, response latencies were: SEMANTIC +50ms, CATEGORICAL +29 ms, UNRELATED +18 ms, PSEUDOWORD +14 ms; F(4,20)=7.08, p=0.001. SEMANTIC vs UNRELATED: t=3.81, p=0.003. The semantic interference effect correlated with activity in the left middle temporal gyrus (-62 -45 +8), where a significant result was present for 5/6 subjects. Other areas of common activation were the left ventral occipito-temporal junction (-24 -73 -10), left middle frontal gyrus (-31 +55 +9; -39 +32 +31), and the right lateral occipital lobe (+33 -83 +8).

CONCLUSION: The results are consistent with a role for left IT in lexical-level processing, and specifically in lexical selection.

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