Discourse Processing in the Brain: Setting Up New Discourse Referents

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Introduction
During listening or reading language users construct a mental representation of the on-going discourse, which is continuously modified and augmented. One of the modifications is to refer back to, and elaborate upon, previously mentioned entities. For instance in (1a), “all five” refers to the set of ships mentioned in the first sentence. However, in (b) “all three” cannot refer to this previously mentioned set, resulting in an infelicitous discourse.

(a) Five ships were in the port. All five were being loaded. [1]
(b) Five ships were in the port. All three were being loaded.

Since previous neuropsychological research has implicated a right hemispheric dominance for discourse processing [1,2], we were particularly interested in differences between the hemispheres.

Experimental
In the past year, we continued the analysis of fMRI data collected in 2007-2008. In this experiment, a total of twenty-one neurologically healthy, right-handed, monolingual speakers of English were scanned using the Philips 3T whole body system located at the McKnight Brain Institute. Sentences were presented visually and participants were asked to rate the plausibility of the connection between the two sentences by pressing buttons on a response pad. Data from sixteen participants were included in the analysis.

Results and Discussion

Significant activations for the plausible (2a) versus implausible (2b) condition were found in the right superior temporal gyrus, right middle frontal gyrus. Left hemisphere areas included the superior, middle, and inferior frontal gyri and lingual gyrus (see figure 1). Implausible conditions showed more activation in the right inferior parietal lobe when compared with plausible conditions.

This supports the view that the right hemisphere is involved in processing reference in discourse, but not predominantly so. A connectivity analysis will be carried out to determine which areas are functionally connected in processing discourse referents.

Figure 1.
Significant differences in activation for the plausible (1a) versus implausible (1b) conditions. Crosshair is on the right middle frontal gyrus. Areas activated in the left hemisphere are the middle and inferior frontal gyri.

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References