Evidence for an Atypical Pattern of Lexical Access in Agrammatic Aphasia

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Background

The typical time-course of activation of a lexical item during an ongoing auditory sentence is not observed in studies exploring on-line language processing with individuals who have agrammatic aphasia. That is, they demonstrate a pattern of delayed initial lexical access as well as slowed re-access (Love et al., 2008). This latter finding suggests that the ‘syntactic’ comprehension disorder observed in agrammatic aphasia might have its roots in a lexical access deficit; a slowed lexical activation system may result in lexical information “feeding” syntactic processing too slowly, leading to subsequent syntactic deficits. The bulk of this evidence, however, has come from investigations of complex filler-gap constructions. To address this issue, we present a cross-modal picture priming (CMPP) study using simple active sentence constructions to map out the time course of lexical activation throughout a sentence in both college-age unimpaired listeners and language impaired individuals with agrammatic aphasia.

Methods

Data from 58 unimpaired listeners and 7 individuals with agrammatic aphasia were included. All language impaired subjects survived a single unilateral left hemisphere stroke, and were premorbidly right handed, monolingual English speakers.

In this experiment we used an on-line CMPP task, with sentences presented at a normal rate of speech. The test items consisted of 40 experimental active sentences like the following:

\textit{The guide carried the student\textsuperscript{1} during\textsuperscript{2} the utter\textsuperscript{3}ly exhaust\textsuperscript{4}ing hike to the summit.}

A visual probe was presented at one of four positions during the ongoing auditory sentence (indicated approximately by superscript numerals). Priming was measured by comparing response times to related and control probes – faster response times to related probes indicate a priming effect, thus activation of the lexical item.

Results

Only correct data were used in the analysis (errors or reaction times below 300ms or above 1500ms [for controls] or 2000ms [for agrammatic participants]). A priori paired one tailed t-test results for college-aged
language unimpaired listeners, illustrated in Figure 1, demonstrated priming at the offset of the noun ($t_{30}=2.87$, $p=.0035$), which slowly tapered off throughout the rest of the probe positions ($p>.05$ for all 3 test points).

Results for agrammatic participants demonstrated no evidence of priming at probe point one (PP1, $p>.05$); however, priming becomes evident 400ms later at PP2 ($t_8=2.11$, $p=.04$). Following this activation is a much more accelerated decay through PPs 3 and 4 ($p>.05$ for both test points).

![Graph showing priming effects for unimpaired controls and LHD patients.](image)

**Figure 1.** Priming effects for Unimpaired Controls and LHD patients

**Discussion**

The patterns of priming demonstrated for our neurologically intact participants suggest initial activation of the direct object noun, and then a relatively linear and gradual decay across the next 1200ms. Our participants with agrammatic aphasia evinced a different pattern, with late initial activation and almost immediate decay. This protracted time-course for lexical access in agrammatic aphasia corroborates what has been established in the literature. However, the immediate decay suggests that the word’s meaning might not be available to be integrated within the ongoing context and hence contribute to the difficulties we see with sentence comprehension.

**Reference**