Text Verification and Verb Factivity: An ERP Investigation

Todd R. Ferretti
Department of Psychology, Wilfrid Laurier University
Waterloo, Ontario, Canada

Murray Singer
Department of Psychology, University of Manitoba
Winnipeg, Manitoba, Canada

Courtney Patterson
Department of Psychology, Wilfrid Laurier University
Waterloo, Ontario, Canada

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Introduction

Singer (2006; JML) has recently investigated text verification processes when people read passages similar to (1). These passages included sentences that varied in their truth with reference to antecedent text (i.e., *truck* (true) / *bus* (false)), factivity of the main verb (*comprehended* (factive) / *implied* (nonfactive)), and negation (*was* (affirmative) / *wasn't* (negative)).

(1)
Dan had been driving all night in order to get home for Thanksgiving. Before long, Dan drove past a **truck/bus** which was stopped with a flat tire. He couldn't help but laugh because its spare tire must have been underneath everything and suitcases and boxes were strewn everywhere. Later, while Dan was sitting in a diner, drinking some coffee, a policeman came in and started a conversation with him. He **implied/comprehended** that the vehicle with the flat **was/wasn't** a truck.

Singer found that reading times varied systematically with truth, factivity, and negation. For factive, but not nonfactive verbs, reading times for false, affirmative sentences were read more slowly than true, affirmative sentences. Alternatively, false, negative sentences were read more slowly than true, negative sentences, but this was only true for nonfactive verbs. These results are consistent with Singer's proposal that readers verify discourse constituents against the referents that they passively cue during reading.

In the present research, we extend these results by providing converging neurocognitive evidence for these reading processes by employing ERP methodology. The main focus of this research was on affirmative sentences.

Method

Materials

Stimuli consisted of 32 target passages and 21 filler passages. The target passages were identical to (1) with the exception that we only used affirmative target sentences. Words in the target sentences were presented one a time for a duration of 300 ms and an SOA of 500 ms.

EEG Recording Parameters

EEG was recorded from 64 electrodes from 48 participants. Impedances were kept below 5KΩ. ERPs were computed in epochs that extended 100 ms before the critical word in the target sentence (i.e., *truck*) to 1000 ms post stimulus onset.

Results and Discussion

The results demonstrated that in the Late Positivity Complex (LPC) region (600-1000 ms post stimulus onset), amplitudes were more positive for true, factive sentences than for false, factive sentences. However, truth had no influence on nonfactive verbs. Similarly, in the P2 region (200-300 ms), amplitudes varied in the same way as a function of truth and factivity. Despite these clear differences in early and late components, in the N400 region (300-500 ms), amplitudes varied only as a function of truth (see Figure 1). These findings are consistent with Singer's (2006) reading time data, and provide insight into how the brain processes information about truth of discourse constituents in conjunction with the factivity associated with verbs. In particular, the interaction in the P2 results suggest the brain is most prepared to process the visual features of the targets words in true, factive sentences, and the least prepared for the targets in false, factive sentences. The same pattern of findings in the LPC data also suggests that people had the least difficulty integrating the targets into the discourse in the true, factive condition, and the most difficulty for the targets in the false, factive condition.

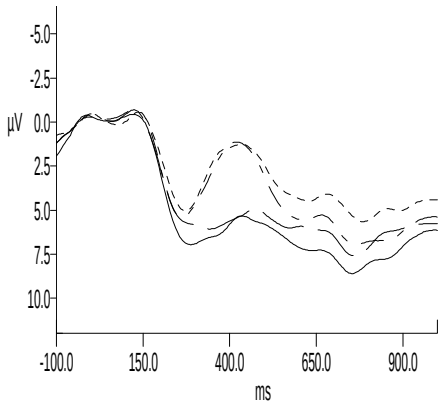

Figure 1: Results at a central - parietal electrode located on the midline. Solid = true / factive, dots = false / factive, dash = true / nonfactive, dash + dot = false /nonfactive.

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