# Event knowledge and simple word associations jointly influence predictive processing during discourse comprehension

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A substantial body of literature has shown that readers and listeners often anticipate information. An open question concerns the mechanisms underlying predictive language processing. Multiple mechanisms have been suggested. One proposal is that comprehenders use event knowledge to predict upcoming words. Other theoretical frameworks propose that predictions are made based on simple word associations. In a recent EEG study, Metusalem and colleagues [1] reported evidence for the modulating influence of event knowledge on prediction. They examined the degree to which event knowledge is activated during sentence comprehension. Their participants read two sentences, establishing an event scenario, which were followed by a final sentence containing one of three target words: a highly expected word, a semantically unexpected word that was related to the described event, or a semantically unexpected and event-unrelated word (see Figure, for an example). Analyses of participants' ERPs elicited by the target words revealed a three-way split with regard to the amplitude of the N400 elicited by the different types of target: the expected targets elicited the smallest N400, the unexpected and event-unrelated targets elicited the largest N400. Importantly, the amplitude of the N400 elicited by the unexpected but event-related targets was significantly attenuated relative to the amplitude of the N400 elicited by the unexpected and event-unrelated targets. Metusalem et al. concluded that event knowledge is immediately available to constrain on-line language processing. Based on a post-hoc analysis, the authors rejected the possibility that the results could be explained by simple word associations.

In the present study, we addressed the role of simple word associations in discourse comprehension more directly. Specifically, we explored the contribution of associative priming to the graded N400 pattern seen in Metusalem et al's study. We conducted two EEG experiments. In Experiment 1, we reran Metusalem and colleagues' context manipulation and closely replicated their results. In Experiment 2, we selected two words from the event-establishing sentences which were most strongly associated with the unexpected but event-related targets in the final sentences. Each of the two associates was then placed in a neutral carrier sentence. We controlled that none of the other words in these carrier sentences was associatively related to the target words. Importantly, the two carrier sentences did not build up a coherent event. We recorded EEG while participants read the carrier sentences followed by the same final sentences as in Experiment 1. The results showed that as in Experiment 1 the amplitude of the N400 elicited by both types of unexpected target words was larger than the N400 elicited by the highly expected target. Moreover, we found a global tendency towards the critical difference between event-related and event-unrelated unexpected targets which reached statistical significance only at parietal electrodes over the right hemisphere.

Because the difference between event-related and event-unrelated conditions was larger when the sentences formed a coherent event compared to when they did not, our results suggest that associative priming alone cannot account for the N400 pattern observed in our Experiment 1 (and in the study by Metusalem et al.). However, because part of the effect remained, probably due to associative facilitation, the findings demonstrate that during discourse reading both event knowledge activation and simple word associations jointly contribute to the prediction process. The results highlight that multiple mechanisms underlie predictive language processing. [1] Metusalem et al. (2012). *JML*.
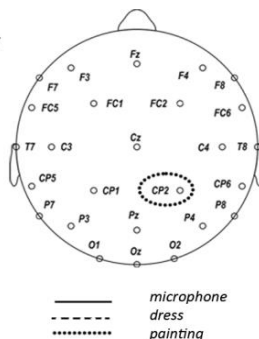


**Event-context:**
My sister was only twenty when she won a Grammy for her first album. She seemed so nervous as she gave her acceptance speech.

**Target sentence:**
Her voice was shaky as she spoke into the ___ and thanked everyone.

CP2

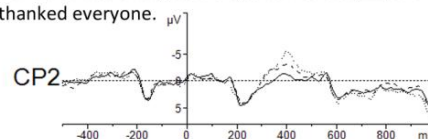—— microphone
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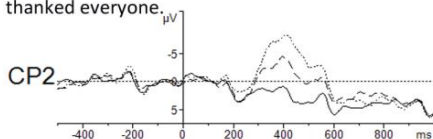
Experiment 1

**Carrier sentences:**
When Susie looked inside she saw a **Grammy** standing on the table. In one of the boxes Tom found an **album** he could use.

**Target sentence:**
Her voice was shaky as she spoke into the ___ and thanked everyone.

CP2

Experiment 2