The Role of Prediction Disconfirmation in Language Comprehension and its Consequences for Memory

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Abstract

The consequences of prediction disconfirmation in language comprehension are still unclear, as well as the functional role of EEG signatures underlying prediction disconfirmation. Here we investigated the consequences of prediction disconfirmation for later recognition memory. We ran a sentence comprehension study with sentences ending with plausible unexpected words that either disconfirmed a prediction or followed an unconstraining context. This was followed by a surprise memory test where recognition memory for the previously read words was probed. We found that recognition memory performance was better for items that previously disconfirmed a prediction than when no strong predictions could be made. By back-sorting items based on later memory responses, we further characterized the EEG signal at sentence comprehension and memory retrieval on the basis of processes underlying successful encoding. We found that a late parietal positivity was predictive of subsequent recognition and was enhanced in items disconfirming a prediction. In addition, time-frequency analysis showed stronger beta decreases in items disconfirming a prediction. Effects of contextual constraint were also found prior to the presentation of the disconfirming word with a beta decrease possibly involved in word retrieval. At retrieval, items disconfirming a prediction were characterized by an old/new effect in the form of an N400 and LPC suggesting that prediction disconfirmation enhanced both familiarity and recollection memory processes. Overall, these findings show that prediction disconfirmation has beneficial consequences on memory encoding and retrieval, which supports models of prediction error as a driver of memory encoding.