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The N400 event-related potential component reflects a learning signal

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Abstract

A lot of studies on the N400 event-related brain potential (ERP) component have tried to understand its functional significance. Recently, the N400 was modeled in a neural network model as the update of a probabilistic representation of sentence meaning. The change in activation induced by a word was proposed to reflect a semantic prediction error that drives adaptation of the model's connections (Rabovsky et al., 2018), which implies that more negative N400 amplitudes should lead to greater adaptation. By experimentally manipulating expectancy in a sentence reading task (n=33), we could show that this manipulation did not only influence N400 amplitudes, but also implicit memory: reaction times in a perceptual identification task were significantly faster for previously unexpected words. Additionally, difference in N400 amplitude correlated with the reaction time benefit for unexpected compared to expected items. These finding support the interpretation of the N400 as a prediction error and learning signal.