Presentation Abstract

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Title: Distinguishing association formation from item encoding using ERPs

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Abstract: Although neuroimaging studies have identified neural correlates of association formation, the time course of neuroelectic activity that differs between association formation and single item encoding is not well understood. The present study aimed to distinguish the electrophysiological time course for item encoding and association formation, by presenting items of a pair sequentially during study. This made it possible to record the encoding of the first word (W1) separately from the encoding of the second word (W2), and the association formed between them. These data were collected from 12 participants. The ERPs to W1 were subtracted from the ERPs to W2: the evidence obtained from the encoding of W1 was used to differentiate the process(es) underlying the encoding of W2 from the process(es) underlying association formation. This W2-W1 subtraction was derived separately for the subsequently recalled (R) and subsequently non-recalled (N) pairs, resulting in two difference waveforms: the W2-W1 difference for R pairs [R(W2-W1)] and for the N pairs [N(W2-W1)].
We posited that differences between W1 and W2 of N pairs would primarily index neural adaptation, whereas differences between W1 and W2 of R pairs would index neural adaptation and association formation. The findings showed differences between the [R(W2-W1)] and [N(W2-W1)] waveforms between 400-600 ms after W2 onset. These differences were distributed over the centro-parietal region of the scalp, where the ERPs to W1 and W2 did not differ for the N pairs, but did differ for the R pairs. A temporal principle component analysis of these ERP data revealed a frontal component that differed for the [R(W2-W1)] and [N(W2-W1)] waveforms within the same 400-600 ms time window. These

observed differences likely reflect ERP signatures that differentiate item encoding from association formation, and further suggest that association formation begins around 400-600 ms after the onset of the second item of a pair.