The Effect of Semantic and Relational Similarity on the N400 Event-Related Potential in Verbal Analogical Reasoning

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Abstract: Previous neuroimaging studies (e.g., Green et al., 2010; Kmiecik & Morrison, 2013) suggest the neurocognitive processes responsible for verbal analogical reasoning vary with the semantic distance between source and target. In order to further investigate how semantic and relational similarity interacts during reasoning, we presented the A-, B-, C-, and D-terms of verbal analogies sequentially while participants judged whether problems were valid analogies. A:B and C:D pairs of the analogies were either semantically near or far as judged by Latent Semantic Analysis. Alternate versions were created so that every-word appeared in every position across participants. We recorded EEG to access the level of priming at various stages during reasoning. Our results suggest that relational priming impacts processing as early as the C-term, but becomes increasingly important as the D-term of the analogy is revealed. We discuss these results with respect to different models of analogical processing.