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Putting emergence to the test: Modeling the effects of context in the time and frequency domain on the N400 Component

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Abstract: In recent work (Laszlo & Armstrong, 2013; Armstrong & Laszlo, 2013), we have been laying the foundation for developing connectionist models of the N400 ERP component that are sensitive to the context in which lexical item occurs via the incorporation of a neural fatigue dynamic. Here, we test the capacities of a prior model, to which this dynamic has been added, in accounting for a range of identity-repetition context effects measured in a coordinated electrophysiological study. These effects include the standard reduction of mean amplitude in the time domain and concurrent modulation of spectral power in the frequency domain. Evaluating whether the model accounts for these effects puts the strength of domain-general principles in generating “emergent” phenomena to the test because it requires generalization to novel dimensions including: context, new lexical types, and effects in the frequency domain. We show that the model explains core effects on all these fronts.