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Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 48(0)

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Publication Date

2026

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Dissociating Cortical Signatures of Semantic Prediction Error and Lexical Surprisal during Naturalistic Language Processing

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Language comprehension relies on predictive processes operating at multiple representational levels, yet it remains unclear whether these predictive signals are supported by shared or dissociable neural mechanisms. Previous work shows that semantic prediction error and lexical prediction error independently predict N400 and reading times during naturalistic language processing. Here, we use fMRI to investigate cortical correlates of these two forms of prediction during naturalistic listening. Semantic prediction error is operationalized as Semantic Update, derived from the Sentence Gestalt model of incremental meaning construction, while lexical prediction error is indexed by GPT-2-based Lexical Surprisal. Whole-brain and Region of interest analyses reveal largely overlapping but partially distinct effects of both predictors in temporal language regions. These results indicate predictive processing in language is representationally stratified, with semantic and lexical prediction errors mapping onto partially dissociable cortical substrates.