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Proceedings of the Annual Meeting of the Cognitive Science Society

Title

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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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Peer reviewed

How does Semantics Interact with Emotional Prosody in the Bilingual Brain?

This fMRI study investigated the neural bases underlying semantics and emotional prosody processing in Mandarin Chinese among native and non-native speakers. 15 native Chinese speakers and 15 L1-English L2-Chinese learners completed an emotional prosody judgment task across four 11-minute functional runs. The critical manipulation was the congruence between semantics and prosody in the stimuli. Behaviorally, native speakers outperformed L2 learners, and semantics-prosody congruence facilitated accuracy for both groups. Neuroimaging analyses revealed that emotional prosody recruits a distributed fronto-temporo-parietal network: negative prosody elicited greater activation in temporal regions, whereas positive prosody engaged frontal regions more strongly. Notably, native speakers showed greater activation than L2 learners in semantics-prosody interface regions, such as the superior temporal gyrus, middle temporal gyrus, and inferior frontal gyrus. This increased activation suggests that native speakers effectively engage specialized neural mechanisms for tone categorization, meaning–sound integration, and emotion evaluation in a tonal language.