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Neurophysiological Correlates in the Comprehension of Emotional Prosody

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We examined the neurophysiological basis for prosody in 10 healthy, college-aged adults with functional magnetic resonance imaging (*f*MRI; 4 Tesla). Stimuli included brief (~1500ms) audio recordings of professional actors rendering utterances of minimal semantic content (i.e., dates, numbers) conveying specific emotional and non-emotional (i.e. distance) attitudes. Participants judged aural stimuli blocked by emotional vs non-emotional features over 2 tasks presented in pseudo-random fashion: 1) explicit categorization (for affective material: Is the emotion expressed tentative, neutral, or dominant?; for non-affective material: Is the distance between the speaker and intended listener very close, at a conversational distance, or far away?); and 2) a category-neutral condition (Is this something you might hear at a bus stop?). Across both tasks, the emotional-minus-distance contrast showed significant activation in the left orbital and ventral inferior frontal (BA 47/11; peak coordinate x=-52, y=16, z=-4; z-score=4.03) and left dorsal inferior frontal cortex (BA 44/46; peak coordinate x=-44, y=20, z=24; z-score=3.57). For the distance-minus-emotional contrast, we found activation of medial parietal cortex bilaterally (BA 7; peak coordinate x=-8, y=-48, z=44; z-score=4.36), left dorsal prefrontal cortex (BA8; peak coordinate x=-32, y=28, z=44; z-score=4.28), right dorsal prefrontal cortex (BA10; peak coordinate x=12, y=56, z=8; z-score=3.71), and striatum (peak coordinate x=-16, y=4, z=-8; z-score=3.84). Emotional prosody appears to be supported by a neural network including orbital frontal cortex for interpreting emotional stimuli and dorsal inferior frontal cortex to support the complex, multi-factorial properties of emotional prosodic stimuli. Judging distance prosody seems to recruit a parietal-frontal circuit supporting spatial properties of auditory stimuli.

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