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Motor regions contribute to speech perception: awareness, adaptation and categorisation

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Functional imaging and TMS studies show that motor and premotor cortex responds to heard speech though the functional significance of this response is unclear. Three recent fMRI studies, showing modulation of motor responses to heard speech in the absence of overt spoken or manual responses, may shed light on how regions typically associated with speech production contribute to perception. (1) Motor activity remains robust during light anaesthetic sedation, but is obliterated for deeply sedated participants who are no longer aware of speech. (2) Motor cortex responds more to distorted yet intelligible noise-vocoded words than to clear speech or unintelligible noise. This neural correlate of listening effort is also observed for "clear-then-vocoded" presentations that enhance perceptual adaptation compared to a matched "vocoded-then-clear" condition that doesn't enhance adaptation. (3) During paired priming of audio-morphed syllables we see a greater response to acoustic changes that cross phonological category boundaries compared to acoustically-equivalent within-category changes. Additional responses to between-category pairs extend to motor regions, suggesting that neural correlates of categorical perception include regions involved in speech production. These findings illustrate how perceptual awareness, adaptation and categorisation of speech all engage motor regions. Implications for neurobiological accounts of speech perception will be discussed.