Feedback-driven corrective movements in speech in the absence of altered feedback

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Altered auditory feedback often evokes a compensatory vocal response in speakers, providing evidence that errors in speech production can be rapidly corrected online. To assess whether the same compensatory mechanism is employed in natural, unaltered speech, we carried out an acoustic analysis characterizing formant movement during single speaking trials. Subjects produced 200 repetitions each of three different monosyllabic words in the MEG scanner and, separately, in the presence of varying background noise levels. To assess corrective responses, we compared the centricity of formant values at the beginning to that at the middle of each trial. In all subjects, we found strong evidence of vowel "centering"—that is, a corrective movement mid-utterance that caused utterances at the periphery to move closer to the center of the formant distribution. Across subjects, the magnitude of vowel centering was correlated with auditory cortical suppression preceding the corrective movement, suggesting that the suppression may serve as a neural mechanism for error detection and correction. These findings suggest that less-prototypical utterances, which make up a large proportion of natural speech, are processed as potential errors, and that feedback-driven speech error correction is occurring constantly on a small scale.

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