Enhancing speech adaptation to a palatal perturbation using ultrasound visual biofeedback

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Prior clinical studies suggest that *visual biofeedback* may be effective in some speech therapy cases, but results are limited and outcomes have been mixed, partly because of the variability in both the clinical profiles of participants and the way in which treatments have been carried out. Surprisingly, there is a near complete lack of systematic research on the mechanisms of speech motor plasticity that are presumed to underlie the use of visual biofeedback. Here, we propose a novel experimental approach to address these questions in a way that mimics the conditions of clinical treatment for speech disorders while maintaining a high level of consistency and control over the speech-learning task. In this study, speech adaptation to an artificial palate serves as the basis for examining the influence of ultrasound biofeedback. A training phase involving 20 minutes of /si/ and /sa/ initial words is performed with or without ultrasound biofeedback. The high degree of experimental control combined with detailed acoustic and kinematic measures (head-corrected ultrasound imaging) provides a powerful new tool for examining wide ranging questions about the use of visual biofeedback in speech therapy, not only to validate its use, but also to determine how to maximize its benefits.