Prosodic compensations to pitch perturbation during running speech

R.Patel, P. Campellone, K. Reilly, C. Niziolek, F. Guenther

The study is part of a larger set of psychophysical and fMRI experiments that aim to extend the DIVA (Directions Into Velocities of Articulators) model of speech production to include prosodic control. Two architectures are hypothesized: 1) an Independent Channel Model where speakers manipulate each prosodic cue separately (fundamental frequency, intensity and duration) or 2) an Integrated Channel Model in which the cues interact for collective feedback control. To differentiate between these mechanisms the effects of near real-time pitch perturbations during speech productions were examined in three monolingual speakers of American English. Each speaker produced 360 short sentences with stress either on the first or second word across baseline, perturbation and post-perturbation trials. Perturbations consisted of downshifting the fundamental frequency (F0) on the stressed word within the phrase. Off-line acoustic analyses examined whether participants compensated using F0 cues alone, or in conjunction with intensity and duration changes. Preliminary results suggest that downshifted F0 resulted in compensatory increases in F0 and/or in intensity, thereby supporting the Integrated Channel Model. The data suggest that speakers use differing strategies to compensate for perturbations and have individualized time courses for adaptation. Further data are required to generalize these findings.