Patterns of speech abnormality in a large dysarthria database: Interactions between severity, acoustic features and dysarthria type

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The goal of this study is to examine the effect of speech severity on classification of different types of dysarthria, based on the observation that speech severity has not been considered in depth as a potential factor describing acoustic features of speakers with dysarthria.

103 speakers with dysarthria due to Parkinson's disease, stroke, traumatic brain injury, and multiple system atrophy participated in this study. The tasks for speakers included word repetition and sentence recitation. Recoded sentence samples were used to obtain speech intelligibility scores using a direct magnitude estimate (DME) technique.

Acoustic analysis included eight segmental/suprasegmental features: articulation rate, voiceless interval duration, first moment analysis for fricatives, F2 slope, vowel space, f_0 range, intensity range, and pairwise variability index (PVI).

The results showed that speech severity affected the acoustic characteristics of dysarthria in a way that 1) diverse types of dysarthria revealed not only uniqueness, but also a considerable degree of commonality (t-test analysis), 2) acoustic predictors of speech intelligibility slightly differed across different types of dysarthria, depending on acoustic features of the specific type dysarthria (regression analysis), and 3) the distribution of acoustic features was explained by speech severity as much as by types of dysarthria (classification analysis).