

Acceleration of Tongue and Lip Movements of individuals with ALS

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The aim of this study is to examine longitudinal changes of articulatory motion patterns in patients diagnosed with Amyotrophic Lateral Sclerosis (ALS). Acceleration, the rate at which the velocity of the articulators change, may be a sensitive measure of the decline in speech performance due to the muscle degeneration caused by ALS. This longitudinal study included 31 sessions from 13 participants with ALS to investigate speech motion patterns as they relate to clinical measures of disease progression. Using the NDI WAVE system, 3D tongue and lip motion data was collected during the production of stimuli at the phrase level. The mean, maximum, standard deviation (SD), and spatiotemporal index (STI) of 3D acceleration was calculated based on articulatory motion patterns. Preliminary results show significant positive correlations between the mean 3D acceleration and communication efficiency. Our findings also suggest the variability of 3D acceleration increased as speech performance declined. This evidence contrasts previous studies using amplitude and speech from early- or middle-stage ALS patients. Inconsistent articulatory motion patterns may be an adaptation to motor control strategies in response to disease progression.