Physiological Constraints and their Effects on Articulatory Performance in ALS

A. Mefferd, J. Green, L. Ball, G. Pattee

The purpose of this study is to identify pathological articulatory movement characteristics that may explain the declines in speaking rate and speech intelligibility in talkers with amyotrophic lateral sclerosis (ALS). The following two questions were explored to determine the effects of motoneuron degeneration on orofacial muscle function and speech: (1) Can talkers with ALS increase lip and jaw speed as much as healthy controls? (2) What is the effect of these limitations on articulatory performance?

Eight participants with ALS and eight age matched controls completed silent oscillations of the jaw and lower lip at various metronome paces while having to reach a fixed spatial target for oral opening, as well as syllable and sentence repetitions at various speaking rates. Three-dimensional motion analysis was used to compare movement durations, articulatory speed and displacement in talkers with ALS to controls. It was hypothesized that talkers with ALS cannot move their articulators as fast as healthy controls and that with disease progression a decline in lower lip movement speed will be compensated by jaw movement speed. Results are discussed with regards to talker-specific differences in the decline of oral motor functions, speaking rate, and intelligibility.