

Discrete categories and continuous speech dynamics in typical and atypical speech: How much variability is tolerated by the phonological system?

Chronic deep brain stimulation (DBS) of the nucleus ventralis intermedius (VIM) is an effective treatment for patients with medication-resistant Essential Tremor (ET). However, these patients report that stimulation has a deleterious effect on their speech, severely impacting their quality of life and social functioning (Flora et al. 2010, Mücke et al. 2014). The present study investigates the effect of deep brain stimulation in German Essential Tremor patients on the realisation of prosodic constituents. We recorded 12 ET patients treated with deep brain stimulation in ON and OFF condition and 12 healthy control speakers using 3-D Electromagnetic Articulography. We analysed variability in coordination patterns in syllable onsets with low and high complexity, such as in <Lima> and <Klima> or <Plina>, within the coupling hypothesis of syllable structure (Browman & Goldstein 2000; Nam et al. 2009, Pouplier 2011). Results for the patient group reveal a timing deficit in the phonetic realisation of syllables with high complexity, indicating a lack of complex (non-innate) coupling relations. These timing differences are not categorical but gradient in nature pointing to the fact that there are dynamic mechanisms of regulation behind quantitative consequences of qualitative syllable parses. We discuss how much variability is tolerated in a phonological system before it becomes unstable and patterns of syllable organisation break down. First results point to the fact that most problems arise in postnuclear position: when the level of prominence decreases patients have problems adapting to the requirements of localised reduced speech (compare to Ziegler 2002).

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