

Speech effects of subthalamic deep brain stimulation in Parkinson's disease
A. Jacks, D. Robin, S. Narayana, P. Fox

Subthalamic nucleus deep brain stimulation (STN-DBS) has emerged as an important treatment for motor symptoms in individuals with Parkinson's Disease (PD). Studies have shown marked reductions in hyperkinesias with STN-DBS and improved overall motor function. However, reports of speech outcomes have been mixed, with some authors reporting improved speech function and others reporting speech deterioration with STN stimulation. To date, measures of speech performance have been primarily limited to a single-dimension perceptual scale (UPDRS), providing limited information regarding speech changes related to STN-DBS. Our approach combines multidimensional perceptual measures of speech with acoustic contrastivity measures. We report perceptual and acoustic measures of speech performance ON and OFF STN-DBS in an initial two patients with PD. One participant demonstrated clear worsening with STN-DBS in six of eight perceptual dimensions identified (e.g. monoloudness, harsh, breathy, strained/strangled voice quality, short phrases, overall intelligibility), while the other worsened only in monoloudness, and improved in harshness. Acoustic measures showed decreased contrastivity with STN-DBS in both participants vis-à-vis measures of speech-pause ratio, intensity variation, and spectral change, measures previously shown as sensitive to hypokinetic dysarthria. Results indicate variable response of speech systems to STN-DBS and potential of sensitive acoustic measures to identify changes imperceptible to listeners.