

## **Noninvasive Brain Stimulation Enhances Sub-phonemic Learning of Novel Consonant Clusters**

Adam Buchwald, Mara Steinberg Lowe, Holly Calhoun, Rebecca Wellner and Stacey Rimikis

New York University, Department of Communicative Sciences and Disorders

Speech motor learning research has revealed that many (but not all) of the same approaches to structuring practice and feedback can facilitate motor learning in both speech and nonspeech domains. Recent research has revealed that limb motor learning may be enhanced by combining motor learning training with transcranial direct current stimulation (tDCS). Within speech/language, tDCS has been studied as a tool to facilitate language production in aphasia and unimpaired speakers, but not for speech motor learning. We report that using tDCS as an adjunct to a speech motor learning protocol can facilitate learning of nonnative consonant clusters. Participants performed a speech motor learning task in conjunction with either active or sham stimulation presented immediately before or during the task. We previously reported that participants receiving active tDCS before the task showed the greatest improvement in accuracy. Here we report that the benefit of active tDCS before the task extends to the acoustics of errors and accurately produced items. For example, epenthetic vowels inserted into /gd/ clusters shortened more for speakers receiving tDCS before the learning task, suggesting that errors came closer to the target. Similar analyses for nasal duration in accurately produced /fm/ and /fn/ clusters will be reported.