

**STATISTICAL ANALYSIS FOR**  
**TREATING CHILDHOOD APRAXIA OF SPEECH:**  
**A Randomized Controlled Trial of Treatment Distribution and Biofeedback Effects on**  
**Speech Production in School-Aged Children with Apraxia of Speech**

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## STATISTICAL ANALYSIS

Linear mixed effects models will be applied to assess the impact of Treatment Distribution (Intensive vs Distributed), Biofeedback (Ultrasound vs No Ultrasound) and Modality (Teletherapy vs Face-to-face) on percent target sounds correct from untreated phrase probes. The dependent variable is the percentage of correct speech sounds at each time point (week 0, 5, 10 and 15). Fixed effects include Groups as the combination of Treatment Distribution, Biofeedback and Modality, time points and their interaction. Participants are included as random effects. Appropriate correlation structure between observations from a single subject is selected via visual examination of fitted residual variance-covariance matrix and comparing Akaike Information Criteria (AIC) values. Time points are modeled as categorical variable instead of continuous variable with smaller AIC values. The final model includes each participant's baseline (pre-treatment) accuracy at week 0 as a covariate, using heterogeneous first-order autoregressive variance and correlation structure. No missing values are imputed and no multiplicity adjustment are applied. Restricted maximum likelihood is used to estimate covariance parameters and Kenward and Roger's method is used for approximating degrees of freedom (Kenward & Roger, 1997). Specific contrasts are constructed to test the difference between treatment groups in terms of the improvement between baseline and week 5, 10, 15, respectively. Interaction terms at each time points between Treatment Distribution and Biofeedback are also tested. The primary analysis is a comparison of change in percent correct from pre-treatment to the 10-week period (after all participants had completed 20 hours of therapy). Additional analyses are conducted after 5 weeks, in which the Intensive group had completed 20 hours and the Distributed group had completed 10 hours of treatment, and also at

15 weeks to assess retention following the conclusion of treatment. Furthermore, we examine the effects of treatment in an analysis that holds constant number of treatment sessions rather than number of weeks (i.e., short-term generalization following 20 hours of therapy, plus retention 5 weeks later). All tests of significance were claimed at 2-tailed alpha = .05.