

Speech Buddies™ and Intra-Oral Tactile Biofeedback: An Efficacy Study

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Abstract: The INTACT (Intra-Oral Tactile Biofeedback) study is a randomized, controlled, single blind study with 20 subjects aged 5-8. The trial evaluates efficacy of the Speech Buddies™ /s/ tool which uses tactile feedback to train correct and consistent tongue placement. The subjects all initially present with a distorted production of /s/ with 0%-20% accuracy and none have received prior therapy. With 75% of enrollment complete, the results show that after eight therapy sessions, children who use Speech Buddies pronounced an average of 71% of stimulus items correctly while those who did not use Speech Buddies averaged 32%. The before and after accuracies were determined using a 50 word test battery administered by a blinded investigator. The results provide evidence that Speech Buddies can be a more effective, first treatment option for articulation disorders.

1.0 Hypothesis

We hypothesize that patients will have improved treatment of /s/ distortion when traditional therapy is used in conjunction with the Speech Buddies /s/ tool specifically engineered to train correct and consistent tongue placement. Clark, Schwarz & Blakeley (1993) showed 160% improved learning in treatment resistant patients with the use of tactile feedback devices; we hypothesize that tools designed specifically for everyday clinical use could produce similar results.

2.0 Methods

2.1. Study Design. The study is a prospective, controlled, randomized, single blind study; the gold standard for efficacy trials for devices in the field of speech and language therapy.

2.2. Inclusion Criteria. The major inclusion criteria are: 1) age 5-8 at time of enrollment, 2) fewer than 10 hours of prior articulation therapy, 3) 0-20% correct productions of the /s/ phoneme (frontal or lateral lisp) on a 50 word baseline test, 4) adequate language skills and hearing function; CELF-4 screener and auditory discrimination test, and 5) native American English speakers.

2.3. Experimental Device. The Speech Buddies™ Seal or /s/ tool (Articulate Technologies, Inc. 2009) was engineered by an interdisciplinary team of biomedical engineers and speech therapists to provide consistent tactile feedback to train the tongue placement required to achieve the correct /s/ sound. Hundreds of prototypes and fluid dynamics analytics were used to aid in the design process. The Speech Buddies /s/ device aligns a target precisely 8mm behind the front teeth, which the tongue tip can readily identify and navigate toward. The design is safe, minimally invasive and allows sufficient airflow around the target. This makes co-articulation possible and does not add distortion to the sound. Additionally, the tools are designed ergonomically for real-life clinical use, train proper teeth position, and are physically robust.

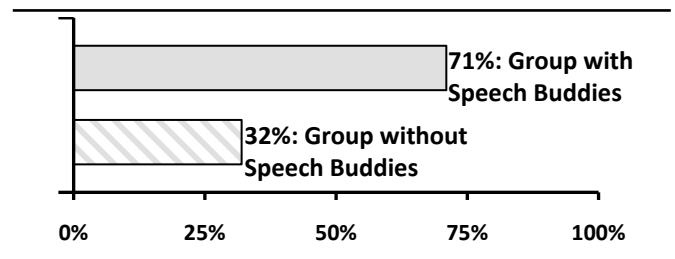
2.4. Investigational Procedure. INTACT is an IRB-approved study with 20 subjects who are either randomly assigned to a control group who just receive traditional therapy, or to an experimental group who receive traditional therapy in conjunction with intra-oral tactile feedback.

After initial screening, enrollment and randomization, each patient receives eight therapy sessions from an assigned therapist. Each session consists of 45 stimulus items: an auditory discrimination task (5 stimulus items), the /s/ sound in isolation (6 items), followed by the /s/ either in initial, medial, final word position, or in sentences (34 items) that are randomly selected. For the control group, no device is used whereas for the experimental group the device is used on every other (23) stimulus item. After the final session, the same 50 word battery used for screening is administered by a therapist who is blinded with respect to which group the subject has been assigned.

3.0 Preliminary Results and Discussion

Preliminary results with 15 patients enrolled show that the mean accuracy of the group using the Speech Buddies is 71% whereas the group without averaged 32%.¹ Figure 1 shows that the group using Speech Buddies are learning more than twice as fast as the group that did not use Speech Buddies. These data are in line with the Clark (1993) findings.

Figure 1: Accuracy after eight therapy sessions using a 50 word test battery and a blinded evaluator



These data show that the tool is effective in a group of patients with varying ages, and various presentations of /s/ distortion. In addition, it is effective as the first treatment option for children that have received no prior therapy. Finally, these data support the hypothesis that Speech Buddies, which use intra-oral tactile biofeedback to train correct and consistent tongue placement, can be a more effective method of treating articulation disorders.

Future studies could yield positive results in populations that are treatment resistant, hearing impaired, or have phonological disorders.

¹ Preliminary results reflect per protocol data and are statistically significant with $\alpha=0.10$ and $t=1.62$