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 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. An ANCOVA statistical analysis showed that the experimental group, which used tactile feedback, recorded a statistically significant remediation response over time (p<.05), whereas the control group, which only used traditional phonetic-based treatment, did not. After eight sessions, 88% of subjects using Speech Buddies exhibited remediation with a mean group accuracy of 74%, whereas for those not using Speech Buddies only 42% exhibited remediation with a mean group accuracy of 45%. The results provide evidence that Speech Buddies can be a more effective, first treatment option for articulation disorders.

1.0 Hypothesis

We hypothesized that subjects 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.

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) normal language skills and hearing function, and 5) native American English speakers.
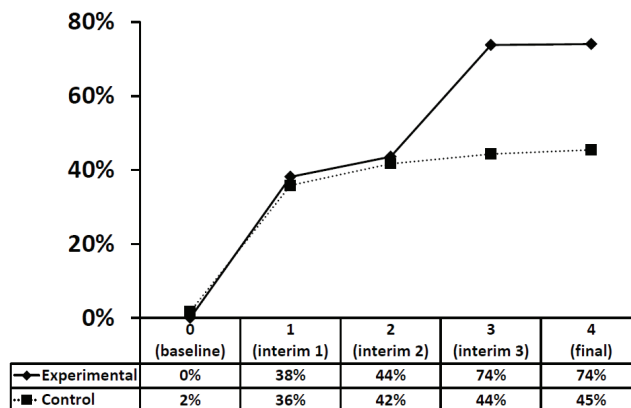
2.3. Experimental Device. The Speech Buddies /s/ tool (Articulate Technologies, Inc.) designed to train correct tongue placement during speech through intra-oral biofeedback.

2.4. Investigational Procedure. INTACT The study was an IRB-approved study with 20 subjects who were either randomly assigned to a control or experimental group. After initial screening, enrollment and randomization, each patient received eight therapy sessions from an assigned therapist. Each session consisted of 45 stimulus items. For the control group, traditional therapy was administered and no device was used, whereas for the experimental group traditional therapy was administered in conjuction with intra-oral tactile feedback for 23 of the 45 stimulus items. All accuracy assessments were administered by a therapist who was blinded with respect to which group the subject has been assigned. A 50-word picture naming test was used for baseline screening and final assessment. Three separate interim assessments, administered after sessions two, four, and six, consisted of three 20-word tests of randomly selected words from a set of 60 words. To mitigate learning effect, no assessment items were used as treatment items. Of the twenty subjects enrolled in the intent-to-treat population, fifteen were included in the per-protocol analysis due to: loss to follow up, loss of upper front dentition during the study, concurrent therapy disclosed post randomization. Analysis showed statistical similarities between control and experimental groups at the start of therapy, and inter-rater and intra-rater reliability.

3.0 Results and Discussion

Results show that the mean accuracy of the group using Speech Buddies was 74% whereas the group using traditional methods averaged 45%. Figure 1 shows the average mean accuracy over time. The experimental group, which used tactile feedback, recorded a statistically significant remediation response over time (p<.05), whereas the control group did not. A one way repeated-measures ANCOVA was conducted using SAS software version 9.2 to compare the effect of Speech Buddy use on performace over time. Performace at time 0 was the covariate. There was significant interaction between time and group, $(F(3,35)=5.46, p=.004)$.

Figure 1: Mean percentage accuracy vs. time

	0 (baseline)	1 (interim 1)	2 (interim 2)	3 (interim 3)	4 (final)
◆ Experimental	0%	38%	44%	74%	74%
■ Control	2%	36%	42%	44%	45%

Of the subjects using the Speech Buddy, 88% exhibited remediation after eight sessions vs 42% who were not using the Speech Buddy using a 70-80% Van Riper accuracy threshold.[1]

These data show that the group using Speech Buddies learned nearly twice as fast and more consistently than the group that did not use Speech Buddies.

These data also show that the tool was effective in a group of patients with varying ages, and various presentations of /s/ distortion. In addition, it was 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 efficient method of treating articulation disorders.

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[1] Van Riper, C. Speech Correction: An Introduction to Speech Pathology and Audiology (Seventh Edition), Englewood Cliffs, N.J.: Prentice-Hall 1984