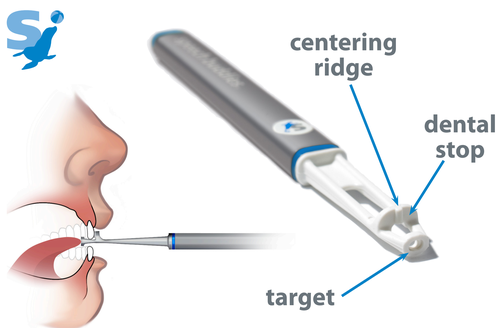
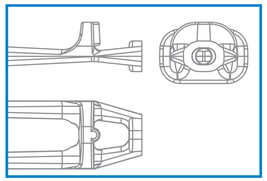
Gordy T. Rogers, MS CCC-SLP
Co-Founder, Chief Scientific Officer
Articulate Technologies, Inc.

Parent Effectiveness in Treating Speech Sound Disorders through Tactile Biofeedback

ABSTRACT

This case study examines the effectiveness of a parent-driven therapy regimen in treating a mild to moderate speech sound disorder. The methodology used was tactile biofeedback with parent administered exercise blocks. The study clinician primarily acted as a consulting clinician. The subject improved from 20% to 98% accuracy after 8 hours of parent-led intervention which included 1.5 hours of direct-clinician support. The results compare favorably to the traditional model of service delivery.





- Device can be held by a clinician, parent, or subject
- Precise intra-oral target placement can be achieved with the dental stop and centering ridge
- Design enables running speech and high speed airflow without sound distortion

Subject

- 7 year, 4 month old male
- Mild to moderate, consistent misarticulation of /s/ phoneme
- Distortion in all word positions, words-in-sentences, and all phonetic contexts
- Less than 10 hours of prior speech therapy
- Hearing function within normal limits
- Frontal lisp
- No congenital or acquired neurological, structural or physiological deficit.
- Not at risk for language disorder

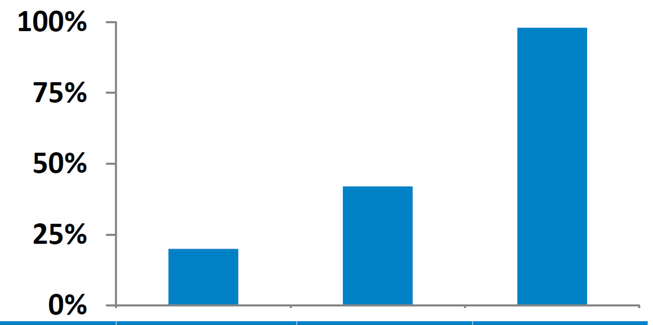
Methods

This study sought to replicate a typical articulation therapy regimen, however the clinical emphasis was on the use of the intra-oral tactile biofeedback method by a trained parent. The test article was the S Speech Buddy® which precisely locates a target within the oral cavity to teach correct tongue and jaw placement during speech. The article is hand-held, minimally invasive, and designed to fit various sizes of upper dentition and oral cavities. The figures above highlight the key features of the test article and how it can be used as a therapy aid in combination with simple verbal cues.

Parent-Administered Therapy:

- 32 total exercise blocks of 40 stimulus items - 8 hours, administered over 12 weeks
- Stimulus items represented a traditional hierarchy of complexity:
  Blocks 1-8: /s/ in isolation and syllables - device used every item
  Blocks 9-16 /s/ in simple words - device used every other item
  Blocks 17-24: /s/ in initial, medial and final word position - device used every other item
  Blocks 25-32: /s/ in sentences - device used every 4th item / as needed
- For each item, parent made accuracy judgements, with appropriate reinforcement

Remediation after 8 Hours



Time point	Baseline	4 Hours	8 Hours
Accuracy	20%	42%	98%
Items Correct	30	42	147
Items Tested	150	100	150

Methods (cont.)

Consulting Clinician:

- Total consultation time: 1.5 hours
- Initial training of mother on use of test article: 30 minutes
- Interim observations: Three, 20 minute sessions after blocks 8, 16, and 24
- Consultations: observations of intervention, direct demonstration to improve effectiveness, review of block results from previous weeks, assign lesson plan for upcoming weeks

Assessment Battery: 50 word picture naming test

- 40 items: /s/ in words in initial, medial and final positions, as singletons (i.e. non-cluster)
- 10 items: /s/ words in sentences in various word positions and various phonetic contexts
- Data collected by a single, licensed, ASHA certified evaluator
- Administration: 3 tests at baseline, 2 at midpoint, and 3 after completion

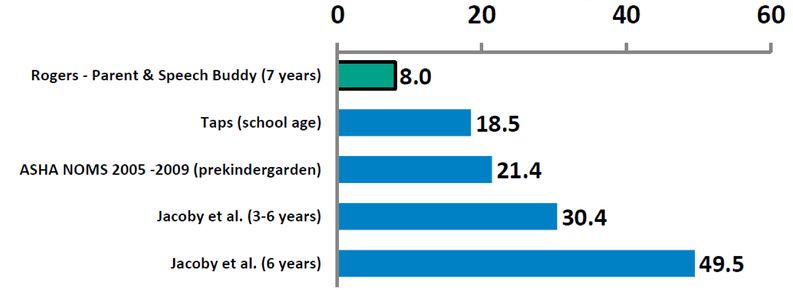
Results

The graph and table above summarize the data and show an average of 98% accuracy was achieved after 8 hours of parent-administered therapy. The data above suggest a full remediation response to therapy.

Conclusions

- Parents can achieve successful results with the right tools and training
- Following a similar service model can reduce therapy costs for families and schools
- This service model yielded results in less than half of the time of a typical articulation therapy regimen as compared with industry averages as shown in the chart above .[1,2,3]

Treatment Time vs. Industry Norms



Study	Power	Method	Presentation	Age	Hours for Remediation	Remediation Qualification
Rogers	n=1	Tactile Feedback Method using S Speech Buddy	Articulation, S, mild to moderate	7 years 4 months	8	98% Accuracy on 150 item test
Taps	n=71	Speech Improvement Class, School District	Articulation, mild, Single Sound Disorders	School Age	"most between 17-20 hours"	Unspecified
ASHA NOMS 2005 -2009*	n=3,598 (portion)	Traditional Therapy	Articulation, varying severity	Pre Kindergarten	21.4	2 or more FCM Improvement*
Jacoby et al.	n=147	Traditional Therapy	Articulation or intelligibility, varying severity	3 to 6	30.4	2 to 3 FCM Improvement*
Jacoby et al.	n=17	Traditional Therapy	Articulation or intelligibility, varying severity	6	49.5	2 to 3 FCM Improvement*

* ASHA NOMS (National Outcome Measurement System) FCM (Functional Communication Measures) are from a scale of 1 to 7

Discussion

It has been shown that parent involvement can be a critical factor in determining success in a speech therapy regimen, with a wide range of reported clinical outcomes observed.[4] For certain patient populations, adjunctive, parent-driven therapy may be a primary treatment option. Tactile biofeedback with the S Speech Buddy is a particularly favorable methodology for an adjunctive, parent-driven regimen given its ease-of-use and the minimal level of training required to teach a parent to elicit correct tongue placement for target sounds.

The study has important implications for the field of speech-language pathology as results provide support for continued, systematic parent involvement as an important corollary to SLP-driven therapy. For SLP's with high caseloads and limited one-on-one therapy time, Speech Buddies can be practical tools to ensure subjects improve.

From a fiscal standpoint, parent-driven therapy could represent a substantial savings in cost and time for private and public payers of speech therapy services, thereby easing the substantial societal burden of speech sound disorders.[5] The study also provides evidence that parent-driven therapy, conducted with the appropriate clinical tool, may provide an important alternative for many school-age children who do not qualify for therapy in schools.

Further studies could evaluate the use of exercise blocks that are administered in an online format and clinical consultation that could be administered via tele-therapy.

References:
1) Jacoby, G.P, Lee, L., Kummer, A.W. Levin, L, Creaghead, N.A. (2002). The Number of Individual Treatment Units Necessary to Facilitate Functional Communication Improvements in the Speech and Language of Young Children, American Journal of Speech-Language Pathology, 11, 370-80.
2) Taps, J. "RTI Services for Children with Mild Articulation Needs: Four Years of Data," ASHA Perspectives on School-Based Issues 9 (2008): 104-110.
3) "National Outcome Measurement System Pre-Kindergarten Report," American Speech-Language Hearing Association, 2009, 15.
4) James Law, Zoe Garrett & Chad Nye, "The Efficacy of Treatment for Children with Developmental Speech and Language Delay/Disorder" Journal of Speech, Language, and Hearing Research 47 (2004): 924-43.
5) Rubens, R.J. (2000), Redefining the survival of the fittest: communication disorders in the 21st century, Laryngoscope, 110, pp. 241-245.