



## Treating Articulation Disorders with Speech Buddies

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Articulate Technologies, Inc.**

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- This talk was presented at the American Speech-Language and Hearing Association's annual conference, 2010 and was intended as a lecture guide, not as a stand-alone document.
  - Given the limitations of viewing these slides without the accompanying dialogue and attendee questions, we understand that you many have further questions or need for clarification.
  - Please feel free to contact our Chief Scientific Officer, Gordy Rogers, M.S. CCC-SLP, at [gordy@articulatetech.com](mailto:gordy@articulatetech.com) for clarification and recent clinical findings.

# Speech Buddies use Tactile Feedback to train correct tongue placement



Therapy with Speech Buddies achieves superior results compared to therapy alone and should be considered as a first method of treatment for mild, moderate, and severe speech sound disorders

# Agenda

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- **Part 1:** Tactile Feedback: Sound method in need of a new approach
- **Part 2:** The Speech Buddies Solution
- **Part 3:** Measuring Effectiveness: Our Clinical Research Programs
- **Part 4:** Using Speech Buddies in your Practice
- **Part 5:** Conclusion

## Part 1:

### Tactile Feedback:

Sound method in need of a new approach

# The Tactile Feedback Methodology

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- What is the tactile feedback methodology?
  - Auditory, visual and now...tactile learning
  - Tactile Feedback within the mouth trains correct tongue placement and coordination required for speech
- Why tactile feedback works
  - Integrating a third sense (feeling) in the learning process expedites learning
  - Many of our patients are strong tactile learners
  - Enhances muscle motor memory
  - Emphasizes coordination and placement NOT strength
  - Endorsed by research and clinical leaders
- Many of us use tactile feedback already
  - Coffee Stirrers, Tongue Depressors, Peanut Butter

# Tactile Feedback – a Proven Method

## Research



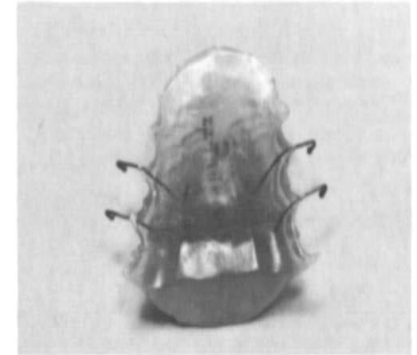
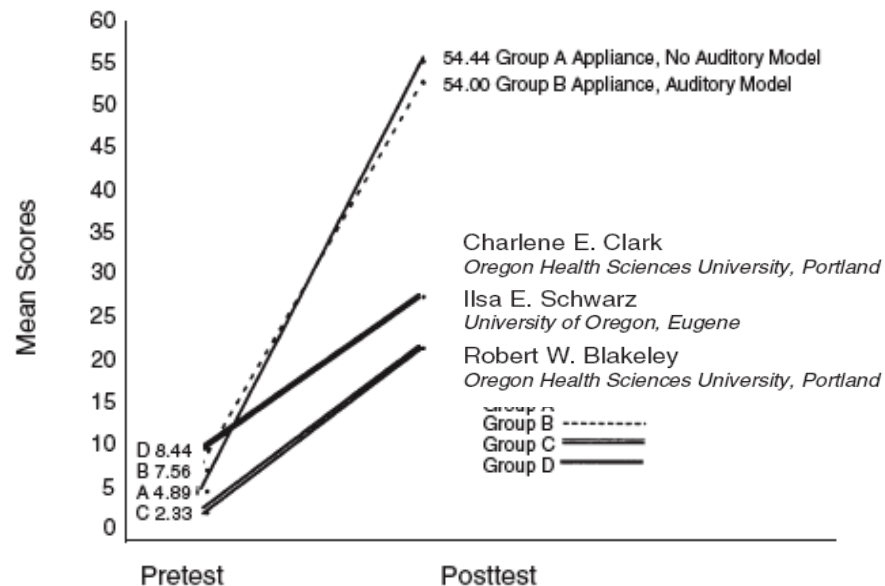
### The Removable R-Appliance as a Practice Device to Facilitate Correct Production of /r/

Charlene E. Clark  
Oregon Health Sciences University, Portland

Ilsa E. Schwarz  
University of Oregon, Eugene

Robert W. Blakeley  
Oregon Health Sciences University, Portland

**FIGURE 2. Summary of pretest and posttest means scores by groups for 60 /r/ words.**



- Study of 36 treatment resistant patients for /r/
- Patients were more than twice as accurate after tactile feedback
- Effective but not applicable out of a research setting



# Speech Therapists deserve a better Tactile Feedback solution

- Needs for a better Tactile Feedback Solution:
  - Precise control of tongue placement for a wide variety of sounds
  - Easy to use and makes getting inside the mouth easy
  - Specially engineered for the needs of SLPs
  - Professional
- Other medical therapy specialties have successfully incorporated medical devices into practice



**Articulation  
Therapy**



**Physical Therapy**



**Audiology**



**Dysphagia**



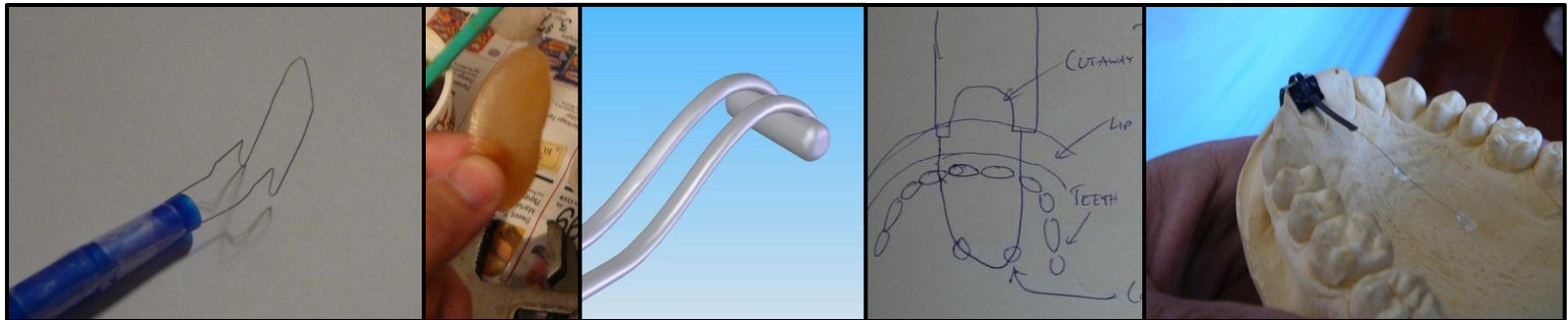
**Dentistry**

## Part 2:

# The Speech Buddies Solution

# The Speech Buddies Story

- Founders: SLPs and MIT biomedical engineers
- Interdisciplinary team of more than 20 professionals
- 1000s of ideas, 100s of prototypes, dozens of children

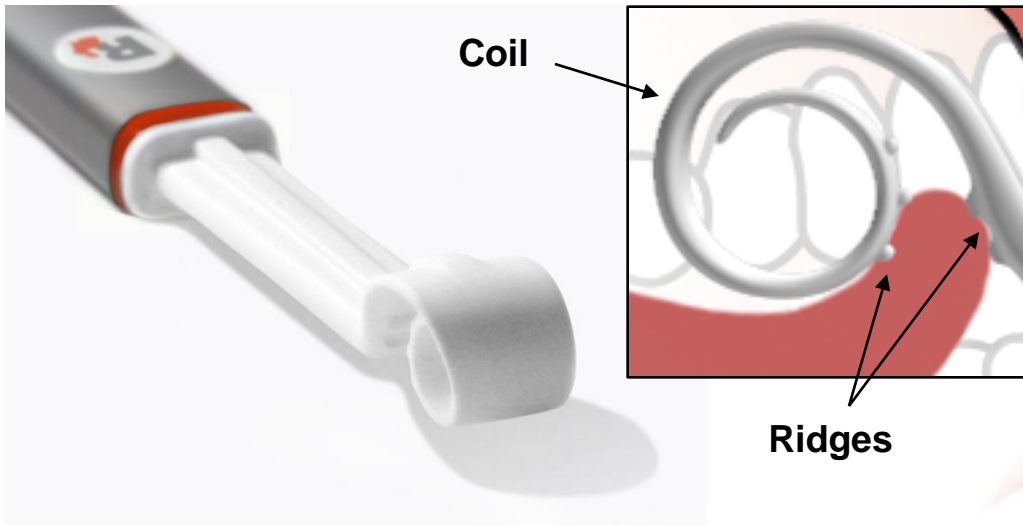


# Speech Buddies – the optimal new solution for Tactile Feedback

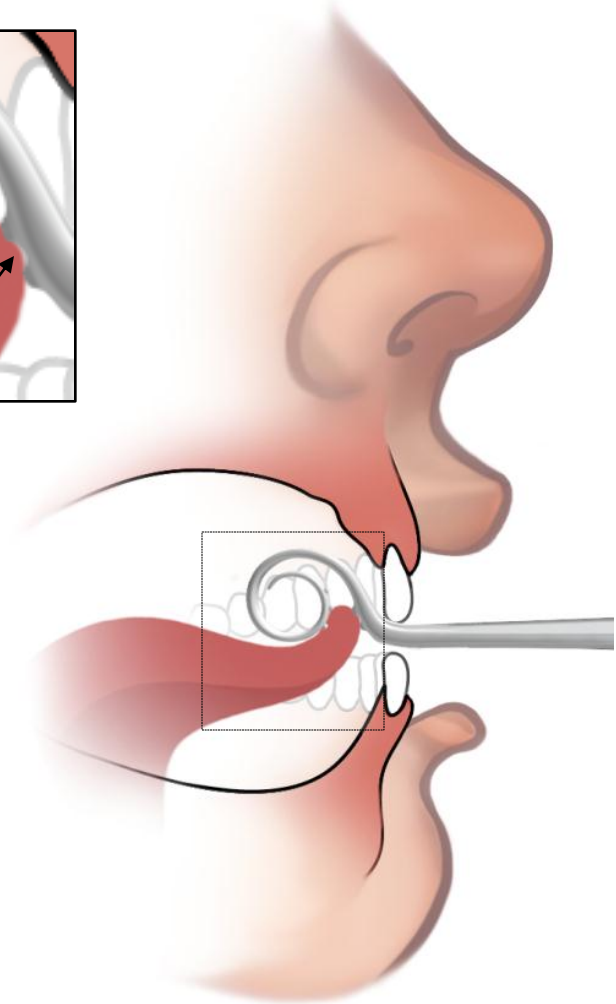


- Handheld tools that get inside the mouth during speech
- Teach correct and consistent tongue placement
- Target the hardest to learn sounds: R, L, CH, S, SH
- Minimally impede co-articulation and airflow
- FDA listed

# The R Speech Buddy



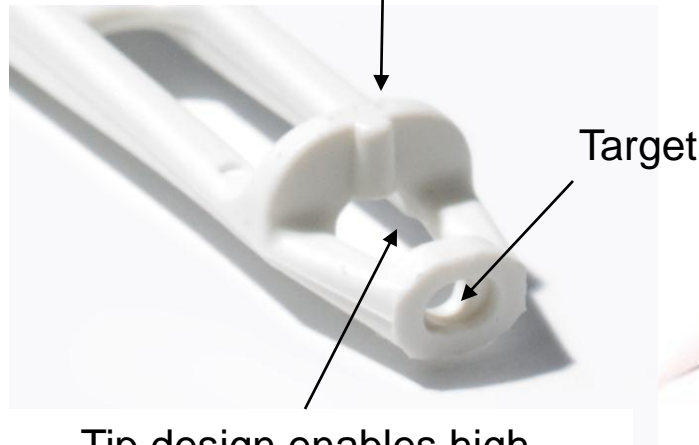
- Trains Retroflexion
- Ridges guide initial tongue position
- Coil guides retroflexion
- Easy to determine tongue position for correct and incorrect productions
- Works for vocalic R (bird, car) and consonantal R (rabbit, rise)



# The S and SH Speech Buddies



Dental stop and centering ridge are placed on upper dentition and ensure correct, consistent placement



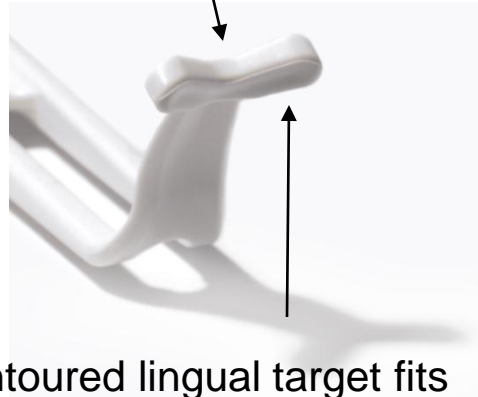
Tip design enables high pressure air flow around the target for clear sound production

Correct tongue depth and height within mouth help with both frontal and lateral errors

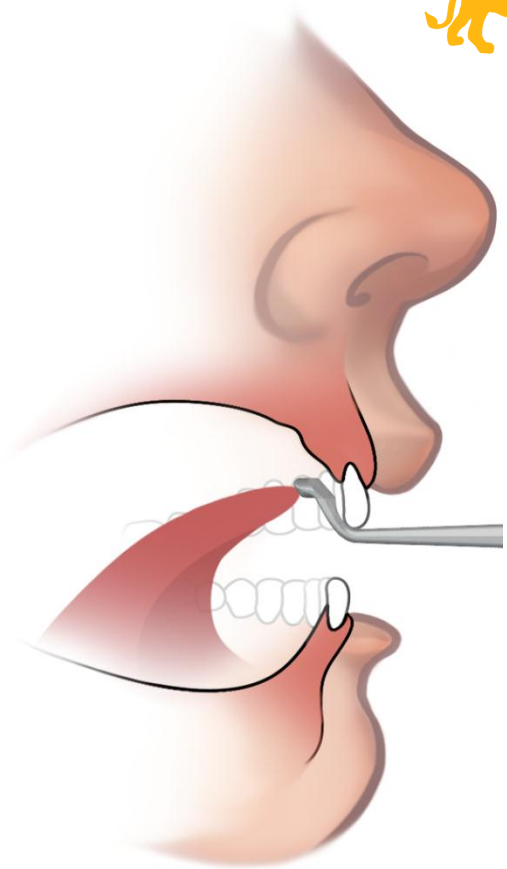
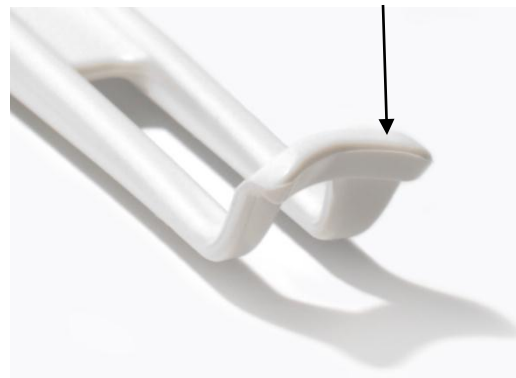
# The CH and L Speech Buddies



Two-pronged target cues “spreading” affrication,  
and tongue **tip** and **blade** contact with palate



Contoured lingual target fits  
around upper front teeth and  
enables coarticulation



# Part 3:

## Measuring Effectiveness: Our Clinical Research Programs



# Research strategy to prove efficacy of Speech Buddies

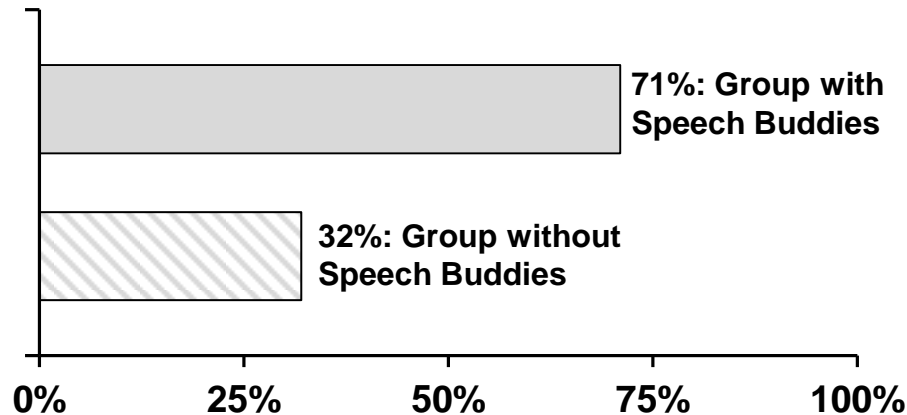
- Goal:
  - Prove Tactile Feedback as the gold standard and first treatment methodology for numerous types and severities of speech disorders
- Strategy:
  - Efficacy study of articulation disorders in children new to therapy
    - Shows method is appropriate as 1<sup>st</sup> treatment option
  - Case Study: R treatment techniques
  - Build a large body of data from many studies:
    - Treatment resistant populations (larger benefit expected vs. new patients)
    - Parent involvement in therapy at home
    - Group therapy with Speech Buddies in schools and clinics
    - Various Disorders: hearing impaired, developmental apraxia, acquired apraxia, accent modification

# Rigorous study design to prove efficacy

- IRB Approved, Controlled, Single-Blind, Randomized Efficacy Study
- Subjects
  - 20 Subjects Aged 5:0 - 8:11
  - Random group assignment: 10 control, 10 experimental
  - /s/ distortion; lateral or frontal
  - No history of congenital or acquired neurological, structural, or physiological deficits
  - Hearing and language skills within normal limits
  - Less than 10 hrs. of therapy (all enrolled had none)
- Method
  - Baseline Evaluation: 50 word test battery by blinded Ph.D. evaluators
  - 8 Therapy Sessions each approximately 30 min., 45 Stimulus items
  - Sessions include: auditory discrimination task, “warm-up” in isolation and syllables, therapy training with /s/ in all word positions and in diverse phonemic contexts
  - Final evaluation: 50 word test battery by blinded Ph.D. evaluators
- Primary Endpoint
  - Mean pre vs post therapy accuracy percentages of /s/ phoneme will be greater in experimental group than control group

# Preliminary data shows that subjects learn twice as fast

## Accuracy after eight therapy sessions using a 50 word test battery and a blinded evaluator



- On track to meet primary endpoint with statistical significance
- Profound results for SLP community!
- Consistent with Clark et al research (1993)
- Pending submission for peer reviewed publication

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

G. ROGERS, M.S., J. GALGANO Ph.D., C. FERRONE Ph.D., M. YUKOV, M.S., S. CHMIELEWSKI, M.S.

20 August 2010

**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™ /v/ tool which uses tactile feedback to train correct and consistent tongue placement. The subjects all initially present with a distorted production of /v/ 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 /v/ distortion when traditional therapy is used in conjunction with the Speech Buddies /v/ tool specifically engineered to train correct and consistent tongue placement. Clark, Schwarz & Binkley (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 /v/ phoneme (frontal or lateral lip) on a 50 word baseline test, 4) adequate language skills and hearing function, CELF-4 criterion and auditory discrimination test, and 5) native American English speakers.

**2.3. Experimental Device.** The Speech Buddies™ Seal or /v/ 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 /v/ sound. Hundreds of prototypes and fluid dynamics analytics were used to aid in the design process. The Speech Buddies /v/ device aligns a target precisely flush 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.

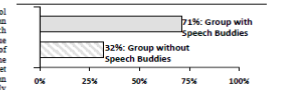
**2.4. Investigational Procedure.** INTACT is an IRB-approved study with 20 subjects who are either randomly assigned to a control group who just receive traditional therapy, or to an experimental group who receive traditional therapy in conjunction with intra-oral tactile feedback.

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 /v/ sound in isolation (6 items), followed by the /v/ either in initial, medial, final word position, or in sentences (24 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 (12) 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%. 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



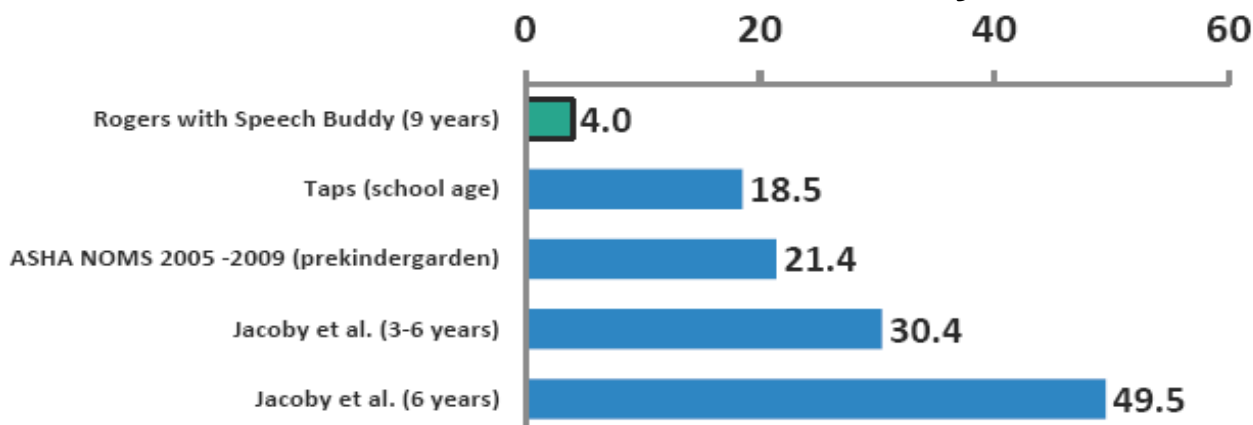
These data show that the tool is effective in a group of patients with varying ages, and various presentations of /v/ distortion. In addition, it is effective as the first treatment option for children that have received no prior therapy. Finally, these data support the hypothesis that Speech Buddies, 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.

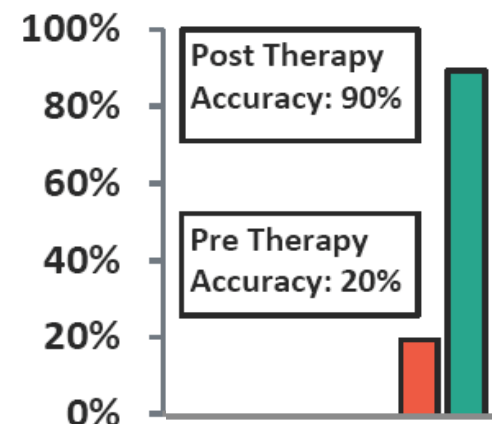
<sup>1</sup> Preliminary results reflect per protocol data and are statistically significant with  $\alpha=0.10$  and  $n=1,62$ .

# R Case Study: Reduced treatment time vs. industry norms

## Treatment time in Hours vs. Industry Norms



## 90% accuracy after 4 hours



- 90% accuracy achieved in eight 30 minute sessions
- 1/4 to 1/8 treatment time vs. industry norms
- Study design basics:
  - Mild to moderate articulation disorder, age 9
  - Pre and Post treatment test of 50 stimulus items
  - 8 therapy sessions each with 55 stimulus items
    - Warm up cues (6): R Speech Buddy used for every cue
    - Remaining cues (49): Every other cue in 1<sup>st</sup> session; every 8<sup>th</sup> cue for 8<sup>th</sup> session

# Summary: research confirms efficacy

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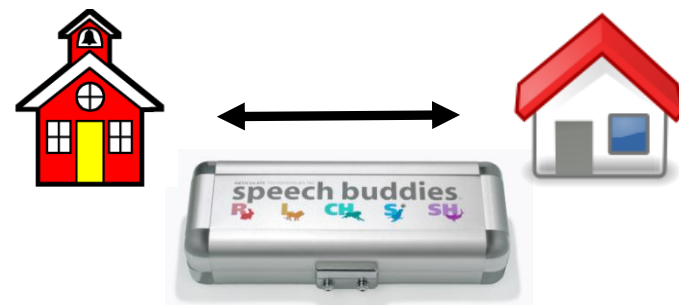
Speech Buddies should be considered as a first therapy method for mild, moderate or severe articulation disorders

## Part 4:

# Using Speech Buddies in your Practice

# How do I use Speech Buddies?

- Speech Buddies are designed to be used by SLPs, parents and children
- Parent involvement is critical in the learning process
- Scenarios of use:
  1. At home and in Therapy (preferred)
  2. In therapy only
  3. At home only
- Individual or group therapy
- One Buddy per child
  - FDA listed for single patient use



# What types of patients can benefit from Speech Buddies and Tactile Feedback?

## Observed benefit (ages 4 and older)

- Speech and articulation disorders
  - All severities
  - Hearing Impairment (with and without cochlear implants)
  - Autism spectrum disorder
  - No known cause
- Childhood apraxia of speech
- Acquired apraxia of speech from stroke or traumatic brain injury (TBI)
- Accent modification

## Benefit under evaluation

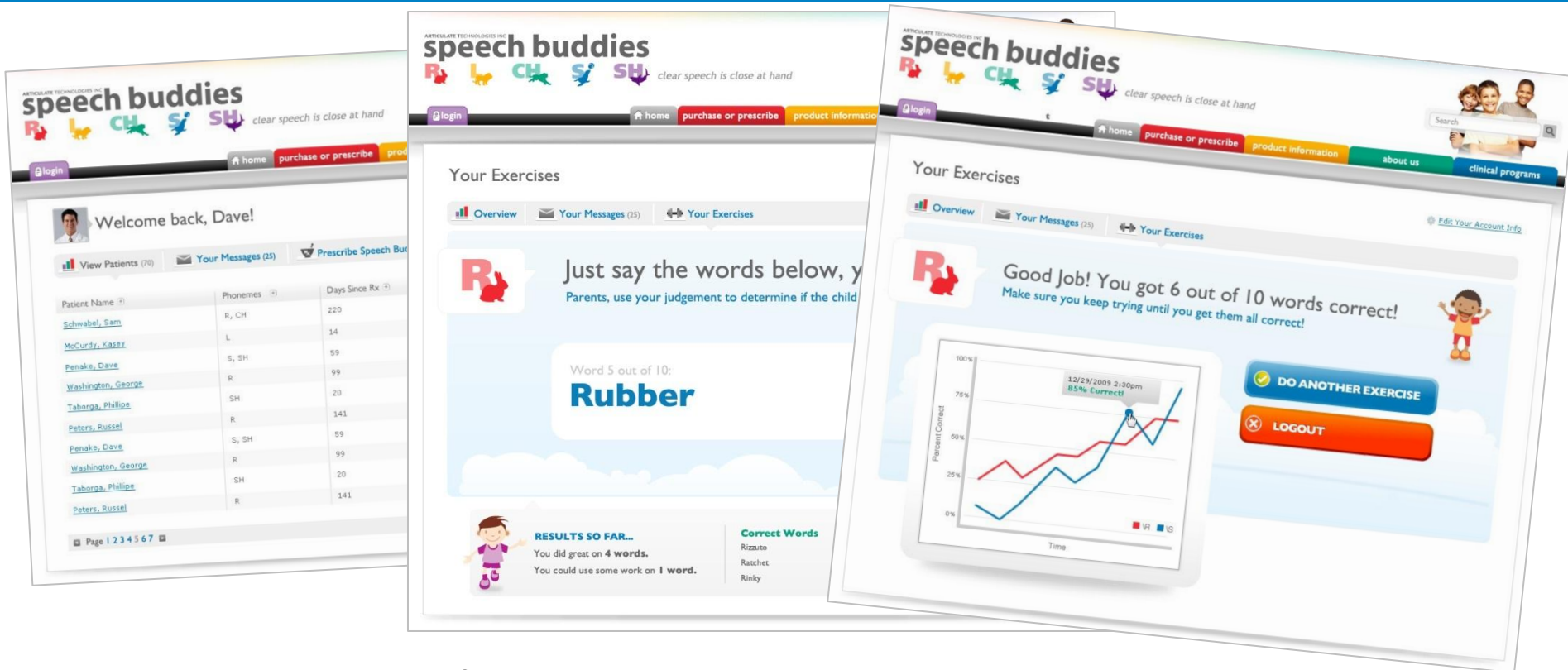
- Speech and articulation disorders tied to neuromuscular weakness, cerebral palsy, paralysis, post surgery cleft palate, and Down Syndrome

## Not recommended

- Language disorders, stuttering, voice disorders



# Free online word games complement the Speech Buddies system



- Word games for kids to practice at home or in the clinic
- Track their progress over time or during the summer
- Prescribe Speech Buddies

# Speech Buddies adopted as first treatment method in private clinics

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- Each therapist in clinic owns a Professional Set of all 5 sounds
- Your clients purchase Speech Buddies for their kids
  - Based on your recommendation
  - Kids take Buddy to and from therapy
  - Send home with online word games
- Group Therapy
  - Leverage your time by using Speech Buddies to treat multiple clients simultaneously
- Get Referrals!

# Speech Buddies adopted as first treatment method in schools

- District level
  - One of the largest school districts in the US purchased sets for multiple speech therapists in the system
- School therapist level
  - School therapists own sets
  - Public, private and charter schools
  - Group therapy application – one Buddy per child
- Parent Outreach
  - Depending on State or District Regulations, inform parents about using Speech Buddies
  - Free online word games
  - Parents “get it”, similar to purchasing a musical instrument or sports equipment for their child to take to and from school

# Become a Speech Buddy Provider

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1. Purchase Full Set
2. Receive \$15 off Speech Buddies for your clients
3. Get Referrals! Priority listing and local referrals from our website.

Join the hundreds of therapists using Speech Buddies!

# Part 5: Conclusion

# Conclusions

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- Speech Buddies should be considered as a first method of treatment for mild, moderate, and severe speech sound disorders
- Proven Method, Proven Product
  - Rigorous clinical studies have shown that kids learn twice as fast with Speech Buddies and the Tactile Feedback method
  - How many of the products you buy have direct evidence to support their use in clinical practice?
- Join the hundreds using Speech Buddies today
  - Take advantage of **ASHA Special** to become a Provider today

# Acknowledgements

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## Development Team & Advisors

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