MAYO CLINIC

INTENSIVE THERAPY FOR CHILDHOOD APRAXIA OF SPEECH

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Iowa Conference on Communicative Disorders
Cedar Falls IA
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SPEAKER DISCLOSURE

- Financial:
  - Consultant of Speech Pathology and Professor of Speech Pathology, Mayo Clinic
  - Research support NIH
  - Travel expenses supported by ICCD
- Nonfinancial:
  - None

OBJECTIVES

Participants will be able to:

- Describe features of childhood apraxia of speech and its common co-morbidities
- Access resources for learning more about Dynamic Temporal and Tactile Cueing Therapy
- Summarize advantages and disadvantages of intensive speech therapy

PLEASE DO NOT PHOTOGRAPH OR VIDEO IMAGES OF CHILDREN

MENTIMETER.COM ENTER CODE ***

- **My current level of skill in treating CAS**

MENTIMETER.COM ENTER CODE ***

- The age group/s I serve

CHILDHOOD APRAXIA OF SPEECH (CAS)

- Difficulty with purposeful movements for speech
- Attributable to disruptions in movement planning and programming

DEFINING FEATURES OF CAS

- Inconsistent errors on consonants and vowels in repeated productions of syllables or words.
- Lengthened and disrupted coarticulatory transitions between sounds and syllables.
- Inappropriate prosody, especially in the realization of lexical or phrasal stress.

(ASHA 2007)

ADDITIONAL FEATURES SUGGESTING CAS

- Use of simple syllable shapes
- Frequent omission of sounds
- Increased errors with increased word length and phonetic complexity
- Difficulty completing a movement gesture for a phoneme easily produced in a simple context, but not in a longer one

CAS: Articulatory Features

SPEECH FEATURES SUGGESTING CAS

- Inconsistent error pat

Target:

/kənstɹʌkʃən/ (construction)

Productions:

/kwʌʃən/

/kwə.ɛdʌʃɪt/

/wʌʃɪt/

/twʌʃɪn/

/ɪn.twʌʃɪn/

/twʌs.tɪn/

/tɔnskwʌʃən/

/dɔnt.kwʌʃən/

SPEECH FEATURES SUGGESTING CAS

- Intrusive schwa

CAS: Prosodic Features

SPEECH FEATURES SUGGESTING CAS

- Segmentation
  - Sound
  - Syllable
  - Word

SPEECH FEATURES SUGGESTING CAS

- Sound segmentation

SPEECH FEATURES SUGGESTING CAS

- Syllable segmentation

SPEECH FEATURES SUGGESTING CAS

- Word segmentation

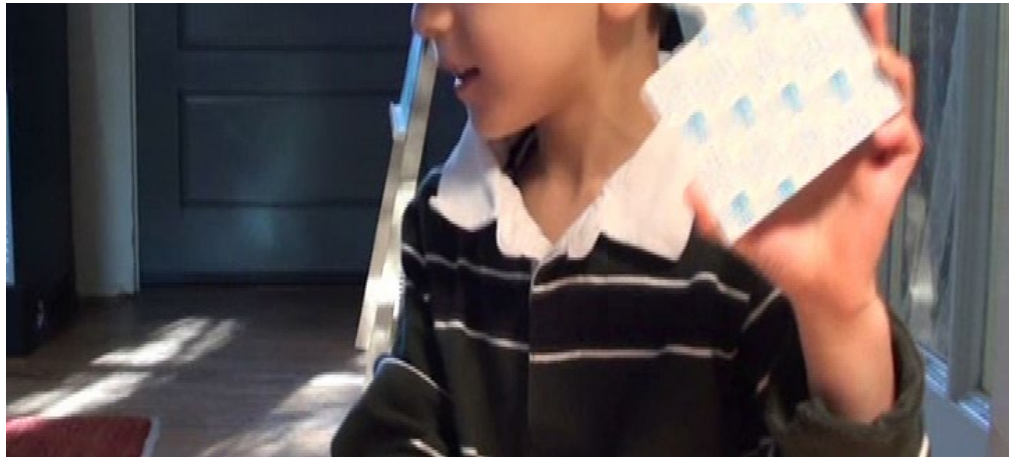
SPEECH FEATURES SUGGESTING CAS

- Lexical stress errors

CAS: Fluency Features

SPEECH FEATURES SUGGESTING CAS

- Groping and/or trial and error behavior



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- CAS primarily affects

Treatment Programs for CAS

- DTTC / ASSIST (Strand 2020)
- ReST / TEMPO^{SM}
- PROMPT
- Kaufman Speech to Language Protocol
- Nuffield Dyspraxia Programme

MENTIMETER.COM ENTER CODE ***

- Treatments I have used

DTTC

American Journal of Speech-Language Pathology • Vol. 29 • 30–48 • February 2020 •

AJSLP

Clinical Focus

Dynamic Temporal and Tactile Cueing: A Treatment Strategy for Childhood Apraxia of Speech

Edythe A. Strand[a,b]

DTTC CORE ELEMENTS

- Focus on movement
- Intent to improve motor control for communication
- Attention to proprioception

Focus on Movement

LET'S CLARIFY

- Phonetic consequences and phonemic perception matter
  - Feedback on phonetic accuracy (knowledge of results) is critical, especially when the speaker is not consistently self-evaluating
  - Minimal pairs are perfectly appropriate for contrasting the minimal variations in movement parameters for distinguishing meaning

THE PROBLEM ARISES IN SEPARATION OF PHONEMES

- Children with phonologic difficulties often benefit from separation
  - /b^ oI/
  - /t^ oI/
  - /b^ I g/
  - /p^ I g/
- Children with CAS must maintain the integrity of the *movement pattern*

FOCUSING ON MOVEMENT

- Direct attention to
  - Structure
  - Speed
  - Tension
  - Vibration
- In contrast to “b” or “t”

PRACTICE SHOULD EMPHASIZE SYLLABLES *(AT A MINIMUM)* AND MOVEMENT GESTURES

- Temporal manipulations of movement
  - Prolong initial articulatory configuration
  - Slow movement trajectory
  - Prolong final articulatory configuration

PRACTICE SHOULD EMPHASIZE SYLLABLES *(AT A MINIMUM)* AND MOVEMENT GESTURES

- Manipulations to alter movement complexity
  - Isolated vowel or sustainable consonant
    - /a/
    - /s/
    - /b/, except as a very last resort
  - Emphasize movement of a single articulator
  - Remove voicing

MENTIMETER.COM ENTER CODE ***

- T/F: Motor learning therapies emphasize movement over phonologic representations

Avoid directing attention away from the movement task

MIRROR NEURONS

- Neurons that are activated during production and observation of a movement
- Can lead to unintentional mimicking
- Can support intentional movements

We want our therapy to take full advantage of the support offered by mirror neurons

MOTOR LEARNING REQUIRES ATTENTION

- Avoid pictures that direct attention away from the visual model
  - You won’t see a single picture card in any of these videos

- Avoid too many reinforcers
  - Try to use reinforcers to direct attention to the visual model

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- T/F: DTTC has a deck of picture cards you should use to elicit targets

Prosody Matters

WHAT'S THE DEAL WITH PROSODY?

- Children without dysarthria or AOS may never struggle with prosody, so it's not always on our radar
- Children with CAS (and/or dysarthria)
  - May adopt compensatory strategies that disrupt prosody
    - Segmentation
  - May lack motor programming resources to specify prosody

WHAT'S THE DEAL WITH PROSODY?

- Prosody reflects variations in movement planning
  - Rate
  - Loudness
  - Pitch
- Disrupted prosody has a profound impact on intelligibility

IMPLICATIONS

- Correct prosody should be included in judgments of accuracy
- Prosody can be targeted specifically
  - Word level
  - Phrase level

INTEGRAL STIMULATION

Watch me

Listen to me

Do what I do

VARYING TEMPORAL ASPECTS OF CUEING

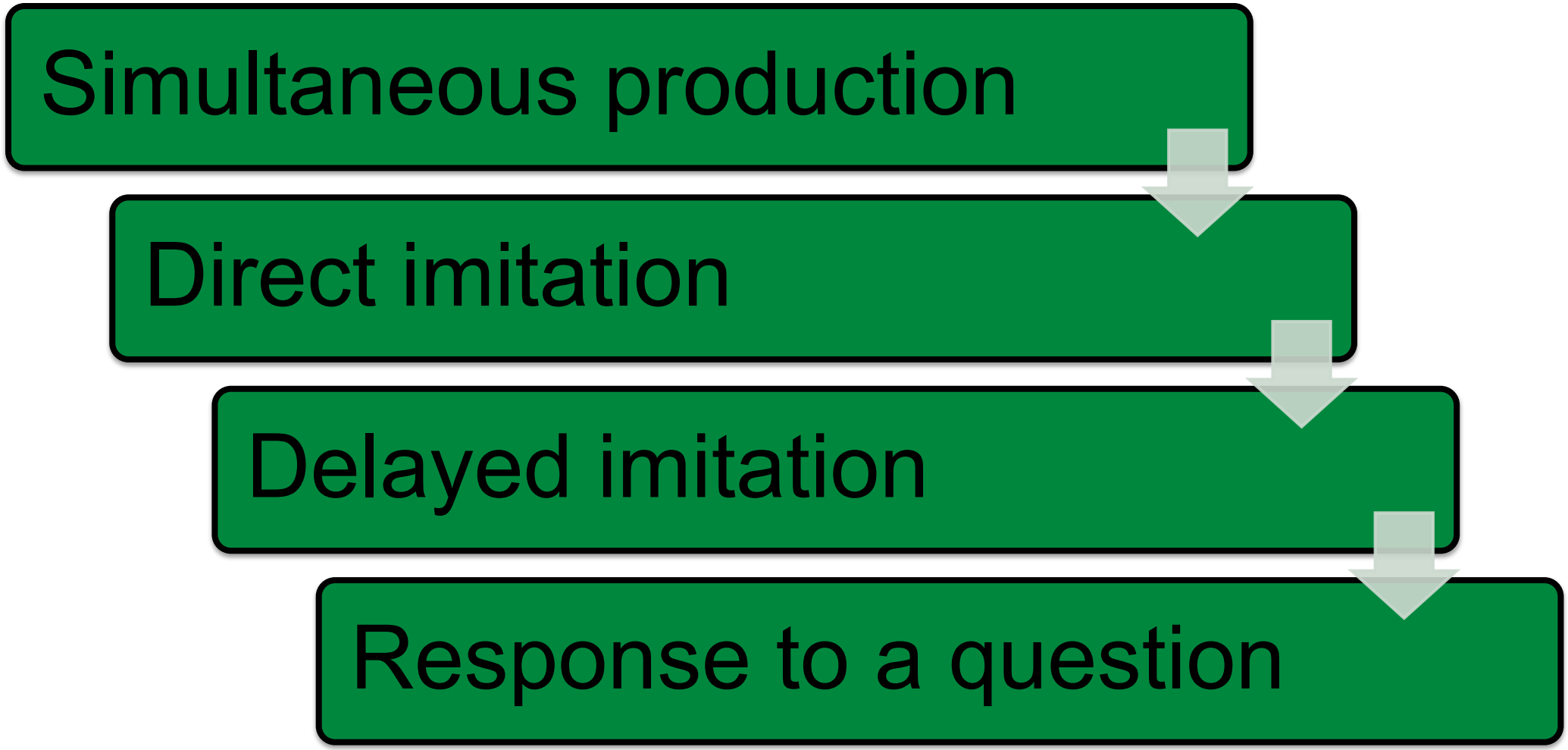
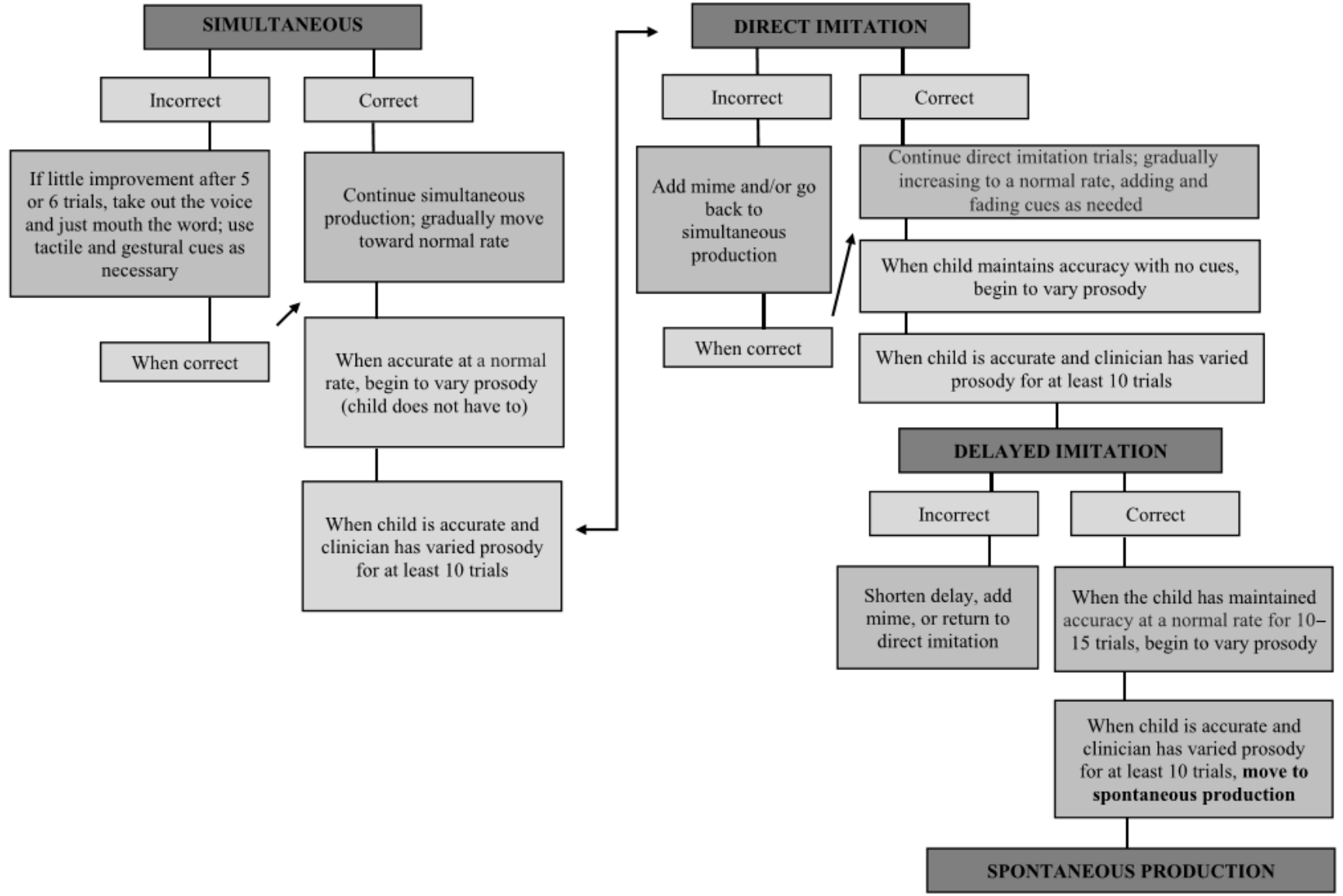


Figure 3. Complete dynamic Dynamic Temporal and Tactile Cueing hierarchy illustrating when and how to move up or down the hierarchy.



CUEING STRATEGIES

Child must attend to the clinician's face

- Slowed rate
  - Hold initial articulatory configuration
  - Slowed gestures **without segmentation**
- Gestural and tactile cues
- Mimed speech (deletes respiratory and phonatory demands)
- Gradually moving toward normal rate
- Varying prosody

Table 2. Examples of tactile and gestural cues for each level of the hierarchy.

When to use cues	Steps within each level of the hierarchy	Suggested but unspecified cues
	Simultaneous production: first few attempts at a target word or phrase	
First cued trial after initial direct imitation attempt	- Draw child's attention to the clinician's face - Repeat the model more slowly - May add a gestural cue (e.g., pointing to retracted lips, using fingers to thumb-closing gesture)	
Second cue and following	Have the child simultaneously produce the utterance slowly with the clinician	If the child cannot get to the initial articulatory position, may use phonetic placement techniques May add tactile cues if necessary, such as: - Use fingers to round the child's lips - Hold fingers under the jaw to reduce jaw opening - Use fingers to retract the child's lips - Other tactile cues the clinician feels may be helpful
If little improvement is noted after five or six trials at simultaneous	Reduce the movement specification requirements by taking out the respiratory and laryngeal systems; have the child just mouth the movements for the word silently with the clinician.	May also need to add gestural or tactile cues here as well. Again, fade cues as the movements become more accurate.
	Simultaneous production: continued practice	
Continued trials at simultaneous level When the child is accurate at a normal rate over 5–10 trials without cues	Repeat simultaneous production, slowly working toward accurate movement and normal rate Begin to vary prosody during your models (don't worry if the child does not vary prosody at this level).	- Slow rate if needed; gradually move to a normal rate. - Add and fade tactile or gestural cues as necessary with each response.

	Direct imitation	
When the child is accurate at a normal rate without cues over at least 10–15 trials	Move to direct imitation	- If they falter, may either go back to simultaneous or add a mime - Add or fade gestural or tactile cues as necessary with each response and fade as soon as possible - Slow a bit when needed, and continue to move to a normal rate
When the child maintains accuracy at a normal rate over at least 10–15 trials without cues	Begin to vary prosody, asking the child to "say it just like me"	Continue to add and fade gestural and tactile cues with continued practice trials (as described above) as necessary
	Delayed imitation	
When the child is accurate at a normal rate without cues over 10–15 trials and has varied prosody at least 10–15 trials	Move to delayed condition	If they falter, may either go back to direct imitation or add a mime Continue with delay trials, adding or fading cues as necessary
When the child is accurate at a normal rate over 10 or so trials in the delayed condition	Begin to vary prosody, again asking the child to "say it just like me"	
	Spontaneous production	
When the child is accurate, at a normal rate, and has varied prosody in delayed imitation	Move to spontaneous production elicited by a question or picture	At this point, no tactile or gestural cues should be needed. If they falter, go back to additional practice in the delayed condition.

ADDITIONAL TENETS OF DTTC

- Cues increased and faded immediately to balance errorless learning with independence

- Practiced each target between 10 and 40 trials, with one or two targets receiving more trials than the other targets and perhaps more than one block of practice per session

- Feedback was faded (in both specificity and frequency) during practice within a block, as the child became more accurate (score if this was observed at least 50% of the time when appropriate

CANDIDACY FOR DTTC

- ✓Ability and willingness to focus on the clinician's face for at least two seconds
- ✓Ability and willingness to attempt imitation of oral movements
- ✓Ability and willingness to follow simple directions
- ✓Ability and willingness to perform 4 trials of the same speech target

SELECTING TARGETS AND EXEMPLARS

- Functional real words
  - High saliency
  - Get input from family
- Phonetic features
  - Vowel accuracy & complexity
  - Syllable shape
  - Prosody

Nonwords can be used to extinguish incorrect motor programs

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- How many different words should a child with CAS practice in a 30 minute session?

Use a small number of carefully selected exemplars

HOW MANY EXEMPLARS?

- Just a few
- How many is that?
  - 2-3 to start
  - Up to 5 that are not well established
  - Up to 10 with cycling back around to “mastered” targets

WHAT'S THE ADVANTAGE OF FEWER EXEMPLARS?

- Acquisition
  - More trials on same pattern
  - Faster success
  - Child gains trust with the process

But we don't forget about generalization

CHOOSING EXEMPLARS

- **Functional**
  - Words and phrases the child will actually use
  - Child and parent input is helpful

CHOOSING EXEMPLARS

- Incorporates target phonetic patterns and movement patterns
  - At least one phoneme in current repertoire
  - Vowel targets may be more heavily targeted in severe CAS
  - Prosody should be considered sooner than later

CHOOSING EXEMPLARS

- Complexity matches stimulability
  - But don’t be afraid to stretch, especially for highly motivating exemplars

EXAMPLES

Targets

- Hi
- Out
- Home
- Daddy
- On top

Rationale

- Diphthongs
- CV, CVC, Cv1Cv2, VCCVC
- /h/ /o/ mastered
- Daddy and ‘on top’ involve lexical stress

THIS PRINCIPLE CAN BE EXPLOITED IN MODERATE AND MILD CAS AS WELL

- May be most important when intelligibility is limited

EXAMPLES

Targets

- Baseball
- I need help
- I’m home
- Can I have it?
- Show me

Rationale

- Prosody
- High interest/function
- Word separation
- Sibilants

EXAMPLES

Targets

- canoe
- swim
- open up
- my name
- computer
- outside

Rationale

- Vowel context
- Function
- Lexical stress
- Stimulability

EXAMPLES

Targets

- Hi dad
- I’m home
- I want popcorn
- Bye Edy
- I am loud

Rationale

- Diphthongs
- Varying vowel contexts
- Prosody
- Consonant targets nearly mastered

EXAMPLES

Targets

- We like to hug mummy
- This is taking forever
- I don't want to go to bed
- Sophie is my sister
- We call Sophie Bean
- How did you do that?

Rationale

- 7 weeks intensive tx
- Intelligibility was key
- Prosody
- Extinguishing habituated patterns
- Chosen from spontaneous language sample

TAKE HOME MESSAGE ON EXEMPLARS

- Only a few may be needed (at a time)
- Should be selected strategically
- Don’t be afraid to stretch

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- **If you were the person receiving, DTTC, what are some of the exemplars you'd want to the SLP to target for you personally?**

Hetty's response: Valya, Lucian, Icee, Sun, Love you

PROGRESSING BEYOND DTTC

SET SIZE IS 10 OR MORE ITEMS

ALL VOWELS MASTERED ACROSS COARTICULATORY CONTEXTS

SMOOTHNESS AND PROSODY IMPROVED (NOT NECESSARILY PERFECTED)

ONGOING TARGETS

- Segmentation
- Lexical and sentential stress
- Naturalness

DTTC SUMMARY

- Designed for children with severe CAS and limited speech
- Key concepts
  - Focus on movement
  - Prosody matters
  - Dynamic cueing
  - Facilitate proprioception
  - Principles of motor learning

COMPARING CAS TREATMENT APPROACHES

Feature	DTTC	K-SLP	NDP3	ReST
Stimuli	Words	Words	Words	Nonwords
Use of Power Words	Yes	Yes	Only for motivation	No
Acceptable	Approximations for late developing sounds (mo' for more)	Approximations		Exact productions
Segmentation	Not allowed	Acceptable and possibly encouraged	Encouraged to enhance phonological awareness	Not allowed
Simplification strategy	Slowing rate, removing voicing	Approximations, Natural phonologic processes	Hierarchical approach	n/a
Simplified targets intentionally targeted	No but may be accepted	Yes	No	n/a

COMPARING CAS TREATMENT APPROACHES

Feature	DTTC	K-SLP	NDP3	ReST
Shaping/cueing during practice	Yes	Yes	Yes	No
Uses pictures or cards	No	Yes	Yes	Yes
Clinician model	Much of the time, critical to the approach	Much of the time, one of many options	Some of the time, one of many options	Always
# of exemplars	Few	Many	Many	Many
Reinforcement	Limited	Emphasized	Encouraged	Structured
Intention	Attention to speech task emphasized	Distraction by reinforcement allowed as long as speech is produced	Attention to task emphasized	Attention to task emphasized

COMPARING CAS TREATMENT APPROACHES

Feature	DTTC	K-SLP	NDP3	ReST
Feedback timing	Varied – immediate to summary	Immediate	Immediate	Delayed
Feedback frequency	Faded informally	Frequent but encourages fading	Frequent	Faded systematically
Feedback earned by…	Feedback provided for learning Reinforcement for trying	Feedback is inherently reinforcing	Feedback provided for learning Reinforcement for trying	Feedback provided for learning Reinforcement for practicing

COMPARING CAS TREATMENT APPROACHES

Feature	DTTC	K-SLP	NDP3	ReST
Errorless learning	No – but dynamic	Yes	No	No
Repetitions per exemplar	Many	One unless not acceptable	3-5	One
Prosody addressed	Early but not ubiquitously	Secondarily	Secondarily	Ubiquitously
Variable practice	Achieved by modulating intonation	Addressed by contextual practice	Addressed with sequencing practice	Addressed by stress patterns
Random practice	Modified blocked practice	Inherent	No	During practice phase

COMPARING CAS TREATMENT APPROACHES

Feature	DTTC	K-SLP	NDP3	ReST
Strategies for expanding language	Longer exemplars can be targeted	Yes	Embedded at each level	n/a
Explicitly stratifies basic versus complex consonants	No	Yes	Yes	Yes
Vowels	Tense vowels may be easier because they can be prolonged	Lax vowels may be easier because they are shorter	Long vowels targeted first, then diphthongs, then short vowels	Both tense and lax vowels are targeted

COMPARING CAS TREATMENT APPROACHES

Feature	DTTC	K-SLP	NDP3	ReST
Explicit attention to sequencing syllables	No	No	Yes	Yes
Slow rate	Yes	No	Yes	No (only during training)
Has specific treatment materials to use	No	Yes	Yes	Yes

SO…HOW DO I KNOW WHICH TREATMENT APPROACH TO USE?

- DTTC is uniquely suited for children with severe CAS and limited speech
- K-SLP has a strong behavioral component that aligns well with children who have CAS plus autism spectrum disorder
- K-SLP and NDP-3 are designed to address language issues concurrently with CAS; DTTC & ReST are primarily movement focused
- If one isn’t working, try another!

TREATMENT INTENSITY

MENTIMETER.COM ENTER CODE ***

- Treatment intensity refers to

MENTIMETER.COM ENTER CODE ***

- Which would you consider to be intensive therapy?

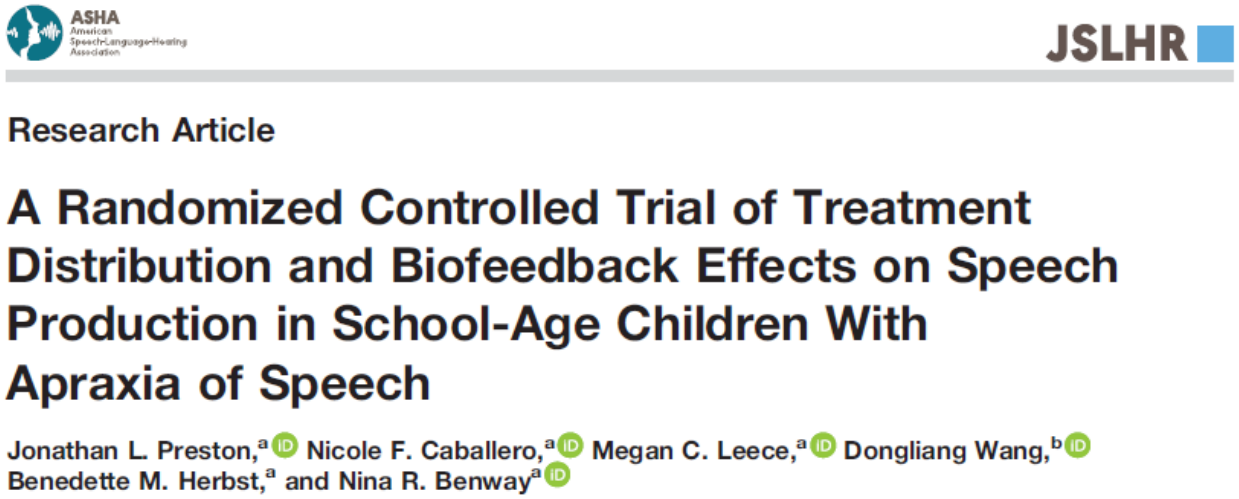
WHAT THE LITERATURE SAYS (PRESTON, CABALLERO ET AL. 2024)

Journal of Speech, Language, and Hearing Research • Vol. 67 • 4053–4068 • October 2024

Intensive treatment (20 hr in 5 weeks, with 10 hr in Week 1) (so actually a hybrid approach)

>

Distributed treatment (20 sessions twice weekly over 10 weeks)



ASHA American Speech-Language-Hearing Association

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Research Article

A Randomized Controlled Trial of Treatment Distribution and Biofeedback Effects on Speech Production in School-Age Children With Apraxia of Speech

Jonathan L. Preston,[a] Nicole F. Caballero,[a] Megan C. Leece,[a] Dongliang Wang,[b] Benedette M. Herbst,[a] and Nina R. Benway[a]

WHAT THE LITERATURE SAYS (NAMASIVAYAM, PUKONEN ET AL. 2015)

Intensive Treatment (2x/week/10wks) > Nonintensive Treatment (1x/week/10wks)

International Journal of Language & Communication Disorders

INT J LANG COMMUN DISORD, JULY 2015,
VOL. 50, NO. 4, 529–546

Research Report

Treatment intensity and childhood apraxia of speech

Aravind K. Namasivayam†, Margit Pukonen‡, Debra Goshulak‡, Jennifer Hard§, Frank Rudzicz#, Toni Rietveld‖, Ben Maassen¶, Robert Kroll‡ and Pascal van Lieshout†

WHAT THE LITERATURE SAYS (NAMASIVAYAM, SHIN ET AL. 2024)

Intensive treatment (2x/week 10 weeks)

> (ns)

Nonintensive treatment (1x/week 10 weeks)

Journal of Speech, Language, and Hearing Research • Vol. 67 • 4053–4068 • October 2024

ASHA American Speech-Language-Hearing Association

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Research Article

Predictors of Functional Communication Outcomes in Children With Idiopathic Motor Speech Disorders

Aravind K. Namasivayam,[a,b] Hyunji Shin,[a,b] Rosane Nisenbaum,[c,d] Margit Pukonen,[e] and Pascal van Lieshout[a,f]

WHAT THE LITERATURE SAYS (NAMASIVAYAM, PUKONEN ET AL. 2019)

Children with SSD with motor speech involvement, treated with Motor Speech Treatment Protocol

Intensive treatment (2x/week 10 weeks)

=

Nonintensive treatment (1x/week 10 weeks)

International Journal of Language & Communication Disorders

INT J LANG COMMUN DISORD, XXXX 2019,
VOL. 00, NO. 0, 1–15

Research Report

Investigating intervention dose frequency for children with speech sound disorders and motor speech involvement

Aravind K. Namasivayam†‡, Margit Pukonen§, Debra Goshulak§, Francesca Granata†, D. James Le†, Robert Kroll§ and Pascal van Lieshout†‡¶‖#

WHAT THE LITERATURE SAYS (THOMAS, MURRAY ET AL. 2024)

Non-Intensive treatment
(1 session (50 min) per week for 12 weeks)

Effective for only **1/5** children

Journal of Speech, Language, and Hearing Research • Vol. 67 • 3392–3413 • September 2024

ASHA American Speech-Language-Hearing Association

JSLHR

Research Article

Weekly Treatment for Childhood Apraxia of Speech With Rapid Syllable Transition Treatment: A Single-Case Experimental Design Study

Donna Thomas,[a] Elizabeth Murray,[a,b] Eliza Williamson,[a] and Patricia McCabe[a]

WHAT THE LITERATURE SAYS (NAMASIVAYAM, CHEUNG ET AL. 2024)

Intensive = 4x/week for 3 consecutive weeks ("Summer Bootcamp")

American Journal of Speech-Language Pathology • Vol. 33 • 2904–2920 • November 2024

Research Article

Effectiveness of the Kaufman Speech to Language Protocol for Children With Childhood Apraxia of Speech and Comorbidities When Delivered in a Dyadic and Group Format

Aravind K. Namasivayam,[a,b] Karina Cheung,[a,b] Bavika Atputhajeyam,[a,b] Julia Petrosov,[a,b] Miriam Branham,[c] Vikas Grover,[d] and Pascal van Lieshout[a]

WHAT THE LITERATURE SAYS (PRESTON, LEECE ET AL. 2016)

Intensive = 16 h of speech therapy over a 2-week period

frontiers in Human Neuroscience

CASE REPORT
published: 30 August 2016
doi: 10.3389/fnhum.2016.00440

Intensive Treatment with Ultrasound Visual Feedback for Speech Sound Errors in Childhood Apraxia

Jonathan L. Preston[1,2]*, *Megan C. Leece*[1] and *Edwin Maas*[3]

WHAT THE LITERATURE SAYS (STRAND, STOECKEL ET AL. 2006)

Intensity =

43 – 50 sessions 6 weeks

38 sessions 4 weeks

Treatment of Severe Childhood Apraxia of Speech: A Treatment Efficacy Study

Edythe A. Strand, Ph.D., BC-NCD

Department of Neurology, Mayo Clinic
and
Mayo College of Medicine, Rochester, Minnesota

Ruth Stoeckel, M.A.

Becky Baas, M.A.

Journal of Medical Speech-Language Pathology
Volume 14, Number 4, pp. 297–307

WHAT THE LITERATURE SAYS (MAAS, GILDERSLEEVE-NEUMANN ET AL. 2019)

Intensive = 2-3x/week (1-hr sessions) over 5–8 weeks

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Research Article

Bang for Your Buck: A Single-Case Experimental Design Study of Practice Amount and Distribution in Treatment for Childhood Apraxia of Speech

Edwin Maas,[a] Christina Gildersleeve-Neumann,[b] Kathy Jakielski,[c] Nicolette Kovacs,[a] Ruth Stoeckel,[d] Helen Vradelis,[a] and Mackenzie Welsh[a]

Journal of Speech, Language, and Hearing Research • Vol. 62 • 3160–3182 • September 2019

MENTIMETER.COM ENTER CODE ***

- Which would you consider to be intensive therapy?

ISAAC PROJECT

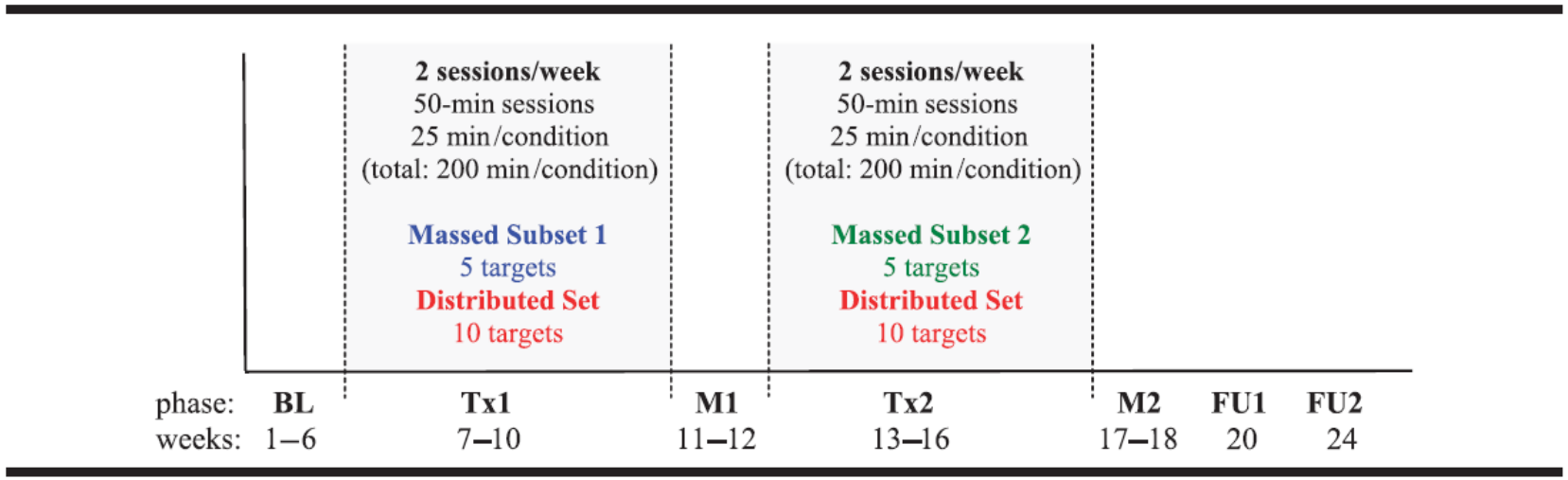
- Benefactor-funded study to provide DTTC to children with severe CAS
- Funds were accepted with stipulation that the DTTC would be administered in the context of a clinical trial
- Plans finalized in late 2019
- Eventually enrolled participants in 2021

IP – EXPERIMENT ONE

- Primary aim was to determine the optimal number of exemplars for DTTC.
- Mixed alternating treatment single subject design with a small number versus a larger number of exemplars

WHAT WE SHOULD HAVE DONE

Figure 1. Overview of study design. BL = initial baseline phase; Tx1 = Treatment Phase 1; M1 = Maintenance Phase 1; Tx2 = Treatment Phase 2; M2 = Maintenance Phase 2; FU = follow-up.



JSLHR

Research Article

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Edwin Maas,[a] Christina Gildersleeve-Neumann,[b] Kathy Jakielski,[c] Nicolette Kovacs,[a]

Journal of Speech, Language, and Hearing Research • Vol. 62 • 3160–3182 • September 2019

IP – EXPERIMENT ONE

- Treatment was delivered for 30-40 minutes, twice per day, five days a week, in 3-6 week blocks
- 3 children completed 3 blocks with several weeks “off” between blocks (one child completed a fourth block when winter was over) – Each child received 100+ treatment sessions

Participant	1	2	3
Age	4:9	4:3	4:6
Infant Babbling	Noted at 5-6 mos	As expected	Reduced
First Words	10 words @ age 2 ½	As expected but slow to gain additional words	Single words at age 2
Previous SLP Therapy	Began at 16 mo	Began at age 2	Began at age 3
Hearing	Normal	Normal	Normal
Feeding/Swallowing Concerns	Infancy	None	None
Cognition/Social/Behavioral	Autism workup negative	Autism workup positive	Autism workup negative
Genetics	20q13.33 deletion Mother with CAS	No family history	Family history of autism; Brother with speech delay
Findings at Pre-Treatment Speech and Language Evaluation			
Goldman-Fristoe Test of Articulation, Third Edition (SS)	45	Not administered	40
Receptive Language SS	99	87	90
Expressive Language SS	66	62	73
Phonologic Errors	Yes	Yes	Yes
Intensive Treatment Sessions Total* (Schedule)	101 (2x/day 5 days/week for 3 weeks x 4 courses)	112 (2x/day 5 days/week Course 1: 3 weeks; Course 2: 6 weeks; Course 3: 4 weeks)	108 (2x/day 5 days/week for 4 weeks x 3 courses)

* Some scheduled sessions included assessment activities only and were not included in the treatment session total

WORD ACCURACY

Figure 1

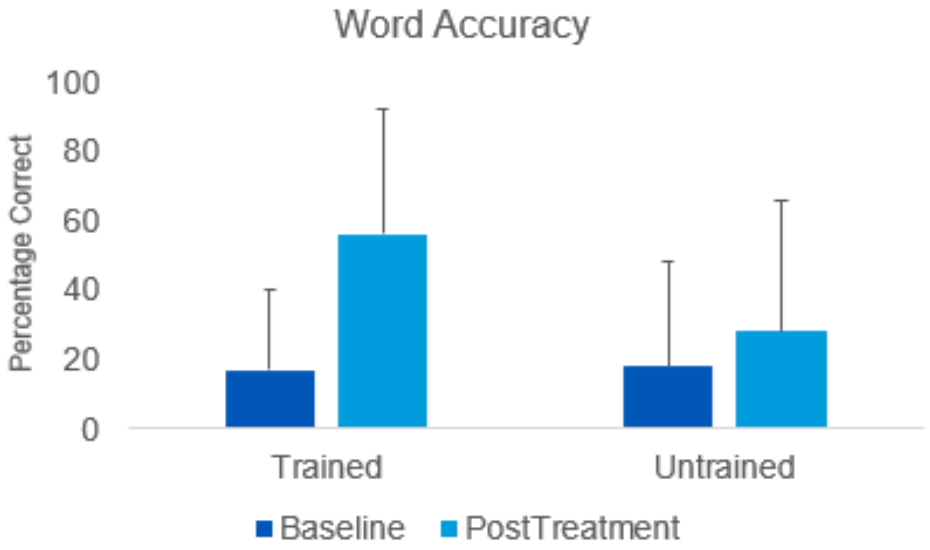
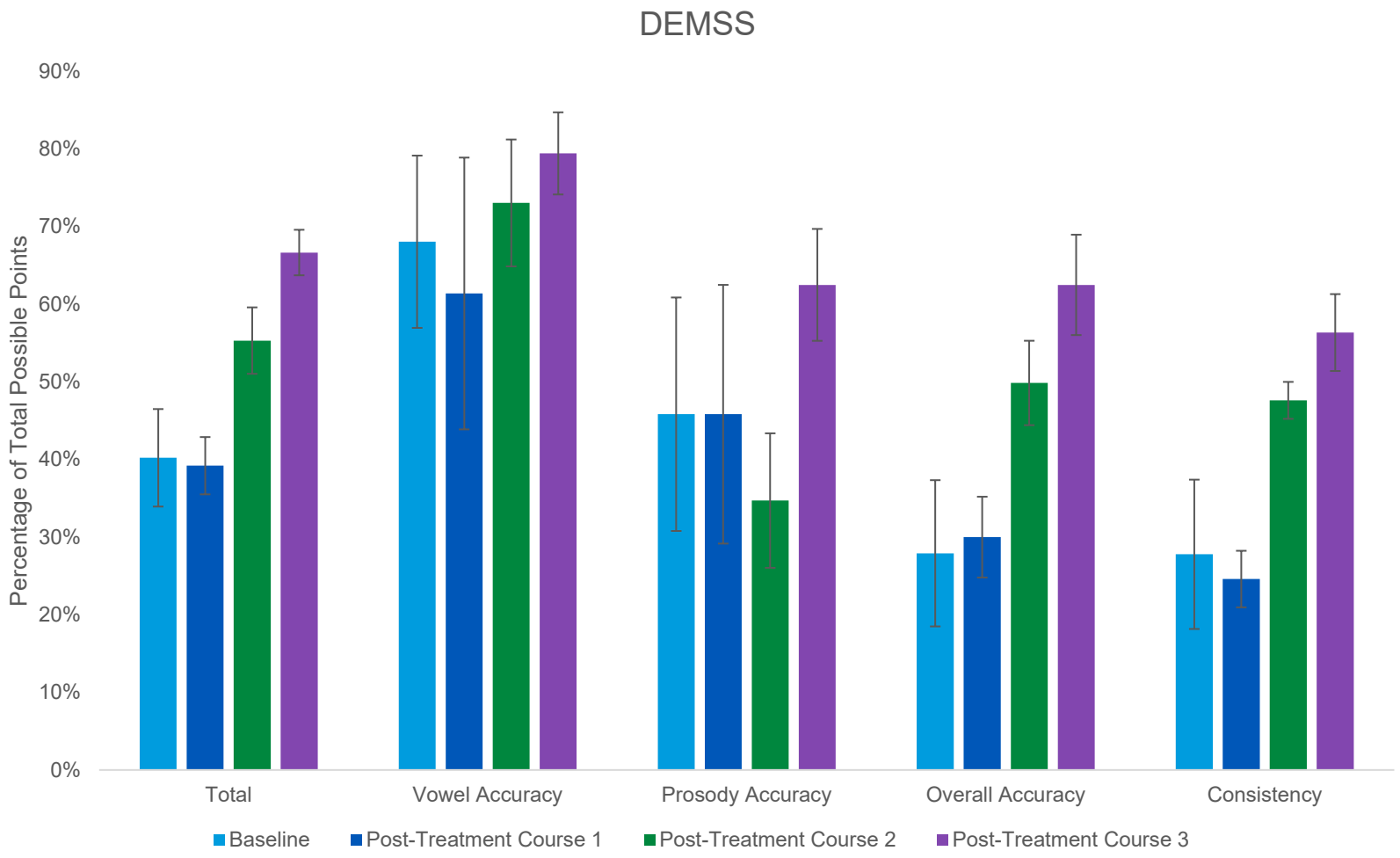
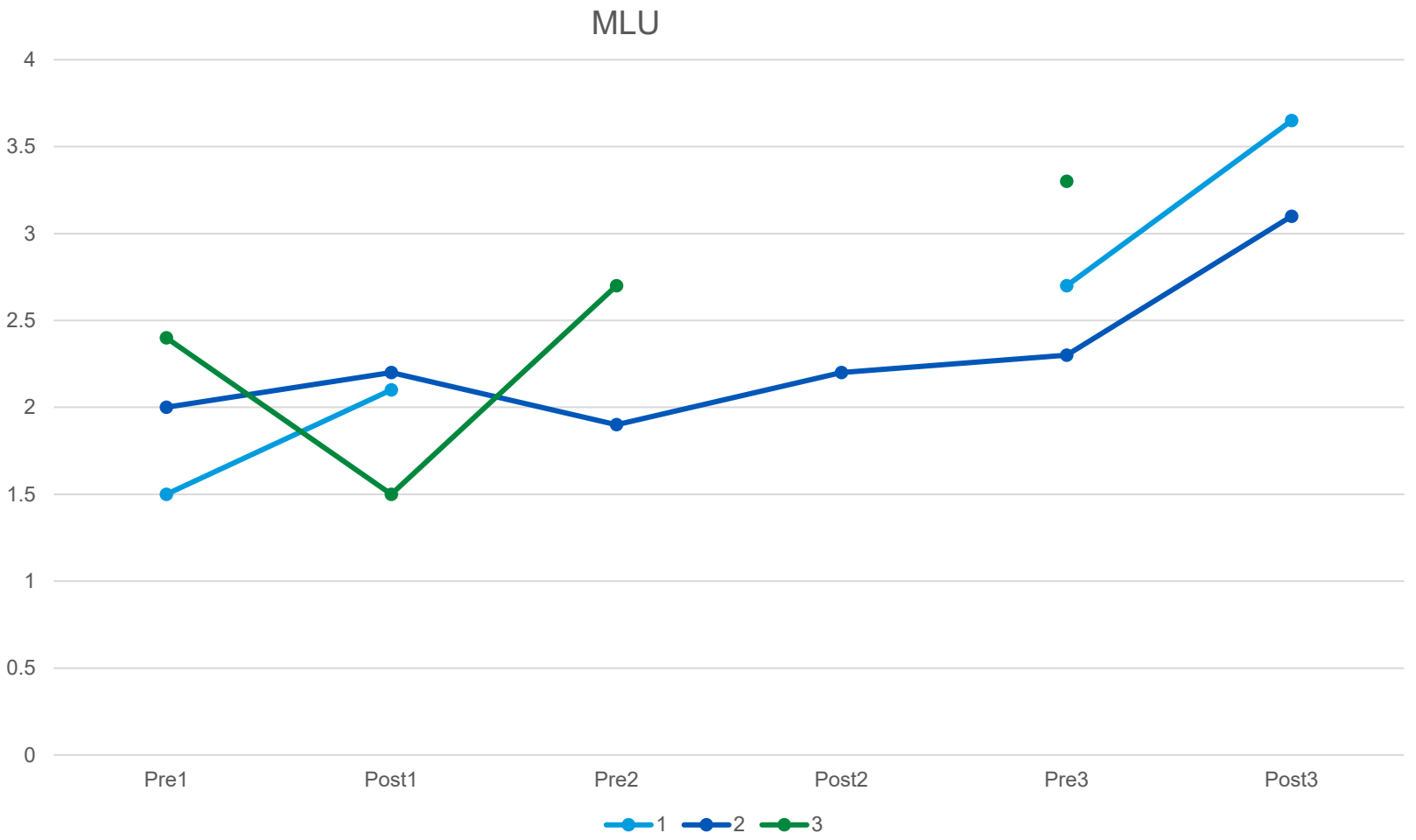


Figure 2

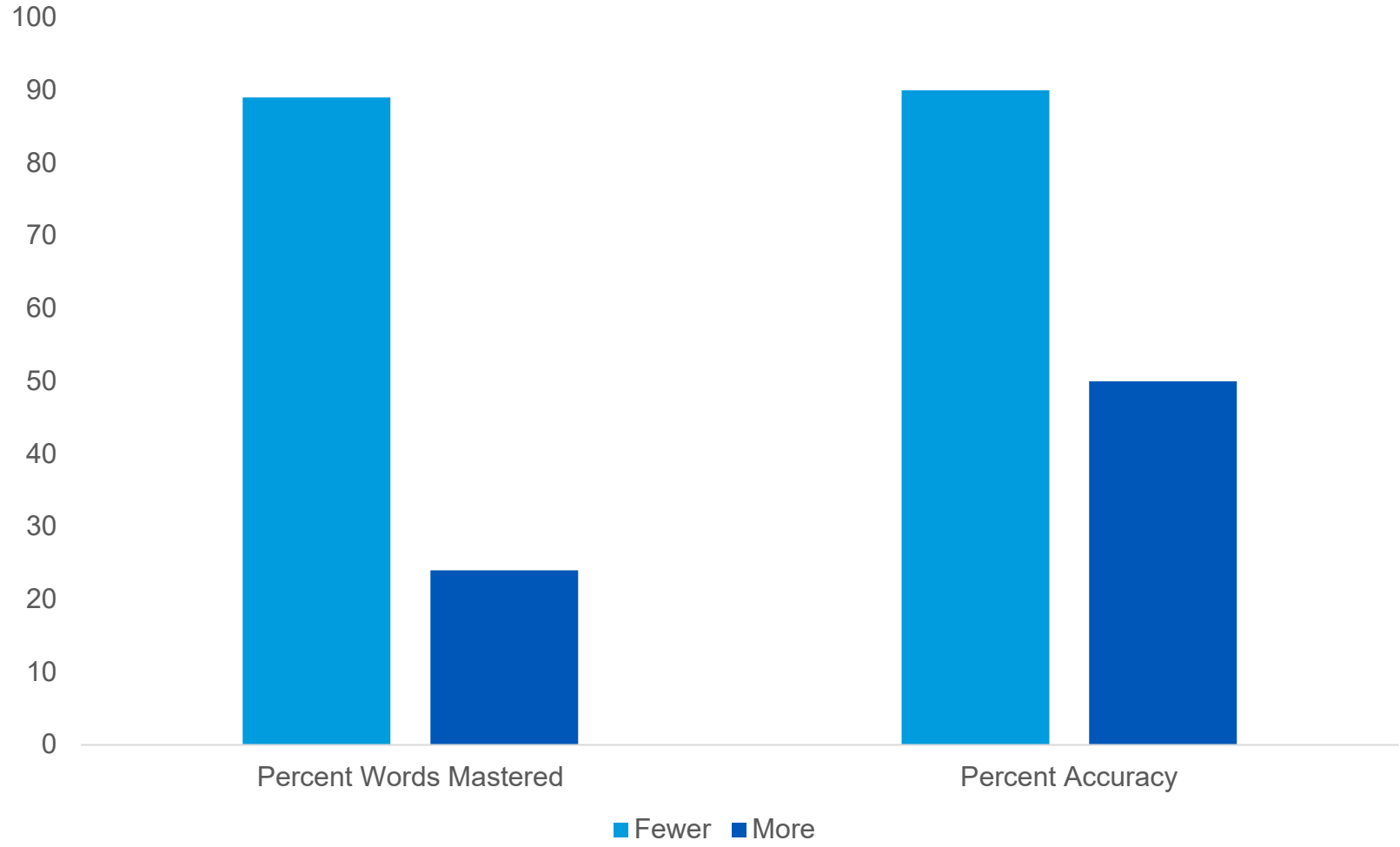
DEMSS PERFORMANCE



MLU



FEWER VERSUS MORE EXEMPLARS



REFLECTIONS: SCIENTIFIC

- Flawed design
  - Most targets were trained under both conditions
  - Should have had separate target lists
- Accuracy ratings couldn’t capture improved productions that still weren’t completely accurate
- Replicated Maas 2019 results favoring blocked practice over random practice

REFLECTIONS

- Two therapy sessions per day for weeks at a time is a lot to ask of young children and their families *and clinicians, even sharing the load*
    - Staying with the same few targets for a long time impacts motivation
- Having four clinicians administering the therapy introduced variability

  We considered this a feature, not a bug, that would foster motor learning
    - Detailed, intentional communication among providers

EXAMPLE OF TEAM COMMUNICATION

- James had another good day. He was a little silly throughout, but did well overall.
- Completed probes & entered data.
- I want: up to direct imitation. Worked on N and tongue placement by upper teeth.
  - You do it: up to direct imitation. More difficulty with vowel today. Some segmentation with cueing.
  - Rainbow: up to direct imitation. Lots of fast productions today, similar to Taylor's description yesterday. Responded well to simultaneous productions and visual cues
  - Oreo: up to direct imitation with prosody. Some initial difficulty with vowels, improved with cues.
  - Home: simultaneous, focused on H and transition to voicing.
- We briefly worked on stimulability for J in James, able to get an approximation in slow, simultaneous productions
- Talked with mom a bit about differences between participation today vs. last week. Mom clarified that a lot of the information dad gave at the beginning of the intensive was incorrect - in addition to school-based services James has been doing weekly therapy at TMC and completing home practice. Still concerning that his rate of progress has been slow.

REFLECTIONS

- Found the research protocol limiting
    - Prominent phonologic processes
    - Behavioral concerns
    - Opportunities for spontaneous practice of related targets
    - Flexibility to move on from targets the child just couldn’t master

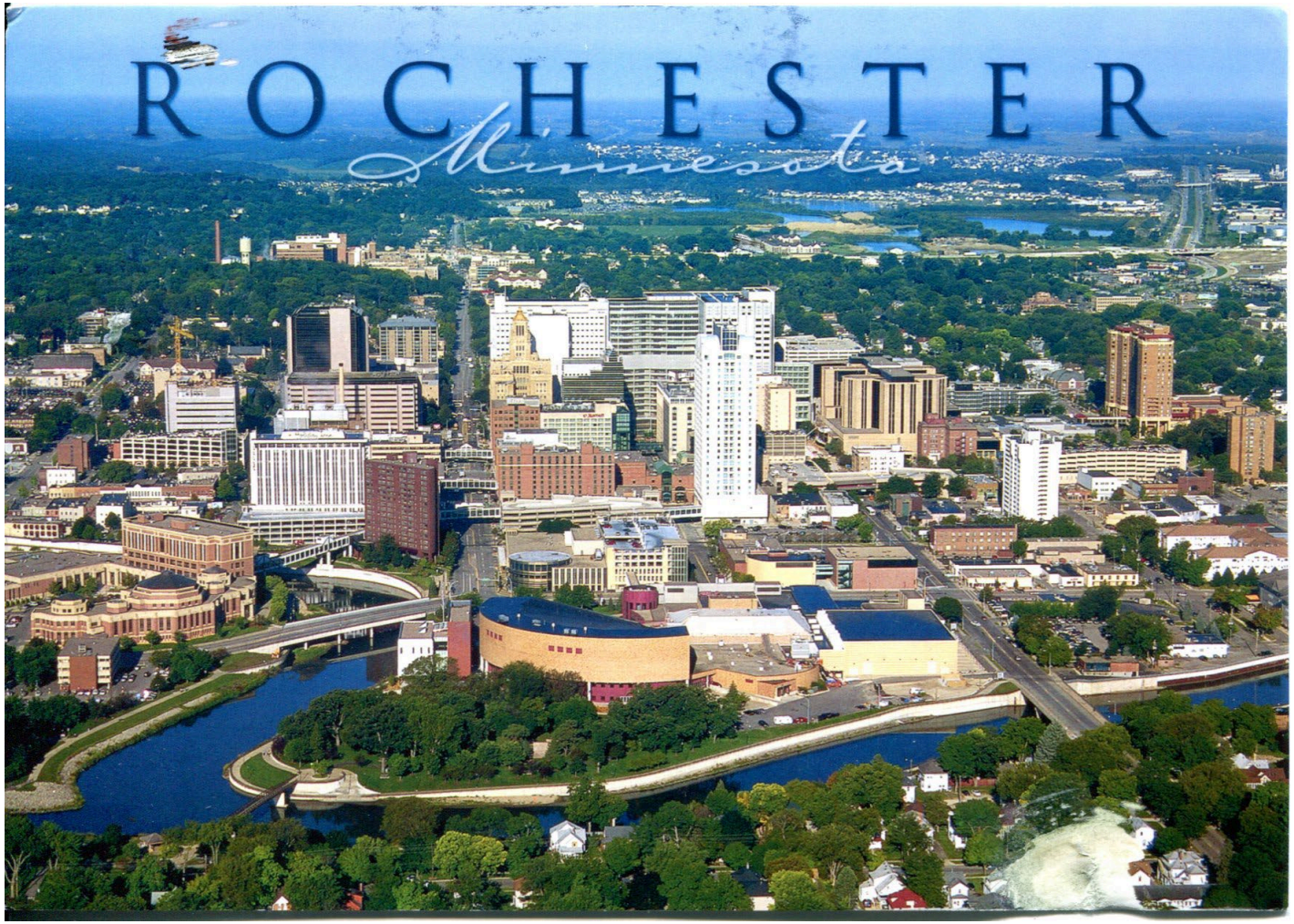
EXPERIMENT 2

- Liberalized inclusion criteria
- Offered 1/x/day for 2 weeks (1-2 blocks)
- Allowed personalization to address child's unique and immediate needs
- Used 5 exemplars, which seemed about right (Hey, that's what Edwin said!)
- Results pending analysis

FINAL THOUGHTS

- Treatment of CAS is often embedded in management of other speech and language impairments
- Clinical judgment needed to identify priorities
  - We don’t need to work on speech if the child has nothing to say
- Collaboration can be powerful
  - School-based language goals with reinforcement of speech goals
  - Center-based speech goals with reinforcement of language goals

INSPIRED?
WANT TO DO THIS FOR A LIVING?



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REFERENCES

- Baas, B. S., Stoeckel, B., Brown, T. M., Strand, E., & Clark, H. M. (2017, November). *Retrospective Review of Treatment in a Large Cohort of Children With Childhood Apraxia of Speech American Speech Language Hearing Association, Los Angeles, CA.*
- Ballard, K. J., Robin, D. A., McCabe, P., & McDonald, J. (2010). A treatment for dysprosody in childhood apraxia of speech. *J Speech Lang Hear Res, 53(5), 1227-1245. https://doi.org/1092-4388_2010_09-0130 [pii]*
- 10.1044/1092-4388(2010/09-0130)
- Ballard, K. J., Wambaugh, J. L., Duffy, J. R., Layfield, C., Maas, E., Mauszycki, S., & McNeil, M. R. (2015). Treatment for Acquired Apraxia of Speech: A Systematic Review of Intervention Research Between 2004 and 2012. *Am J Speech Lang Pathol, 24(2), 316-337. https://doi.org/10.1044/2015_AJSLP-14-0118*
- Maas, E., Gildersleeve-Neumann, C., Jakielski, K., Kovacs, N., Stoeckel, R., Vradelis, H., & Welsh, M. (2019). Bang for Your Buck: A Single-Case Experimental Design Study of Practice Amount and Distribution in Treatment for Childhood Apraxia of Speech. *J Speech Lang Hear Res, 62(9), 3160-3182. https://doi.org/10.1044/2019_JSLHR-S-18-0212*

REFERENCES

- Maas, E., Robin, D. A., Austermann Hula, S. N., Freedman, S. E., Wulf, G., Ballard, K. J., & Schmidt, R. A. (2008). Principles of motor learning in treatment of motor speech disorders. *Am J Speech Lang Pathol, 17(3), 277-298. https://doi.org/17/3/277 [pii]*
- 10.1044/1058-0360(2008/025)
- Miller, H. E., Ballard, K. J., Campbell, J., Smith, M., Plante, A. S., Aytur, S. A., & Robin, D. A. (2021). Improvements in Speech of Children with Apraxia: The Efficacy of Treatment for Establishing Motor Program Organization (TEMPO(SM)). *Dev Neurorehabil, 24(7), 494-509. https://doi.org/10.1080/17518423.2021.1916113*
- Murray, E., McCabe, P., & Ballard, K. J. (2015). A Randomized Controlled Trial for Children With Childhood Apraxia of Speech Comparing Rapid Syllable Transition Treatment and the Nuffield Dyspraxia Programme-Third Edition. *Journal of speech, language, and hearing research : JSLHR, 58(3), 669-686. https://doi.org/https://dx.doi.org/10.1044/2015_JSLHR-S-13-0179*
- Namasivayam, A. K., Cheung, K., Atputhajeyam, B., Petrosov, J., Branham, M., Grover, V., & van Lieshout, P. (2024). Effectiveness of the Kaufman Speech to Language Protocol for Children With Childhood Apraxia of Speech and Comorbidities When Delivered in a Dyadic and Group Format. *Am J Speech Lang Pathol, 33(6), 2904-2920. https://doi.org/10.1044/2024_AJSLP-24-00098*

REFERENCES

- Namasivayam, A. K., Huynh, A., Granata, F., Law, V., & van Lieshout, P. (2021). PROMPT intervention for children with severe speech motor delay: a randomized control trial. *Pediatr Res, 89(3), 613-621. https://doi.org/10.1038/s41390-020-0924-4*
- Namasivayam, A. K., Pukonen, M., Goshulak, D., Granata, F., Le, D. J., Kroll, R., & van Lieshout, P. (2019). Investigating intervention dose frequency for children with speech sound disorders and motor speech involvement. *Int J Lang Commun Disord, 54(4), 673-686. https://doi.org/10.1111/1460-6984.12472*
- Namasivayam, A. K., Pukonen, M., Goshulak, D., Hard, J., Rudzicz, F., Rietveld, T., Maassen, B., Kroll, R., & van Lieshout, P. (2015). Treatment intensity and childhood apraxia of speech. *International Journal of Language & Communication Disorders, 50(4), 529-546.*
- Namasivayam, A. K., Shin, H., Nisenbaum, R., Pukonen, M., & van Lieshout, P. (2024). Predictors of Functional Communication Outcomes in Children With Idiopathic Motor Speech Disorders. *J Speech Lang Hear Res, 67(10S), 4053-4068. https://doi.org/10.1044/2023_JSLHR-23-00070*
- Preston, J. L., Leece, M. C., & Maas, E. (2016). Intensive Treatment with Ultrasound Visual Feedback for Speech Sound Errors in Childhood Apraxia. *Front Hum Neurosci, 10, 440. https://doi.org/10.3389/fnhum.2016.00440*

REFERENCES

- Strand, E. A. (2020). Dynamic Temporal and Tactile Cueing: A Treatment Strategy for Childhood Apraxia of Speech. *Am J Speech Lang Pathol, 29(1), 30-48. https://doi.org/10.1044/2019_AJSLP-19-0005*
- Strand, E. A., Duffy, J. R., Clark, H. M., & Josephs, K. A. (2014). The Apraxia of Speech Rating Scale: a tool for diagnosis and description of apraxia of speech. *J Commun Disord, 51, 43-50. https://doi.org/10.1016/j.jcomdis.2014.06.008*
- Strand, E. A., Stoeckel, R., & Baas, B. (2006). Treatment of severe childhood apraxia of speech: A treatment efficacy study. *Journal of Medical Speech-Language Pathology, 14(4), 297-308.*

