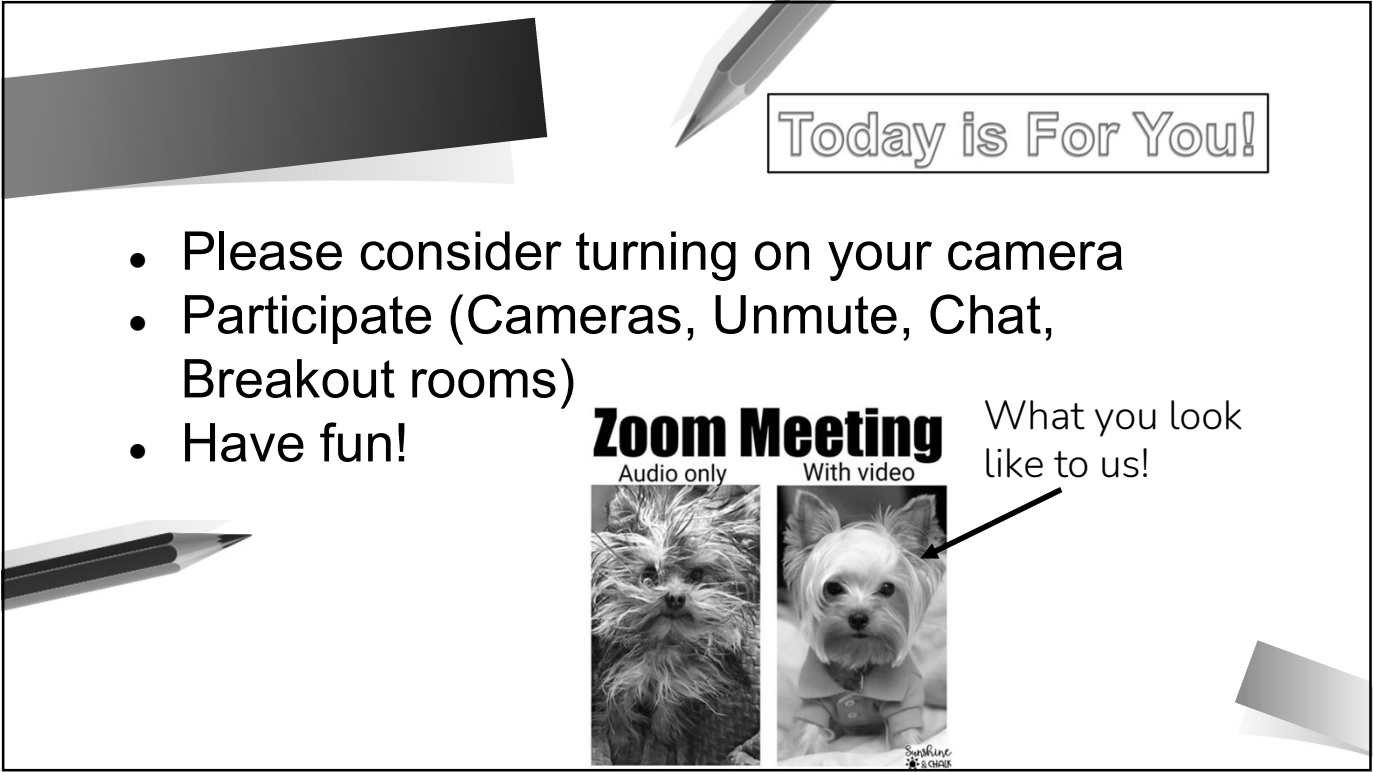




Practical Therapy Techniques for Persistent and Resistant Speech Sound Errors

1



Today is For You!

- Please consider turning on your camera
- Participate (Cameras, Unmute, Chat, Breakout rooms)
- Have fun!

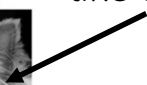
Zoom Meeting

Audio only

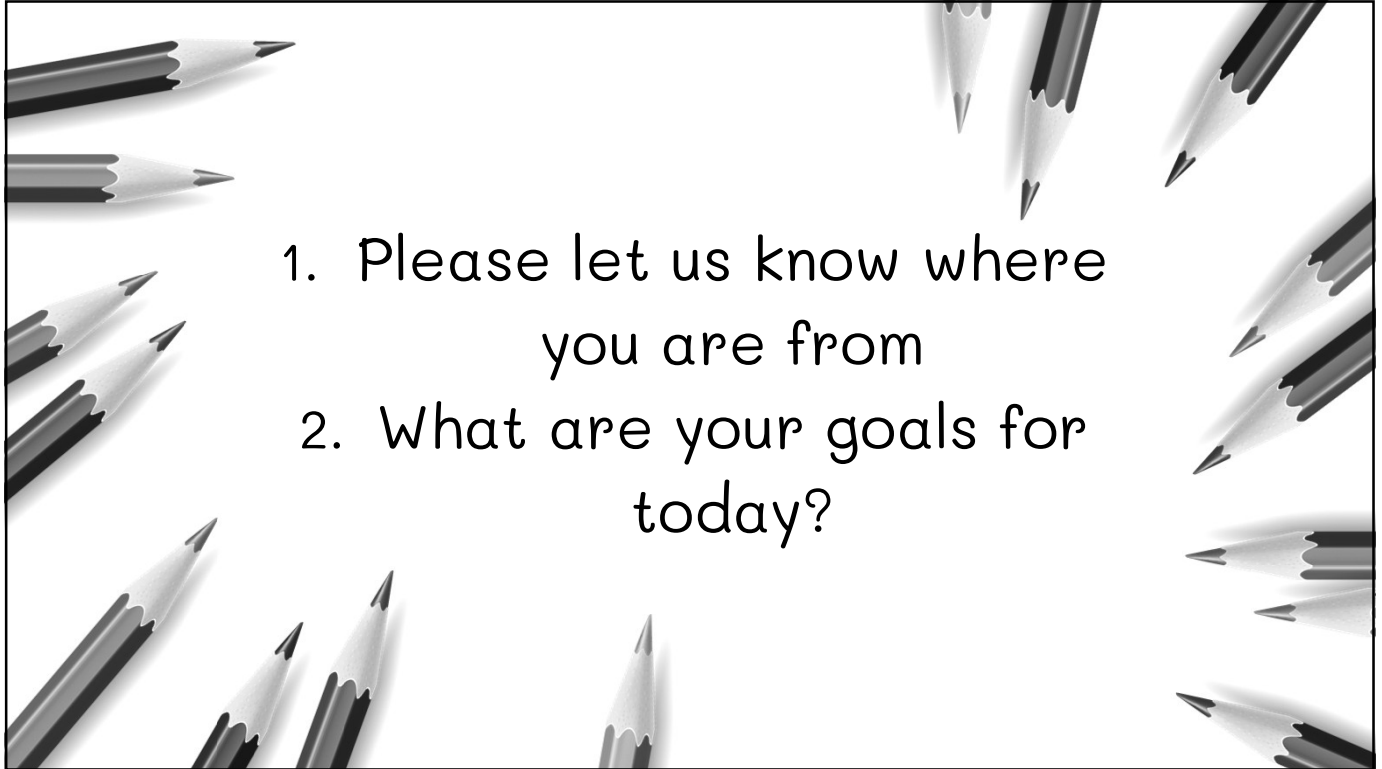
With video



What you look
like to us!

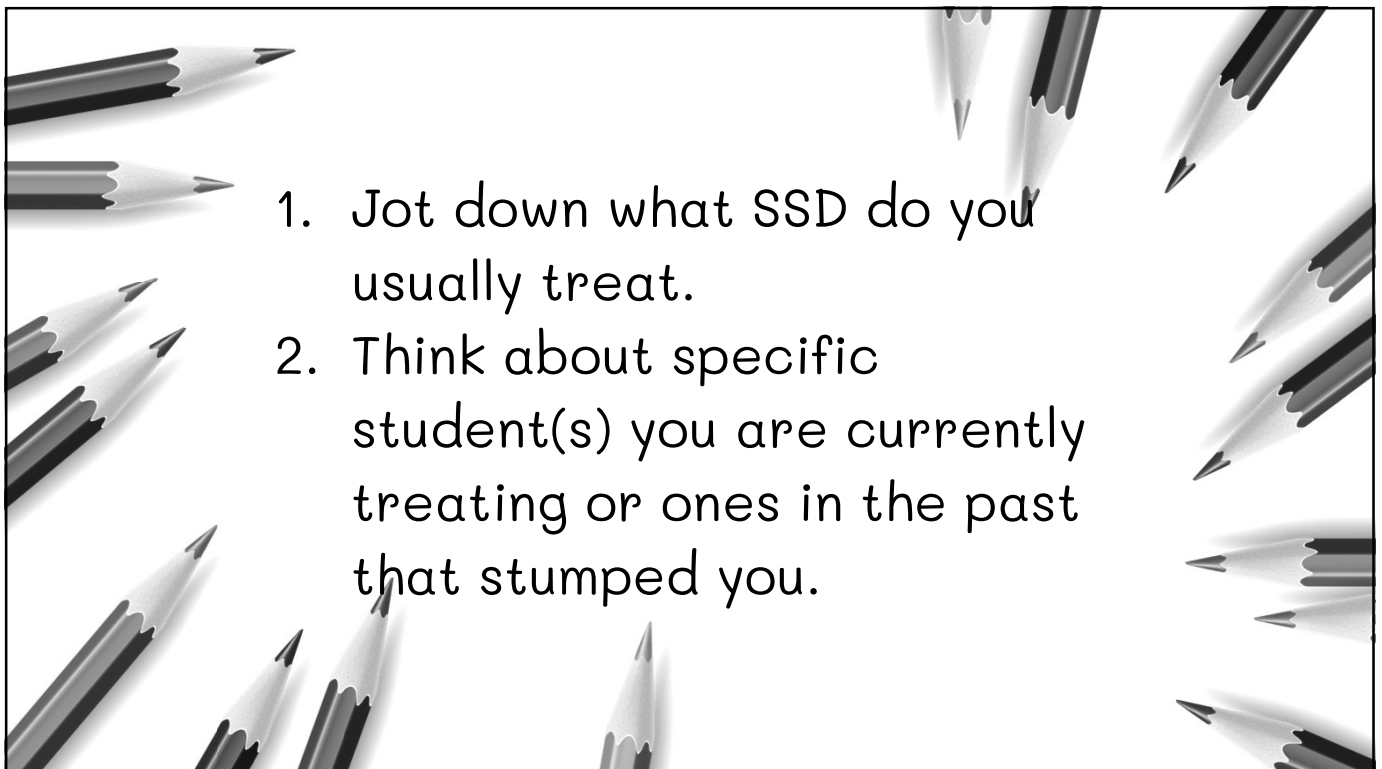


2



1. Please let us know where you are from
2. What are your goals for today?

3



1. Jot down what SSD do you usually treat.
2. Think about specific student(s) you are currently treating or ones in the past that stumped you.

4

Today's Agenda

9:00 Begin (EST)

10:30 Morning Break (announcements and 10 minute break)

12:00 - 1:00 Lunch

~2:10 Afternoon 10 minute break

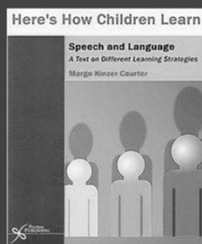
~ 3:30 Seminar finishes

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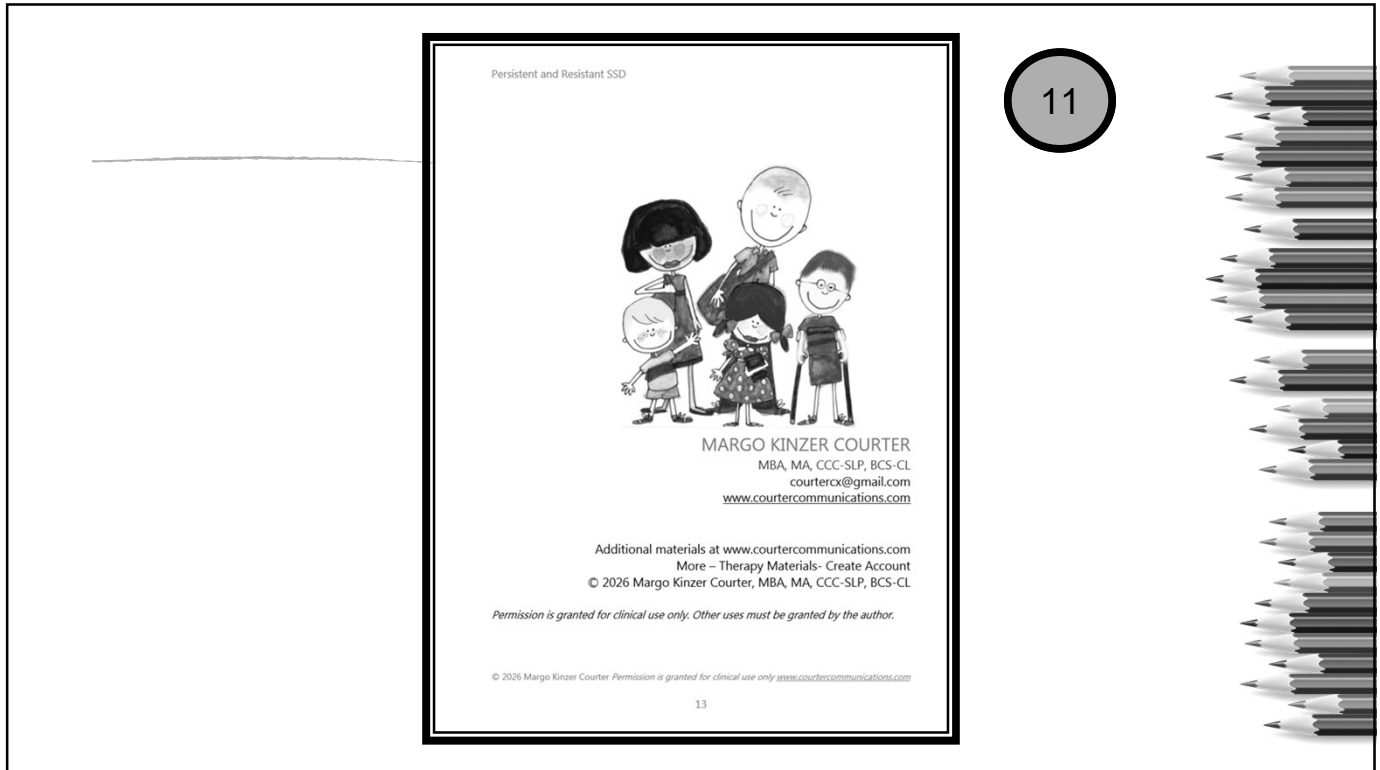
Margo Kinzer Courter, MBA, MA, CCC-SLP, BCS-CL

About your Presenter:

- 35 years experience PreK-12th
- Board Certified Specialist - Child Language and Language Disorders
- Past: National Facilitator for LETRS
- Specialty Areas: Speech and Language Disorders and impact on learning
- Author of :



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Breakout Room: Activity 1

1. In the breakout room, discuss the following
2. Assign a spokesperson to report out to the group.

Discussion:

1. What approach(es) do you use for SSD?
2. Are there particular diagnosis, sounds, processes, etc. that you see that become persistent and resistant?
3. When it is a persistent speech sound disorder, do you do anything differently with your intervention?

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Overview

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- x All of us have stories of students with persistent speech sound disorders
- x Why? (developmental vs. neurological, attention, executive function, etc.)

This workshop will provide several systematic approaches to finally remediate those speech sounds.

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Objectives

SLPs: Practical Therapy Techniques for Persistent and Resistant Speech Sound Errors (Grades PK-12)

NEW Seminar Presented By
Margo Kinzer Courter, MA, CCC-SLP, BCS-CL
Speech-Language Pathologist, Author and National Presenter



Determine the Most Effective Treatment Strategies for Persistent Speech Sound Disorders (PSSD)

Provide Step by Step Approach for Acquisition, Practice, Maintenance, & Generalization

Determine Type of Practice for Quicker Generalization

Discuss the Role of Multisensory Cueing for Faster Maintenance & Generalization

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Ultimate Goals

Discuss how to mitigate SSD, so it doesn't become a PSSD.

Explore characteristics of developmental and neurological speech disorders to determine the best approach for remediation

Determine the best approach for severe phonological and neurological speech disorders for quickest remediation

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Speech Sound Disorders (ASHA)

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Any difficulty or a combination of difficulties with:

- ☐ Perception (ability to perceive the sound correctly),
- ☐ Motor production (ability to motor plan sequence of sounds), or
- ☐ Phonological representation (rules and patterns) of speech sounds and speech segments (i.e.: VC/CV/CVC),
 - ☐ including phonotactic rules governing permissible speech sound sequences in a language

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Speech Sound Disorders can be

- x Functional/developmental (no known cause) such as articulation (motor) and phonological processing (linguistic)
- x Organic (developmental or acquired)
 - Neurological such as childhood apraxia of speech (CAS) (motor planning) and dysarthria (muscle weakness)
 - Structural such as cleft palate
 - Sensory/Perceptual such as with hearing impairment

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4 Categories

Speech Sound Errors (Articulation)

Omissions: Doesn't produce a sound in a word (ub for tub)

Substitutions: A very common speech sound error is the substitution (tun for sun)'

Distortions: Distortions are when a child uses a non-typical sound for a typically developing sound (i.e.: lateral and frontal /s/ and /z/)



Phonological Process

Substitutions

- Backing (/k/ and /g/ for /t/ and /d/)
- Fronting (/t/ and /d/ for /k/ and /g/)
- Gliding (/r/ or /l/ becomes a /w/ or /l/ becomes a /y/ sound)
- Stopping (fricatives and affricates are produced with a stopped consonant like /p/, /b/, /t/, /d/)

Assimilation

- Assimilation (bub for bus)
- Denasalization (dap for map)
- Final Consonant Devoicing (bat for bad)
- Prevocalic Voicing (gat for cat)

Syllable Structure

- Cluster Reduction (/n/ for /sn/, /b/ for /bl/, etc.)
- Final Consonant Deletion (do for dog)
- Initial Consonant Deletion (og for dog)
- Weak Syllable Deletion (nana for banana)

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4 Categories

★ Childhood Apraxia of Speech	Dysarthria
Limited repertoire of vowels	Slurred or distorted speech production
Variability of errors	Imprecise articulation
Idiosyncratic patterns	Uneven speech rhythm
Errors increase in longer words or utterances	Difficulty with pitch or loudness control
Voicing errors	
Prosody errors	

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Comparison of Speech Disorders

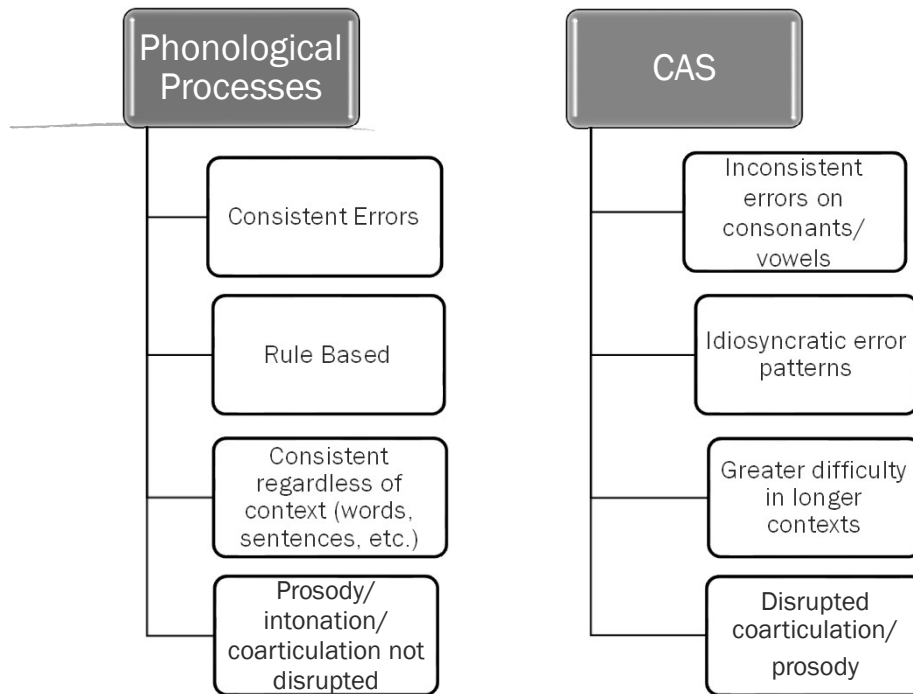
Characteristics	Neurological		Developmental	
	★ CAS	Dysarthria	★ Phonology Disorder	Articulation
Inconsistent errors on consonants (repeated production)	✓			
Inconsistent errors on vowels (repeated production)	✓			
Decreased vowel production	✓			
Disrupted coarticulation transitions between sounds and words	✓			

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Prevalence

1. In 8-year-old children, 3.6% were estimated to have persistent SSDs (Wren et al., 2016).
2. Persistent and residual speech sound errors are estimated in 1-2% of all children (Culton (1986)
3. In young adults, 1%–2% exhibit residual or persistent speech errors (Flipsen, 2015).

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Prevalence

4. Reports estimated that SSDs are more prevalent in boys than in girls, with a ratio of about 2:1 in grade school children (McKinnon et al., 2007). There were no indications whether the data collected were based on sex assigned at birth and/or gender identity.

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Persistent Speech Sound Disorders

Persistent Speech Sound Disorder (PSD) is a speech sound disorder that cannot be easily remediated and resistant to traditional speech therapy methods that continue beyond the typical age of acquisition, often lasting into adolescence or adulthood.

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Persistent Speech Sound Disorders

1. PSD may be due of a
 - a. history of speech delays
 - b. history of normal speech sound development but failure to achieve accurate production of one or two particular speech sounds, or history of motor speech impairment (e.g., Shriberg et al., 2010, 2017) and
 - c. may have accompanying deficits in motor, language, and literacy skills (Cabbage, et al., 2016; Wren et al., 2016).

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Persistent Speech Sound Disorders

2. Children with PSD demonstrate linguistic, literacy, and social deficits and have higher rates of LI than those children with resolved SSD (Bishop et al., 2003; Lewis et al., 2015, 2016)

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Persistent Speech Sound Disorders

3. Early childhood factors that are associated with PSD include little or no babbling, unintelligible speech, limited morphology at 38 months, low cognition, neurobiological conditions (e.g., hearing loss, intellectual disability, cerebral palsy), and a history of coordination problems and poor motor skills and males

(Bishop, 2002; Campbell et al., 2003; Eadie et al., 2015; Lewis et al., 2011; Wren et al., 2016; Wren, Roulstone & Miller, 2012).

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Persistent Speech Sound Disorders

4. Children with PSSD at 7 years did NOT find SES, IQ, family history, language, or gender to be predictive of PSD; rather,

children with disordered speech (not delay) at 4 years were more likely to have PSD at 7 years than children with delayed speech (Morgan et al., 2017).

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Key Aspects

- x Variability (residual sounds, multisyllabic words, neurological)
- x Etiology (known and unknown)
- x Associated Difficulties (phonemic awareness, language, learning, attention, motor)
- x Long Term Impact (motor, language, learning)

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Persistent Speech Sound Disorders and Attention

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1. Children with moderate-severe SSD had
 - a. higher ratings on the inattention and hyperactive/impulsivity scales as rated by their parents than children with no SSD.

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Persistent Speech Sound Disorders and Attention

2. Listening to speech when our attention is divided across multiple tasks is typically referred to as listening under cognitive load. It can also affect the processing of acoustic cues to speech sound categories ([Chiu et al., 2020](#); [Feng et al., 2021](#); [Mattys & Wiget, 2011](#)).

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Persistent Speech Sound Disorders and Attention

4. Norrelgen et al. (1999) found participants with ADHD exhibited speech discrimination difficulties as compared to neurotypicals only when exposed to two- to five-syllable nonword pairs, a pattern attributed to higher sensitivity to working memory load, but not in a discrimination task with monosyllables.

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Overall Guidelines

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- x Developmental Norms
- x Impact
- x Implications for Treatment Timing

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Keep in Mind

**IT'S NOT ABOUT LEARNING THE SOUND YOU TARGET.
IT'S ABOUT TRANSFORMING THE WHOLE SOUND
SYSTEM**

Dr. Holly Storkel

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Developmental Norms

McLeod and Crowe (2018/2020) reviewed 60 articles describing 64 studies of consonant acquisition. This included 26,007 children from 31 countries in 27 languages. In all 27 languages, most consonants were acquired by 5:0 with at least 93% of consonants produced correctly. The following chart provides English consonant acquisition across the world (Australia, Republic of Ireland, Malaysia, South Africa, United Kingdom, and the United States) with correct production (https://pubs.asha.org/doi/10.1044/2018_AJSLP-17-0100)

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6 years th voiceless

5 years th voiced, zh, r

4 years v, s, z, sh, ch, j, l

3 years b, t, d, k, g, m, n, ng, f, h, y, w

2 years p

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Previous Norms

Many SLPs used Sanders norms from 1972 which was actually based on research from Wellman et al. (1931) and Templin (1957) which described “customary” versus “mastery” production of English consonants based on research, Sander defined customary production as “that point when a child is producing a sound correctly more often than [s]he is misarticulating or omitting it” (p. 56). This also included /r/ in place for 90% of children by age 6.

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6 years t, l, r, ng

4 years b, d, k, g, y (yes), f

3 years p, m, n, h, w

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Impact

- x Even mild SSD may reduce communication opportunities
- x Teacher's expectations (academic, social, and behavioral)
- x Listener's negative reaction
- x Communication Disorders:
 - Lower skills jobs
 - More likely to be unemployed (up to 43%)
 - 44% for speech disorders that impact intelligibility are in the lowest income strata

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Implications for Timing

1. Social isolation & teacher perception and expectations
2. Children as young as 4-5 demonstrated success acquiring later developing sounds (Krueger & Storkel, 2023)

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Implications for Timing

3. Regarding phonological disorders, there is a period of
- x accelerated change from 4 to 6 years old,
 - x followed by a plateau from 6 to 7 years old.
 - x period of accelerated change from 7 to 8.5 years old,
 - x final stable plateau beginning at 8.5 years old

(Shriberg, Gruber, and Kwiatkowski, 1994)

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Implications for Timing

5. Children with persistent speech errors achieved lower educational attainment throughout adolescence based on standardized educational assessments when controlling for IQ (Wren et al., 2021).

- One reason for these poor outcomes is that phonological awareness skills is often impacted in children with SSD which leads to difficulty with literacy acquisition (Hesketh, 2004).
- At older ages are learning how to read and having difficulty with even one speech sound can impact their spelling and decoding abilities (Farquharson, 2019).

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Link of SSD to Language & Literacy

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- x Phonological/phonemic awareness, phonological memory, spelling, word reading
- x Lower morphological awareness
 - Which is a unique predictor of spelling abilities

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Place and Manner of Articulation

Place and Manner (including vowels) can support treatment decisions.

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	Manner of Articulation	Place of Articulation						
		Bilabial	Labio-dental	Dental	Alveolar	Palatal	Velar	Glottal
Obstruents (consonants produced with obstruction or turbulence)	Stop							
	Voice	p			t		k	
	Voiceless	b			d		g	
	Fricative		f	θ	s	ʃ		h
	Voice							
	Voiceless		v	ð	z	ʒ		
	Affricate					tʃ		
	Voice							
Sonorants (relatively free & continuous airflow)	Nasal							
	Voiced	m			n		ŋ	
	Liquid				l	r		
	Voiced							
	Glide	w				j (y)		
	Voiced							

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Considerations

1. Continuants may be easier to perceive as correct or incorrect
2. ? Is the student having difficulty with a specific manner or place of articulation?

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Considerations

3. Contrastive Therapy

Minimal pairs for discrimination – consider place, manner, and voicing changes

Minimal opposition: 2 of the three may be the same (ring/wing, cape/tape manner and voicing are the same, place is different)

Maximal opposition: all three are different

(chain/main (i.e.: compare obstruent /f/ with sonorant /l/)

Example on next slide

Manner of Articulation	Place of Articulation						
	Bilabial	Labio-dental	Dental	Alveolar	Palatal	Velar	Glottal
Obstruents (consonants produced with obstruction or turbulence)	Stop Voiceless	p		t		k	
	Stop Voiced	b		d		g	
	Fricative Voiceless	f	θ	s	ʃ		h
	Fricative Voiced	v	ð	z	ʒ		
	Affricate Voiceless				tʃ		
	Affricate Voiced				dʒ		
Sonorants (consonants produced relatively free & continuous airflow)	Nasal Voiced	m		n		ŋ	
	Liquid Voiced			l	r		
	Glide Voiced	w			j (y)		

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Manner of Articulation	Place of Articulation						
	Bilabial	Labio-dental	Dental	Alveolar	Palatal	Velar	Glottal
Obstruents (consonants produced with obstruction or turbulence)	Stop Voiceless	p		t		k	
	Stop Voiced	b		d		g	
	Fricative Voiceless	f	θ	s	ʃ		h
	Fricative Voiced	v	ð	z	ʒ		
	Affricate Voiceless				tʃ		
	Affricate Voiced				dʒ		
Sonorants (consonants produced relatively free & continuous airflow)	Nasal Voiced	m		n		ŋ	
	Liquid Voiced			l	r		
	Glide Voiced	w			j (y)		

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Vowels

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Smile

Schwa

Round

/i/ (see)

/ɪ/ (bit)

/ɛ/ (bed)

/eɪ/ (say)

/æ/ (sat)

/ʌ/ (cut)

/ə/ (about)

/u:/ moon

/ʊ / (book)

/əʊ/ (go)

Diphthongs

/aɪ/ (bike)

/ɔɪ/ (boy)

/aʊ/ (cow)

High Front

Mid Front

Low Front

Mid Central

Open

/ɑ/ (cot)

Low Central

/ɔ:/ (raw)

Low Back

High Back

Mid Back

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Intelligibility to Unfamiliar Listener

Single Words	Multiword
50% by 2;7 (31 months)	50% by 2;10 (34 months)
75% by 4;1 (49 months)	75% by 3;10 (46 months)
90% by 6;11 (83 months)	90% by 5;2 (62 months)

Hustad et al. (2021)

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Screenings

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- x All preschool and kindergarten should have speech, language, and hearing screening
- x Kindergarten through 2nd grade
 - If new to the district
 - Teacher referral
- x Dynamic assessment
 - x Without cueing
 - x Different cues with two occurrences for sounds in error

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Screenings

- x Imitates
 - Isolation
 - Multiple word positions
 - Multiple vowels
 - Multisyllabic

Consider: place and manner of articulation

- x Stimulability
 - Can produce the target in 3 or more attempts correctly
- x Nonstimulable
 - Less than 3
 - Multiple vowels
 - Multisyllabic

Phonemes that are stimulable are more likely to develop

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Possible Screeners

- x Fluharty
- x Speech and Language Screener Quick Take Along (SuperDuper, \$19.95)
- x Little Bee Speech

<https://drive.google.com/file/d/1UQ8AL55W5sTJlc12leOWUw7Y2nBSfFa/view?usp=sharing> (screen and PA)

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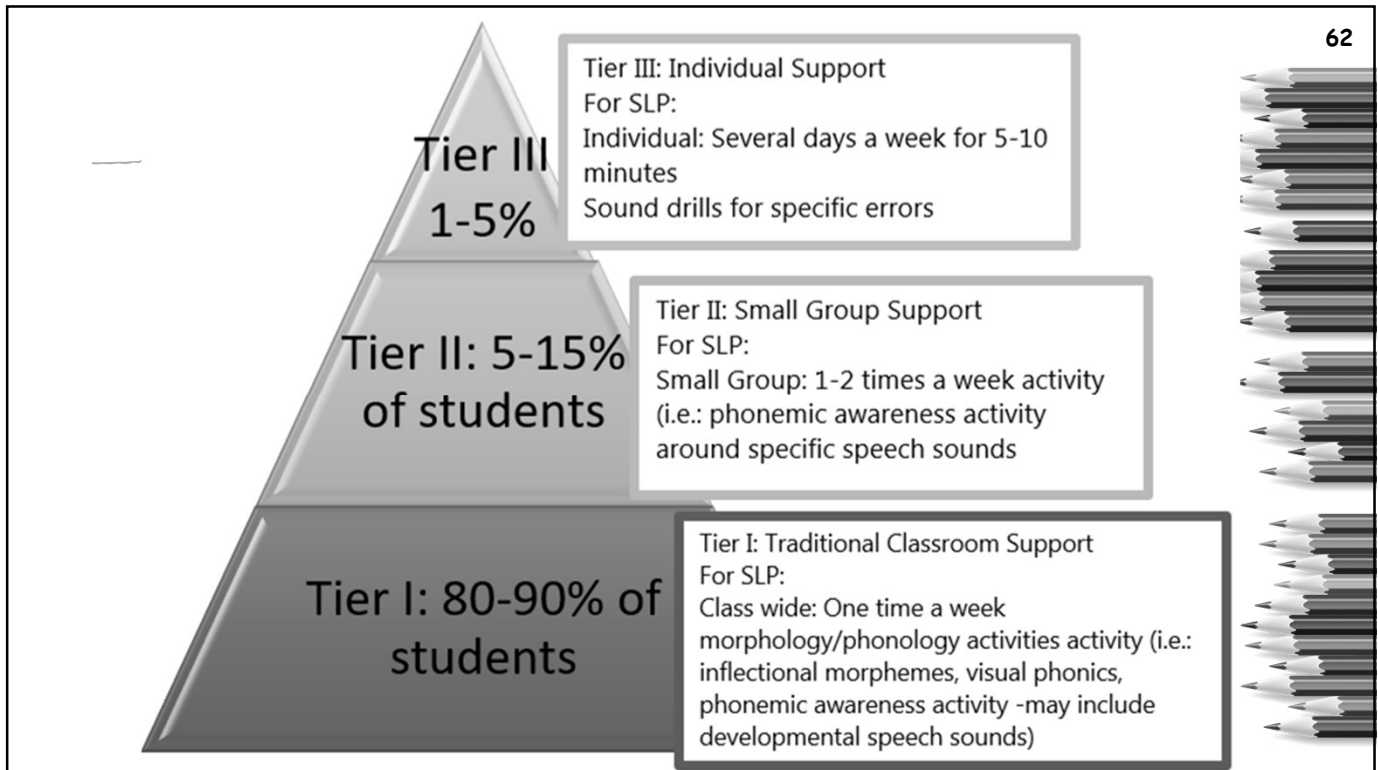
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RTI/MTSS

- x Before referral for special education to determine if referral is warranted
- x Cannot be used to delay or deny evaluation for special education services

Ultimate Goal: Remediate speech sound delays or phonological processes without adding to your caseload!

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Tier I: General Education/Large Group

- x PreK, K, 1: Whole class morphology/phonology lesson one time per week by collaboration SLP/teacher

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Tier I: Phonemic Awareness

Kirk and Gillon (2007) provided an integrated speech, phonemic awareness, and letter knowledge intervention approach to children with SSD. They found that *children who received an intervention that facilitated phonemic awareness and letter knowledge in addition to speech sound production outperformed children who received an intervention for speech sound production alone*

(Program that we will discuss: Integrated Phonological Intervention Program)

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Tier I: Phonemic Awareness

- x Developmental Activity (Moats/Tolman) (Include developmental speech sounds for that age group in phonological/phonemic and morphological awareness activities)
- x Great site for activities: <https://fcrr.org/student-center-activities>

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Order of Acquisition: Phonological Awareness

Age	Skill	Activities
4 years	Rote imitation of rhymes and alliteration	https://sooperbooks.com/rhymes/
5 years	Rhyme recognition (which word does not belong)	https://fcrr.org/sites/g/files/upcbnu2836/files/media/PDFs/student_center_activities/vpk_phonological_awareness/PA1_cards_color.pdf
	Recognize phonemic change in a word (Brown Pear, Brown Pear, What do you see?)	
	Clap out syllables (Target 2 and 3 syllables then move to 1)	https://fcrr.org/sites/g/files/upcbnu2836/files/media/PDFs/student_center_activities/vpk_phonological_awareness/PA7_cards_color.pdf
5 ½ years	Can separate a word into its phonemes (segmenting sounds in a word)	https://fcrr.org/sites/g/files/upcbnu2836/files/media/PDFs/student_center_activities/k1_phonological_awareness/k1_phoneme_segmenting/k1_pa040_say_and_slide_phonemes.pdf
	Blend onset and rhyme (c at = cat)	https://fcrr.org/sites/g/files/upcbnu2836/files/media/PDFs/student_center_activities/vpk_phonological_awareness/PA24_cards_color.pdf

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Order of Acquisition: Phonological Awareness

	Tell the first sound in a word	https://fcrr.org/sites/g/files/upcbnu2836/files/media/PDFs/student_center_activities/k1_phonological_awareness/k1_phoneme_matching/k1_pa025_one_card_out.pdf
6 years	Can delete (manipulate) part of a compound word or a syllable from a two syllable word	https://fcrr.org/sites/g/files/upcbnu2836/files/media/PDFs/student_center_activities/vpk_phonological_awareness/PA14_cards_color.pdf
	Blends 2 or 3 phonemes	
	Segment two or three phonemes in a word	https://fcrr.org/sites/g/files/upcbnu2836/files/media/PDFs/student_center_activities/23_phoneme_segmenting/23_pa014_phoneme_counting_sort.pdf
6 ½ years	Segment three or four phonemes in a word	https://fcrr.org/sites/g/files/upcbnu2836/files/media/PDFs/student_center_activities/23_phoneme_segmenting_and_blending/23_pa017_phoneme_split_and_say.pdf
	Manipulate (substitute) a sound in a simple word to form a new word (Change the l in lip to /s/)	https://fcrr.org/sites/g/files/upcbnu2836/files/media/PDFs/student_center_activities/23_phoneme_manipulating/23_pa025_sound_changes.pdf
7 years	Delete sounds in the initial and final position (not including blends)	
8 years	Delete initial sounds including blends	
9 years	Sound deletion for medial and final sounds	

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Visual Phonics

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https://drive.google.com/file/d/1hAG4rDimqa_KdpLqhk9t8RQLaQa-hV_j/view?usp=sharing (!C)

https://drive.google.com/file/d/1OLQw2HX9XHAnWni6u8M6soYNhIQhn_qv/view?usp=sharing



Add files to Chat: visual phonics posters

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Morphological Awareness

Preschool children who demonstrate deficits in morphology and speech demonstrated better **morphosyntactic competence** when it was targeted before speech sound errors (Tyler, Lewis, Haskill, 2002).

Food for Thought:

- x Fronting: difficulty producing -ing
- x Backing: difficulty producing /t/, /d/, /ed/ for past tense
- x Cluster reduction: plural and possessive /s/ that follows another consonant (cats, dogs, dog's, cat's), superlative -est

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Brown's MLU

https://fcorr.org/sites/g/files/upcbnu2836/files/media/PDFs/student_center_activities/k1_phonics/k1_morpheme_structures/k1_p058_in_flection_toss.pdf

Inflectional Morpheme	Age of Acquisition	Example	Common Core State Standards
Present progressive (-ing)	27-30 months	Baby crying .	1 st grade
Plural regular (-s)	27-30 months	I want cars s .	Kindergarten
Possessive ('s)	31-34 months	Sam' s ball.	1 st grade
Past regular (-ed)	35-40 months	She walked ed home.	Kindergarten-1st
Third person regular (-s)	35-40months	Malcolm plays.	1 st grade
Past participle (-en) (uncontractible and contractible aux. verbs)	41-46 months	She has spoken. It is written.	2 nd grade (irregular past tense)

Inflectional Morpheme	Grade Level Standard
Comparative (-er) and Superlative (-est)	3 rd grade

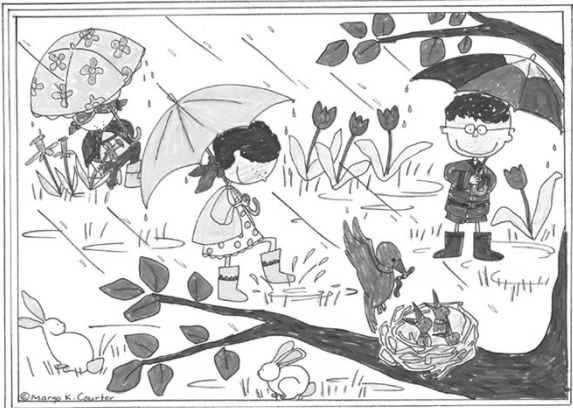
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Activity



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Activity



- **Today:** She is splashing in the puddle.
- **Today:** She splashes in the puddle.
- **Yesterday:** She splashed in the puddle.
- **Tomorrow:** She will be splashing in the puddle.
- **Possessive:** It is the girl's umbrella.
- **-er and -est:** The mommy bird is bigger than the baby birds.
- (Discuss plants).

The grass is bigger than the flowers.

The tree is the biggest plant in the picture.

- **-en:** One baby bird is hidden

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RTI/MTSS II: Small Group Instruction

x Students would move to small group instruction (especially preschool and kindergarten) when they demonstrate speech sound disorders and /or language delays that have not shown progress in Tier I.

x Continue to incorporate phonological/phonemic awareness activities (i.e.: Integrated Phonological Intervention Program)

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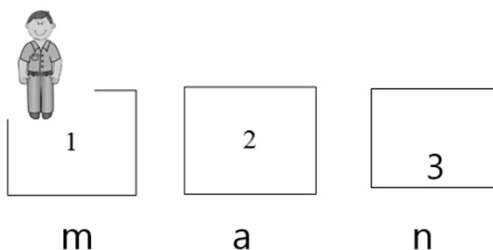
Tier II: SSD/Phonological Awareness

- x Include the speech sounds or phonological processes to adapt each activity. Use the following activities to target speech sound disorders in order to provide the support for students for literacy development.
- x Begin with VC, CV, VCV, or CVC first. For medial sounds, start with simple VCVC or CVCV words. Once the student can discriminate and segment these, move to CCVC or CVCC. Then move to 2 syllable words

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Perceiving Phonemes



Minimal Pairs for SSD

Articulation

Phonological Processing

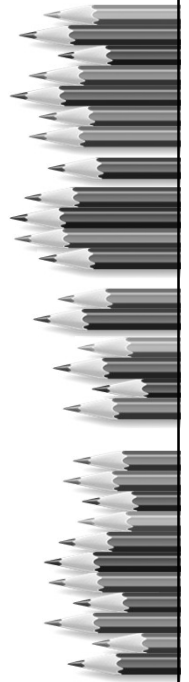
/s/ /z/		Fronting/backing
face/phase	peace/peas	bug/bud/but/buck
race/raise	once/ones	mug/mud/mutt, muck
bus/buzz	dose/does	knot/knock/nod
fuss/fuzz	foes/toes	tap/cap/gap
ice/eyes	base/bays	key/tea/
place/plays		

<https://drive.google.com/file/d/1kodXLyNHuBGiHhj8XZqQ5fvWNAPZfZTi/view?usp=sharing> (dino)

76

77

Slide and Say



77

Tier II: Link SSD to Morphology



write (wrote, written, writing, writes)
ride (rides, riding, ridden, rode)
roam (roams, roaming, roamed)
rip (rips, ripped, ripping)
run (runs, ran, running)

redo (redoes, redoing, redid)
rain (rainier, rainiest, rains, raining, rained)
raincoat (raincoats, raincoat's)
robin (robins, robin's)

Inflectional Targets

Today: She is writing about the rain.

Today: She writes about the rain.

Yesterday: She wrote about the fun in the rain.

Tomorrow: She will write about the fun she had.

Possessive: She writes about the rain's puddles.

-er and -est: It is a rainier day than yesterday. It is the rainiest day of the year.

-en: She has written about her day in the rain.

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/s/ and /z/		Phonological process stopping
birds	skips	(see /s/ and /z/ list
grass	skipped	four leaves (how many did i color)
boots	sleeping	five _____
coats	sleeps	flowers
rabbits	sleepier	the bird's worm
girls	sleepiest	the bird's next
girl's	slips	the boy's boots
sing	slipping	the girls' coats
singing	slips	this flower
sways	slide	them
swaying	slides	then
leaves	sliding	those
trees		thick
glasses		thin
flies		hot
flying		hotter
nest		hottest
splashes		the girl's chin (cheek, chapped)
splashing		jump
flowers		jumps
		jumping

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RTI/MTSS Tier III: 1-2 Students Speech Only					80
From 5 Minute Kids (Sexton & Seth)	Speech Program	Total number of months in therapy	Minutes per month based on average sessions	Total number of minutes in therapy	Equivalent number of hours in therapy
	Traditional Therapy :	18	210	3780	63
	5-Minute Program :	9.6	45	432	7
	Differences Between Programs	8.4 months	165 minutes	3348 minutes	56 hours

80

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Assessment

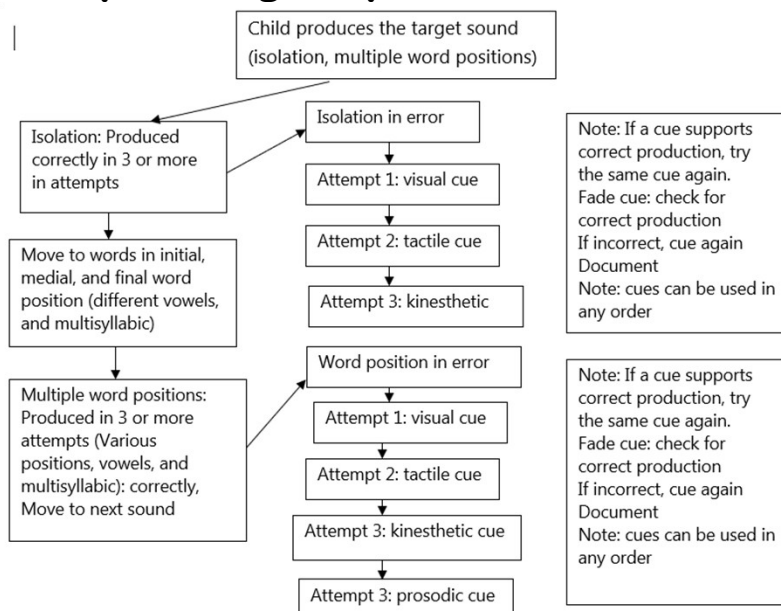
Any assessment instrument (formal or informal) should be conducted as a dynamic assessment.

Any assessment instrument (formal or informal) should be conducted as a dynamic assessment. According to Rvachew, et al (2004), if a child is stimulable for the phoneme sound, they are more likely to develop the sound without intervention. Phonemes that are not stimulable are less likely to be acquired without intervention.

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Stimulability through Dynamic Assessment



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Breakout Activity 2

Discuss the following.

Please assign a spokesperson

1. Are you currently involved in RTI/MTSS?
2. If yes, what is your involvement?
3. If no, what could you do to target SSD before adding to your caseload to attempt to remediate developmental speech sounds/phonological processes?

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Explicit, Systematic, Sequential Intervention

- x Explicit – Clearly defined, whatever is being targeted is clearly defined before targeting and students are informed what they are going to learn.
- x Systematic– Preestablished routines that presents any element and the relationship to the whole (I Do, We Do, You Do)
- x Sequential and Cumulative – Preplanned activities that build new skills on previously targeted and mastered skills
- x Diagnostic – Gathering data, reviewing that data, using this data to drive what the student needs to target

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Explicit	Explain to the student what you are working on and why	cognitive–linguistic approaches seek to address how the child is thinking (cognitive) about how sounds in words affect meaning (linguistic)
Prepractice	Student judges production as correct or incorrect Perceives the difference between minimal pairs	• May start with CV/VC • Begin with continuant sounds to support understanding of concept (even if not the targeted sounds or processes) • Use Multisensory cues • Feedback: Phone Video, App: VowelViz/VowelViz Pro

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Practice Approaches: * Complexity Approach * IPIP * SMC *Based on Motor Learning	I DO:	Therapist demonstrates with several trials	• Explains • Uses multisensory cues
	We Do:	Practice together with feedback	• Motor Planning: May start with CV/VC/CVC • Phonological Processes (Complexity Approach) Start with most complex patterns (3 Cluster – if student has the 2nd and 3rd sound. 2 Clusters if not – start with /fl/ or /sl/. Once student is 80% at 2 Clusters, move to 3.
	YOU DO	Student practices with feedback and cueing as needed	Cueing fades as student is more successful
Assessment	Therapist is constantly assessing how the student is doing, what is working and not working.		Ongoing assessment/progress monitoring.

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If More Than One Persistent Error: Where to Start

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- x Determine frequency of occurrence in English
- x Target more frequently occurring to improve intelligibility
- x Consider influence of vowels

Note: If still only a couple of errors or processes, a traditional therapy approach (Minimal pairs, cycles approach may be appropriate. If multiple sound errors or processes, move to one of the approaches that we will discuss.)

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Consonant Rank

6 years th voiceless

5 years th voiced, zh, r

4 years v, s, z, sh, ch, j, l

3 years b, t, d, k, g, m, n, ng, f, h, y, w

2 years p

Rank	Phoneme	%
1.	n	11.49
2.	t	9.88
3.	s	7.88
4.	r	6.61
5.	l	6.21
6.	d	5.70
7.	ð	5.37
8.	k	5.30
9.	m	5.11
10.	w	4.74
11.	z	4.70

Rank	Phoneme	%
12.	b	3.24
13.	p	3.07
14.	v	2.97
15.	f	2.65
16.	h	2.23
17.	g	2.02
18.	j /y/	1.87
19.	ŋ	1.85
20.	r (alveolar tap - butter)	1.76
21.	θ	1.19

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Vowel Rank

Rank	Phoneme	%
1.	ə (schwa)	19.15
2.	ɪ (short i)	13.51
3.	i (long e)	9.68
4.	ɛ (short e)	8.41
5.	aɪ (long i)	7.79
6.	æ (short a)	5.91
7.	o (long o)	4.85
8.	e (long a)	4.13

Rank	Phoneme	%
9.	ʌ (short u)	3.84
10.	ɑ (spa)	3.75
11.	u: (oo) spoon	2.97
12.	ɔ /au/ caught	2.01
13.	ʊ (book)	1.99
14.	au /ow/	1.69
15.	ɔɪ /oi/	

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/R/ Rank

Rank	Phoneme	%
1.	ə (unstressed er) (father)	79.61
2.	ɜ (stressed er) (sir)	19.04
3.	r (alveolar tap -butter)	1.76
	ɛr (hair)	
	ɑr (car)	
	ɔr (more)	

91

45

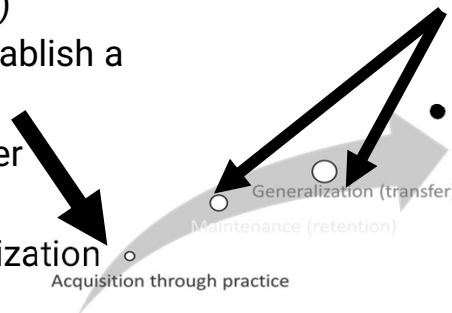
Practice Distribution

Massed Practice

- Practice of a certain amount of trials in a short period of time (fewer sessions/week)
- Effective to establish a motor plan
- Leads to quicker acquisition
- Slower generalization

Distributed Practice

- Practice is divided over time
- Spreading practice out over a longer period of time
- Works better for maintenance and generalization



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Distributive Practice: Therapy Intensity

- Higher number of sessions and practice trials per session results in the greatest gains within one block of treatment.
 - Minimum intensity two sessions a week (Namasivayam, Pukonen, Goshulak, et al., 2015; Thomas, McCabe, & Ballard, 2014)
 - most articles employing sessions 3–5 times a week and 100 production trials per session (Edeal & Gildersleeve-Neumann, 2011; Murray et al., 2015). [Murray, E., and Iuzzini-Seigel, J. (2017).

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Blocked vs Random Practice

Blocked:

- 8-10 stimuli is presented in a block (e.g. you have 10 target words total and you practice target 1 10x, then move on to target 2 and practice 10x, target 3, etc).
- When establishing the motor plan, begin with a more blocked practice for acquisition (Shea et al., 2001) then move to random as movement accuracy improves.

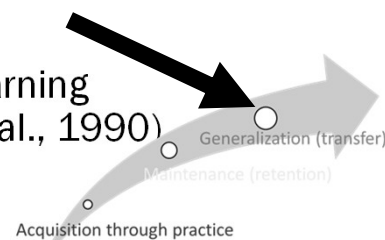


94

Random:

8-10 stimuli is practiced in random order (e.g. you have those same 8-10 target words, however the words are practiced in an unpredictable random order, alternate between words, phrases, sentences, structured tasks, intonation, etc).

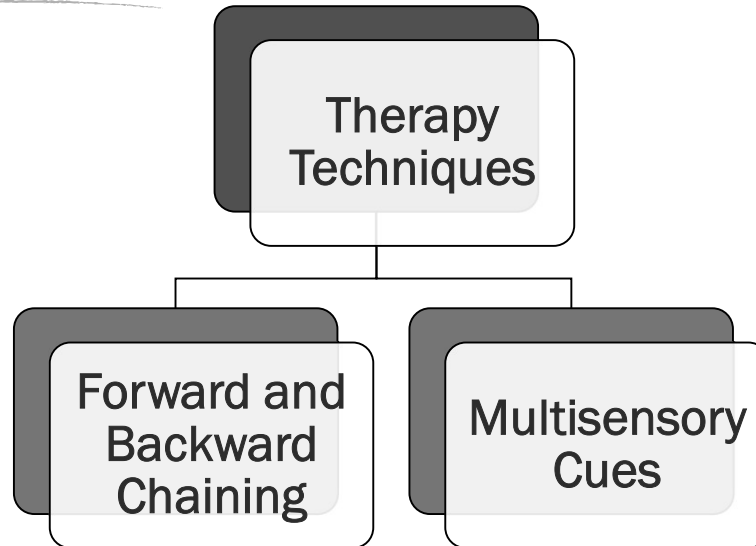
Random practice leads to better motor learning maintenance and generalization (Shea et al., 1990)



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Introduction to Therapy Techniques



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Forward Chaining

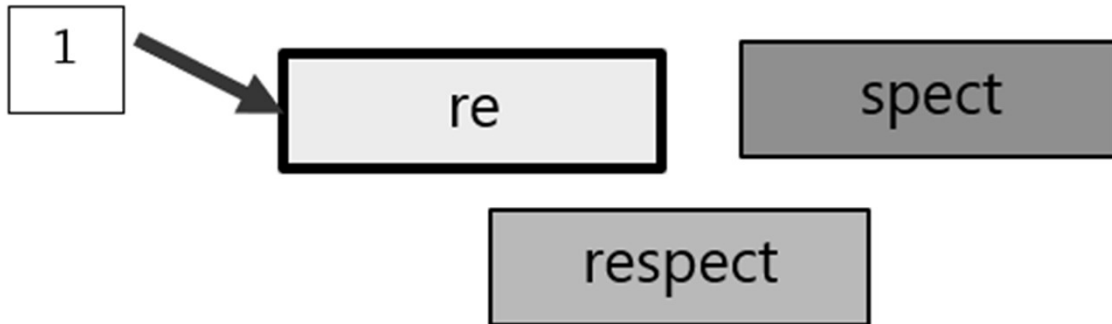
46

- x Always keep the initial sound and the vowel together for coarticulation.
- x Have the student state the first part
 - Provide multisensory cues
 - Could attempt simultaneous production (saying it together)
- x Once the student is successful with the first part, have them state the second part
- x Blend the two together.
 - May need to use cues initially
 - Fade cues as student is successful

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Example: initial /r/



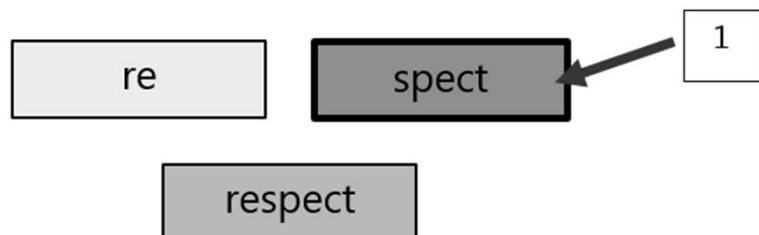
<https://drive.google.com/file/d/1f61oivkTxQqTCwrJUo8mHdOkwIPqdiZ-/view?usp=sharing> (cello)

<https://drive.google.com/file/d/1SiwwFDd93sbDcKPaQ97rKYJJKglfRAhx/view?usp=sharing> (boat)

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Backward Chaining

- Consonants and vowels should be produced correctly
- Example: respect
- Re is produced correctly.
- spect is in error (i.e.: student states "spict" or "pect.")
- Correct the error in the second syllable.
- Then add the first syllable. May need to continue to cue the second syllable and fade as soon as possible.



<https://drive.google.com/file/d/1TIAze2ijc2hGjn3MpnuW5Yviw2xsDCIT/view?usp=sharing> (stream)

100

Multisensory Cues

- Prosodic Cues
- Tactile Cues
- Visual Cues
- Kinesthetic Cues

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101

Prosodic Cues

Pitch	Loudness
Timing	Voice Quality

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Tactile Cues



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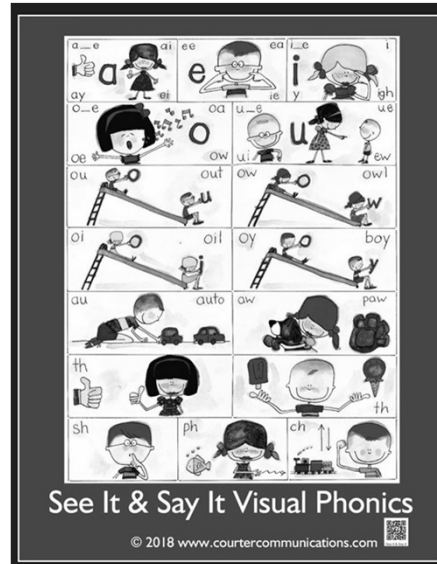
Tactile Cues

- https://drive.google.com/file/d/1fala_1c3IJXY0hysAaXIYgYSvYvQ6TWu/view?usp=sharing



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Visual Cues



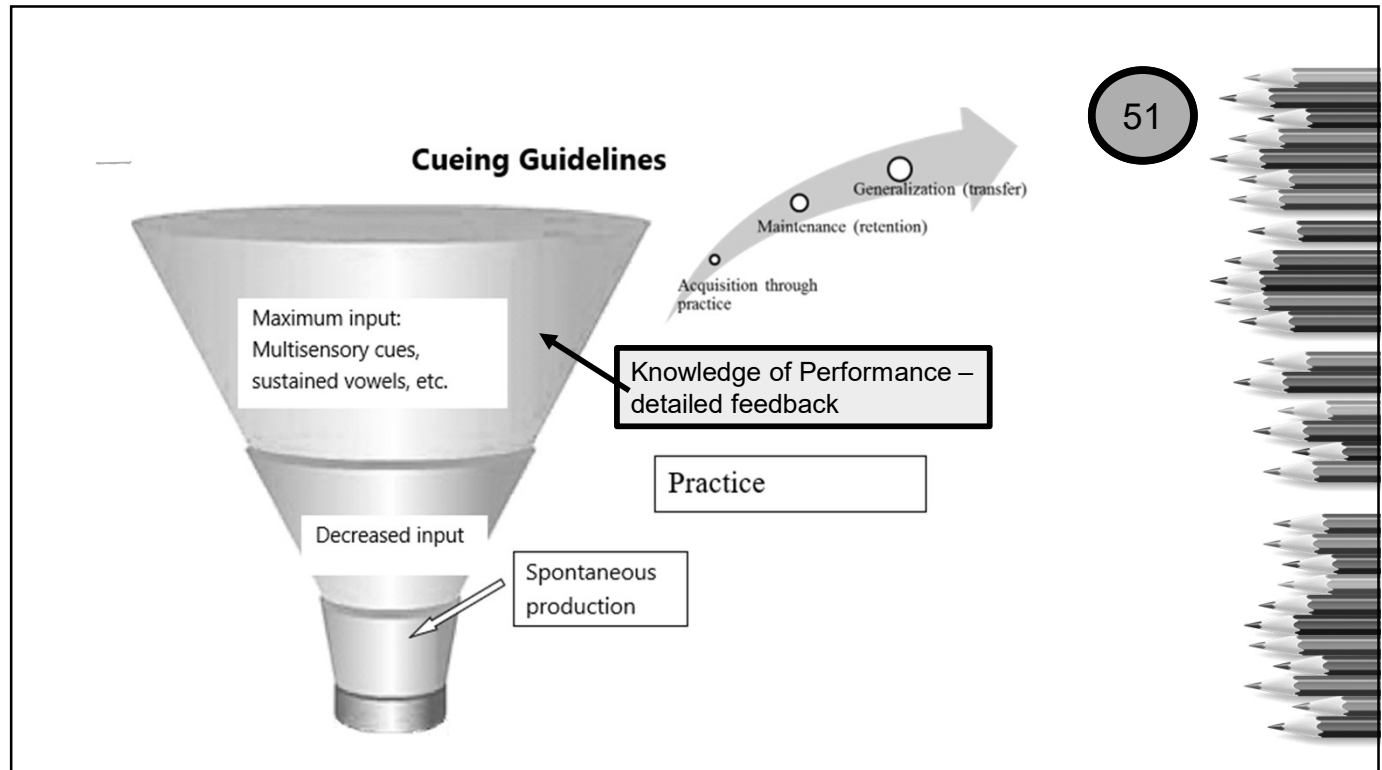
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105

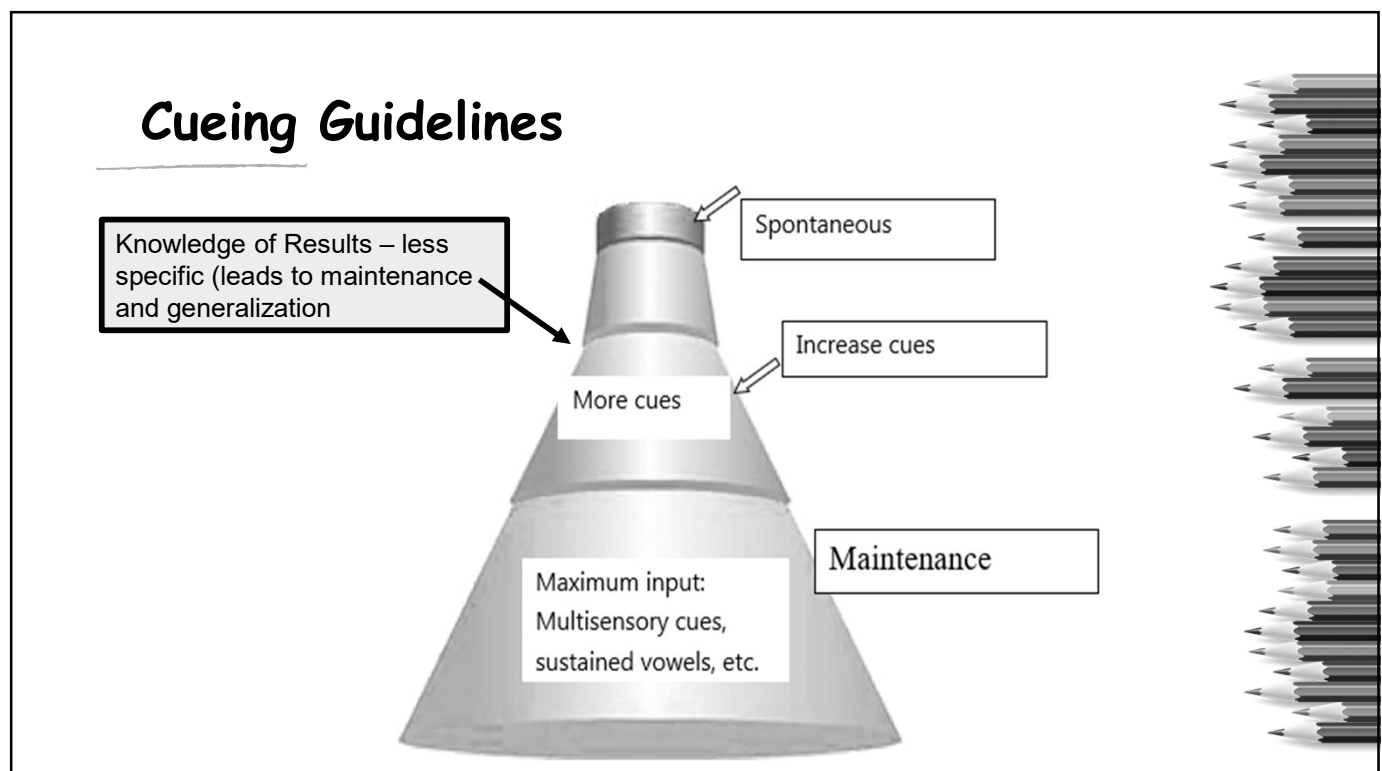
Kinesthetic



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Introduction to Therapy Approaches

Developmental/
Phonological

- x Integrated Phonological Intervention Program
- x Complexity Approach

Neurological

- x Speech Motor Chaining
- x Dynamic Temporal and Tactile Cueing
 - /R/ based on motor planning

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Reminder

100!

Regardless of the approach chosen intensity and number of productions is the key!

The **minimum intensity** that has been shown to work is **two sessions a week** (Namasivayam, Pukonen, Goshulak, et al., 2015; Thomas, McCabe, & Ballard, 2014) with **most articles employing sessions 3–5 times a week and 100 production trials per session** (Edeal & Gildersleeve-Neumann, 2011; Murray et al., 2015). [Murray, E., and Iuzzini-Seigel, J. (2017).

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Integrated Phonological Intervention Program (IPIP)

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We know from the research that children with speech sound disorders are at greater risk for phonological/phonemic awareness delays, thus, delay in literacy development (Rvachew, Ohberg, & Grawburg, 2003; McCormack, et al, 2011; Tambraja, et al, 2022; Nathan, et al, 2004).

Same approach
used for RTI II 37
RTI III 39

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IPIP

Designed to facilitate speech production, phonological awareness, and sound/symbol in children ages 4-7 years with speech and language impairment. The intervention is based on activities implemented in the Gillon (2005), Moriarty and Gillon, (2006) and McNeill (2007) intervention studies.

The findings from these research investigations indicated that the program was effective in facilitating significant improvement in speech production, early reading, and spelling development in preschool children with speech impairment and in children aged 4-7 years diagnosed with childhood apraxia of speech.

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Links: SSD to Language and Literacy

1. Reports estimated that 40% of children with SSDs had concomitant language impairment (Eadie et al., 2015).
2. Approximately 25% of children receiving school-based speech services may also qualify for reading-related services (Tambyraja et al., 2020).
3. Like children with dyslexia, a core deficit in the phonological system has been implicated in children with speech sound disorder (Anthony et al., 2011; Pennington & Bishop, 2009; Sutherland & Gillon, 2007).

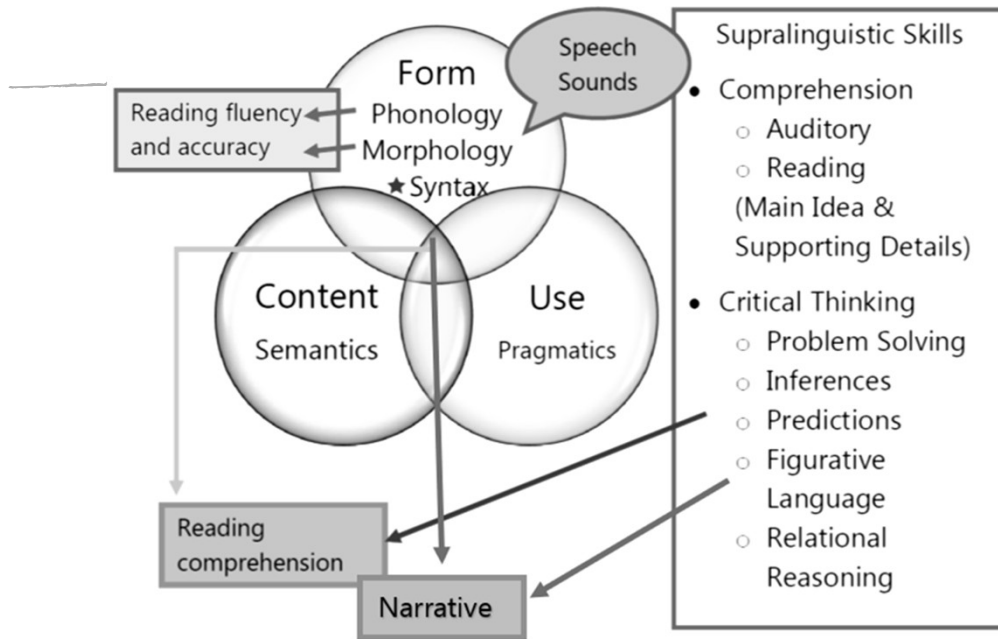
113

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4. Studies indicate that at age 4, children with speech delay are at higher risk for impaired phonological awareness skills (e.g., rhyme matching, onset segmentation, onset matching) compared to children who are typically developing peers (Rvachew, Ohberg, & Grawburg, 2003).
5. Children whose speech production problems persist until age 6; 9 perform worse on tests of reading, spelling, and phonological awareness than controls matched for age and performance IQ (Nathan et al., 2004).

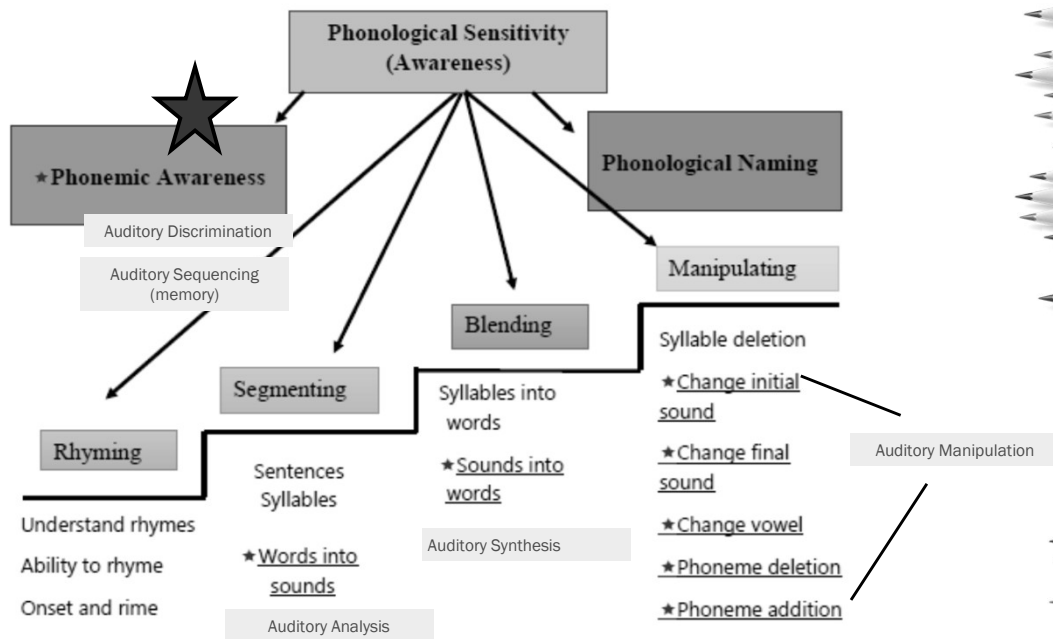
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Phonological Sensitivity (Awareness) Skills



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Program Structure

Each session in the intervention program should include activities to target speech production, phonological awareness, and sound/symbol

Shown Previously

https://drive.google.com/file/d/1hAG4rDimqa_KdpLqhk9t8RQLaQa-hV_j/view?usp=sharing (Cody)

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Complexity Approach

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- x Approach by Gierut (2007)
- x designed for children with **moderate-to-severe *phonological* impairments with low intelligibility and limited phoneme inventories.**
- x by using a complexity approach during a period of accelerated phonological learning (4-6 years old), there is a greater chance to remediate multiple errors, thus, discharging before the students enter school

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Complexity Approach

- x Concentrates on nonstimulable and later developing sounds
- x Concentrates on linguistically marked phonemes (i.e.: targeting affricates to increase stops and fricatives)

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Complexity Approach

Implication Laws
(Jacobsen, 1941)

- a. Consonants imply vowels
- b. Fricatives imply stops
- c. Affricates imply fricatives
- d. Liquids imply nasals
- e. Voiced obstruents (stops, fricatives, affricates) imply voiceless obstruents

Marked (More Complex)	Unmarked (Least complex)
Fricatives (/f/, /v/, /θ/, /ð/, /s/, /z/, /ʃ/, /ʒ/)	Stops (/p/, /b/, /t/, /d/, /k/, /g/)
Affricates (/tʃ/ and /dʒ/)	Fricatives (/f/, /v/, /θ/, /ð/, /s/, /z/, /ʃ/, /ʒ/)
Liquids (/l/ and /r/) and glide sounds (/w/, /j/)	Nasal (/m/, /n/, /ŋ/)
Small sonority difference clusters (/sm/, /sn/)	Large sonority difference clusters (/tw/, /kw/, and /pl/)
Sonority: loudness of the speech sound	

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The Nitty Gritty *****

- x Probe sounds
- x Get a baseline for Percent of Consonants Correct (PCC).
 - Use this periodically for data collection and progress

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Phonemic Inventory Probe: Targeting /p/, /t/, /k/, /w/, /l/, /r/

Child Name _____

Target	# Cons	Production	Target	# Cons	Production	Target	# Cons	Production	Phoneme(s)
1. white	2		20. write	2		39. light	2		
2. hip	2		21. hear	2		40. hit	2		
3. lock	2		22. rock	2		41. walk	2		
4. talk	2		23. tall	2		42. wall	2		
5. wing	2		24. ring	2		43. king	2		
6. tea	1		25. pea	1		44. key	1		
7. tape	2		26. tail	2		45. whale	2		
8. snake	3		27. snail	3					
9. toes	2		28. rose	2					
10. page	2		29. cage	2					
11. cave	2		30. wave	2					
12. pie	1		31. Y /wai/	1					
13. pig	2		32. wig	2					
14. cake	2		33. rake	2					
15. cup	2		34. cut	2					
16. boat	2		35. bowl	2					
17. toe	1		36. low	1					
18. bike	2		37. bite	2					
19. pen	2		38. ten	2			/85		

Stoel-Gammon (1986) stipulated that two occurrences are required for sounds to be included in the phonemic inventory. Circle sounds for which there are two occurrences on the above task: **p t k w l r**

Gierut & Champion (2001) indicated that a child must have the second and third consonants of a three-element cluster in his/her phonemic inventory to teach a three-element cluster. Circle permissible three-element clusters for treatment based on the phonemes indicated above:
/str-/ /spr-/ /skr-/ /skw-/ /spl-/

Total # of Consonants = 85 (Correct # of consonants) ____/85 = ____ %
Percentage Consonants Correct (PCC) = # correct consonants/total # of consonants

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<https://slpath.com/docs/piplongform.pdf>

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Phonemic Inventory Probe: Targeting /p/, /t/, /k/, /w/, /l/, /r/

Child Name AW

Target	# Cons	Production	Target	# Cons	Production	Target	# Cons	Production	Phoneme(s)
1. whif	1/2	wɪf	20. writ	0/2	wɪt	39. wɪht	0/2	wɪt	
2. hip	1/2	hi	21. heaf	1/2	hi	40. hit	1/2	hi	
3. jock	0/2	q	22. wroek	0/2	wɔ	41. walk	1/2	wɔ	
4. talk	1/2	a	23. tall	1/2	tɔ	42. wall	1/2	wɔ	
5. wing	1/2	wi	24. w ring	0/2	I	43. king	1/2	ti	
6. tea	1/1	ti	25. pea	1/1		44. key	0/1	ti	
7. tape	1/2	ti	26. tail	1/2	ti	45. whale	1/2		
8. spake	1/3	jei	27. spail	1/3	jɔi				
9. toes	1/2	tu	28. w rose	0/2	tu				
10. page	1/2	pei	29. e fage	0/2	ti				
11. faye	0/2	ei	30. waye	1/2	wɛ				
12. pie	1/1	pɛ	31. Y wai	1/1					
13. pig	1/2	pi	32. wig	1/2	wɛ				
14. fake	0/2	ei	33. w rake	1/2	wɛ				
15. cup	0/2	ti	34. fut	0/2	ti				
16. boat	0/2	pɛ	35. bowl	1/2	bɔ				
17. toe	1/1	tu	36. w low	0/1	wɔ				
18. bike	0/2	pɛ	37. bite	0/2	pɛ				
19. pen	1/2	pe	38. tex	1/2	te			/85	

Stoel-Gammon (1986) stipulated that two occurrences are required for sounds to be included in the phonemic inventory. Circle sounds for which there are two occurrences on the above task: (p) (t) (k) (w) (l) (r)

Gierut & Champion (2001) indicated that a child must have the second and third consonants of a three-element cluster in his/her phonemic inventory to teach a three-element cluster. Circle permissible three-element clusters for treatment based on the phonemes indicated above:

/spk-/ /spk-/ /skw-/ /skw-/ /spk-/

Total # of Consonants = 85 (Correct # of consonants) 29 / 85 = 25 %

Percentage Consonants Correct (PCC) = # correct consonants / total # of consonants

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*** Target Selection

2. Check for stimulability
3. List sounds that are OUT of the phonetic inventory with 0% accuracy
4. Cross out stimuable sounds (will typically develop without intervention) (Powel and Miccio, 1996)
5. Next cross out all early developing sounds

Excerpted from the Phonological Assessment and Treatment Target Selection
Barlow, Storkel & Taps, 2010)

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*** Target Selection

6. Choose sounds that lead to greater system wide change based on language law (based on Jacobsen, 1941)
<https://slpath.com/docs/ImplicationalLaws.pdf>
 - a. Consonants imply vowels
 - b. Affricates imply fricatives
 - c. Fricatives imply stops
 - d. Voiced obstruents (stops, fricatives, affricates) imply voiceless obstruents
 - e. Liquids imply nasals

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*** Target Selection

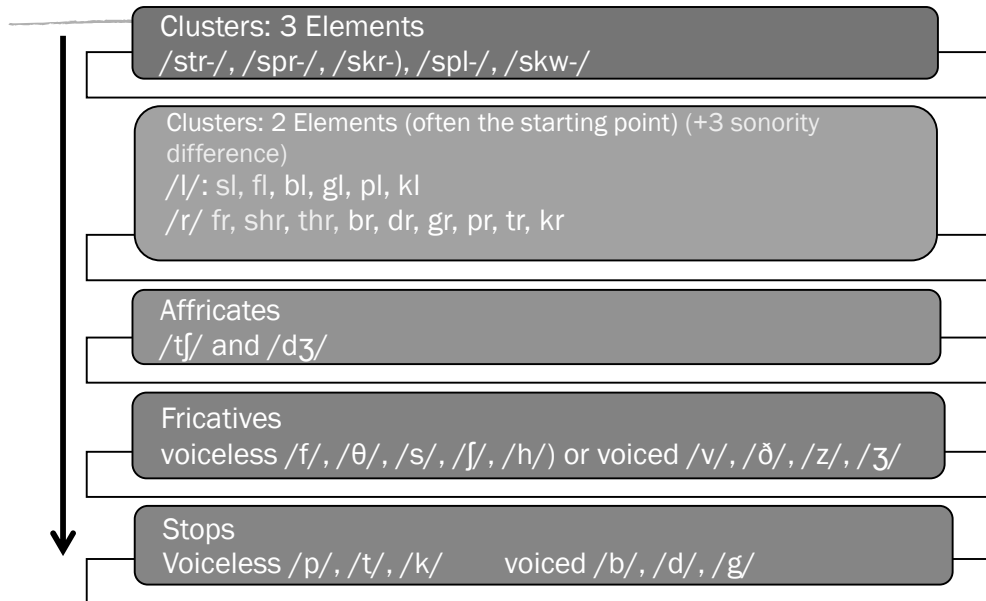
7. If multiple sounds remain, select sounds that occur most frequently in the sound system
 - a. Attempt to use 3 clusters (if the student has the second and third member.
 - b. If cannot use 3 clusters, start with two with a sonority of +3 (loudness of a sound compared to other sounds)– typically /sl/ or /fl/
8. Pick 3-5 targets (may start with CCV) (flee/flea, flew, flow, flaw or sleigh, slow, slew, slaw)

CCV/CCVC			
			
			
			
			

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*** Most Complex to Least Complex



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** Explanation of Most to Least Complex

The most sonorous sounds are (The highest given a value score of 0)

voiceless stops (7)
voiced stops (6)
voiceless fricatives (5)
voiced fricatives (4)
nasals (3)
liquids (2)
glides (1)
vowels (0)

Manner of Articulation	Place of Articulation						
	Bilabial	Labio-dental	Dental	Alveolar	Palatal	Velar	Glottal
Obstruents (consonants produced with obstruction or turbulence)	Stop	Voiceless	p	t	k		
	Fricative	Voiceless	f	θ	s	ʃ	h
	Affricate	Voiceless	tʃ	dʒ			
	Nasal	Voiced	m	n	ŋ		
Sonorants (relatively free & continuous airflow)	Liquid	Voiced		l	r		
Glide	Voiced				j (y)		

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*** Gierut (1999)

- x Gierut applied this principle to treatment. She identified an implicational relationship between clusters with small sonority distances and clusters with large sonority distances. (Sonority Sequence Principle)
- x Research has suggested that it is most efficacious to teach clusters with a small sonority difference (+3 plus (+) indicates sonority is rising)

(Linguists do not consider /sp-/ , /sk-/ and /st-/ to be true clusters. They do not follow the sonority sequence principle of sonority increase at the beginning from the first sound in the cluster to the second sound as the vowel is approached and falls at the end. Example: /s/ (5) voiceless stops (7). 5-7= -2)

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*** Explanation of Most to Least Complex

Sonority Sequencing Principle For Clusters (Gierut, 1999)

7 = voiceless stops	3 = nasals
6 = voiced stops	2 = liquids
5 = voiceless fricatives	1 = glides
4 = voiced fricatives	(Steriade, 1990)

sonority distance = 2
voiceless fricative + nasal
/sm-/
/sn-/
/mj-/

sonority distance = 3
voiceless fricative + liquid
/n-/
/fr-/
/θr-/
/sl-/
/fr-/

/sr-/ (This cluster does not appear in English. However, children with disordered phonology produce this combination, which suggests knowledge of clusters with a sonority distance of 4.)

sonority distance = 4
voiced stops + liquid or voiceless fricative + glide
/bl-/
/br-/
/dr-/
/gl-/
/gr-/
/sw-/

/fw-/ , /fʷ-/ , /θw-/ (These clusters do not appear in English. However, children with disordered phonologies sometimes produce these combinations, which suggests knowledge of clusters with a sonority distance of 4.)

Manner of Articulation	Place of Articulation						
	Bilabial	Labio-dental	Dental	Alveolar	Palatal	Velar	Glottal
Obstruents (consonants produced with obstruction or turbulence)	Stop						
	Voice	p 7		t		k	
	Voiceless	b		d		g	
	Fricative						
	Voice	f 5	θ	s 5	ʃ		h
	Voiceless	v	ð	z	ʒ		
Sonorants (relatively free & continuous airflow)	Affricate				tʃ		
	Voice						
	Voiceless				dʒ		
	Nasal	m		n		ŋ	
Sonorants	Liquid			l 2	r		
	Voiced						
	Glide	w			j (y)		
Sonorants	Voiced						

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Phonemic Inventory Probe: Targeting /p/, /t/, /k/, /w/, /l/, /r/

Child Name AW

Target	# Cons	Production	Target	# Cons	Production	Target	# Cons	Production	Phoneme(s)
1. whipe	1/2	wɪ	20. write	0/2	wɪ	39. wright	0/2	wɪ	
2. hip	1/2	hi	21. heap	1/2	hi	40. hit	1/2	hi	
3. rock	0/2	ɑ	22. rock	0/2	wɔ	41. walk	1/2	wɔ	
4. talk	1/2	ɑ	23. tall	1/2	tɔ	42. wall	1/2	wɔ	
5. wing	1/2	wɪ	24. ring	0/2	ɪ	43. king	1/2	ti	
6. tea	1/1	ti	25. pea	1/1		44. key	0/1	ti	
7. tape	1/2	ti	26. tail	1/2	ti	45. whale	1/2		
8. spike	1/3	jei	27. paid	1/3	ji				
9. toes	1/2	tu	28. rose	0/2	tu				
10. page	1/2	pei	29. cage	0/2	ti				
11. laye	0/2	ei	30. waye	1/2	wɛ				
12. pie	1/1	pɛ	31. Y wai	1/1					
13. pig	1/2	pi	32. wig	1/2	wɛ				
14. fake	0/2	ei	33. rake	1/2	wɛ				
15. cup	0/2	tɪ	34. put	0/2	tɪ				
16. boat	0/2	pɛ	35. bowl	1/2	bɔ				
17. toe	1/1	tu	36. low	0/1	wɔ				
18. bike	0/2	pɛ	37. bite	0/2	pɛ				
19. pen	1/2	pɛ	38. ten	1/2	tɛ			/85	

Stoel-Gammon (1986) stipulated that two occurrences are required for sounds to be included in the phonemic inventory. Circle sounds for which there are two occurrences on the above task: (p) (t) (k) (w) (l) (r)

Gierut & Champion (2001) indicated that a child must have the second and third consonants of a three-element cluster in his/her phonemic inventory to teach a three-element cluster. Circle permissible three-element clusters for treatment based on the phonemes indicated above:

/spk-/ /spk-/ /skp-/ /skp-/ /spk-/ /spk-/

Total # of Consonants = 85 (Correct # of consonants) 29 / 85 = 25 %

Percentage Consonants Correct (PCC) = # correct consonants / total # of consonants

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Recap

x Integrated Phonological Intervention Program

- Designed for children 4-7 years
- Children who received intervention that facilitated PA, letter knowledge and speech sound production outperformed students who just received SSD intervention

x Complexity Approach

- Designed for children 3-6 years to reduce multiple errors
- For limited sound system
- Concentrates on later developing sounds and starts with clusters
- Children must have the 2nd and 3rd member of a 3 Cluster in order to use it for treatment. If not, start with 2 with a sonority score of +3

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Breakout Activity 3

- x What are your thoughts on Integrated Phonological Intervention?
- x Discuss the Complexity Approach
 - Do you currently use this approach for multiple phonological process errors?
 - If yes, what results have you seen?
 - If no, will you consider this approach for quicker remediation of multiple errors?

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From Developmental to Neurological Speech Sound Disorders

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Principles of Motor Learning Approaches

- x Used for students with neurological speech disorder (Childhood apraxia of speech)
- x Students with neurological speech disorders
 - Higher likelihood of language, reading/spelling disorders
 - Language including morphology, phonological, syntax/grammar and vocabulary

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Motor Learning Theory

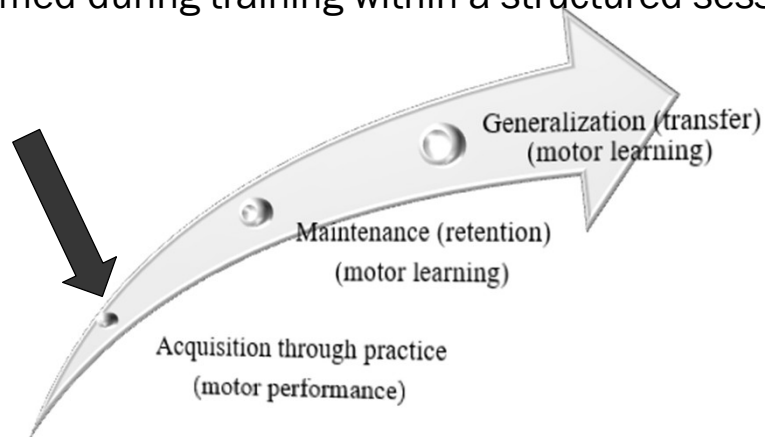
1. Initial Condition: Articulatory placement, voicing, prosody, intonation, phrasing
2. Motor Commands Needed: Timing and amplitude of production
3. Sensory Consequences:
 - a. Tongue and lip movement for production
 - b. Tactile awareness of articulatory placement
4. Outcome: Were the speech sounds, voicing, intonation, and prosody correct?

(Schmidt, 1975, 2003; Schmidt and Lee, 2005)

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Motor Performance

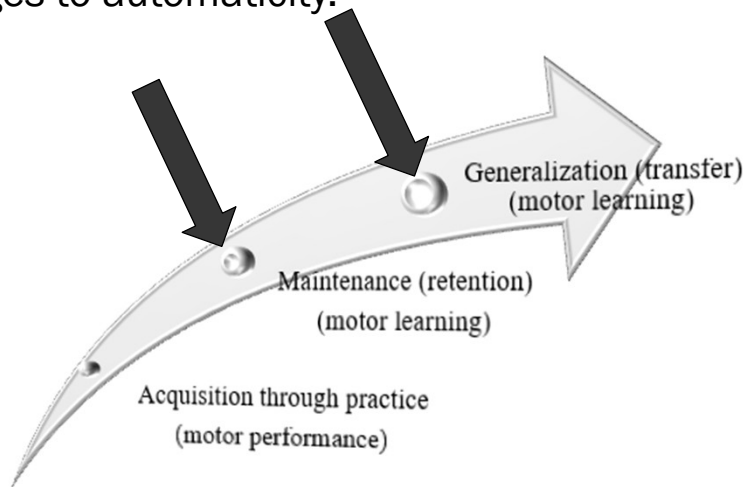
The ability to perform a motor task and how the movement is performed during training within a structured session.



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Motor Learning

The stages to automaticity.

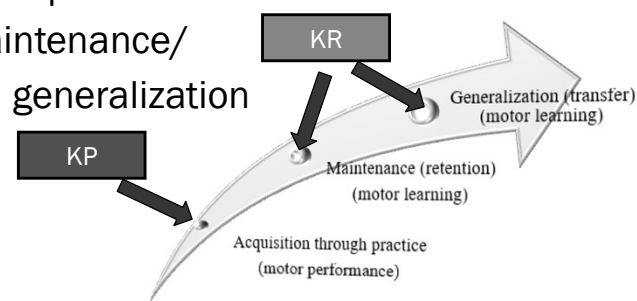


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Feedback

- x Knowledge of Performance (KP) (motor performance) detailed feedback about movements, where to place articulators, etc.
- x Knowledge of Results (KR) (motor learning) less specific
- x Immediate feedback: acquisition
- x Delayed feedback: maintenance/generalization
- x Appropriate support



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Checklist: Distinguishing CAS

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☆ Indicates the top three characteristics of CAS (ASHA Technical Report, 2007)

Vowels

- ☆ Inconsistent use of vowels
- Limited repertoire of vowels
- Schwa additions/insertions to consonant clusters, within words and on the ends of words

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Consonants

- ❑ ☆Inconsistent errors on consonants
- ❑ May produce a sound correctly in one word position but not in another (i.e.: ball, ba _ y)
- ❑ May use an initial sound correctly in one word and substitute a sound or omit the sound in other initial position words (i.e.: ball, _aby)
- ❑ May say a word correctly one time, change the sounds in the word the next, then change them again (bye, dye, mye)
- ❑ Substitution of voice and voiceless consonants

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Consonants and Vowels

- ❑ Idiosyncratic error patterns
- ❑ Increase difficulty and decreased intelligibility with increased length or complexity
- ❑ Imitation more difficult
- ❑ Poor speech intelligibility
- ❑ Distorted substitutions
- ❑ Restricted sound inventory

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Coarticulation

- Lengthened and disrupted coarticulatory transition between sounds and syllables
- Difficulty achieving accurate articulatory movement gestures when trying to imitate words not yet mastered.

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Prosody

- ☆ Inappropriate stress on syllables or words
- Equal stress or lexical stress errors (deleted po from potato, ba from balloon)
- Atypical prosody
- Altered and/or inconsistent suprasegmental characteristics (rate, pitch, loudness)

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Language

- ❑ Reduced amount of babbling or vocal sounds from ages 7 to 12 months old
- ❑ Statistically significant discrepancy between receptive and expressive language
- ❑ Delayed onset of expressive language
- ❑ Loss of previous words

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Other Characteristics

- ❑ Better performance on speaking tasks that require single postures versus sequences of postures (e.g., single sounds such as /o/ vs. words such as "no", or single words vs. phrases)
- ❑ Greater ease in producing automatic Impaired volitional nonspeech movement (oral apraxia)
- ❑ Trial and Error behavior
- ❑ Impaired diadochokinetic tasks

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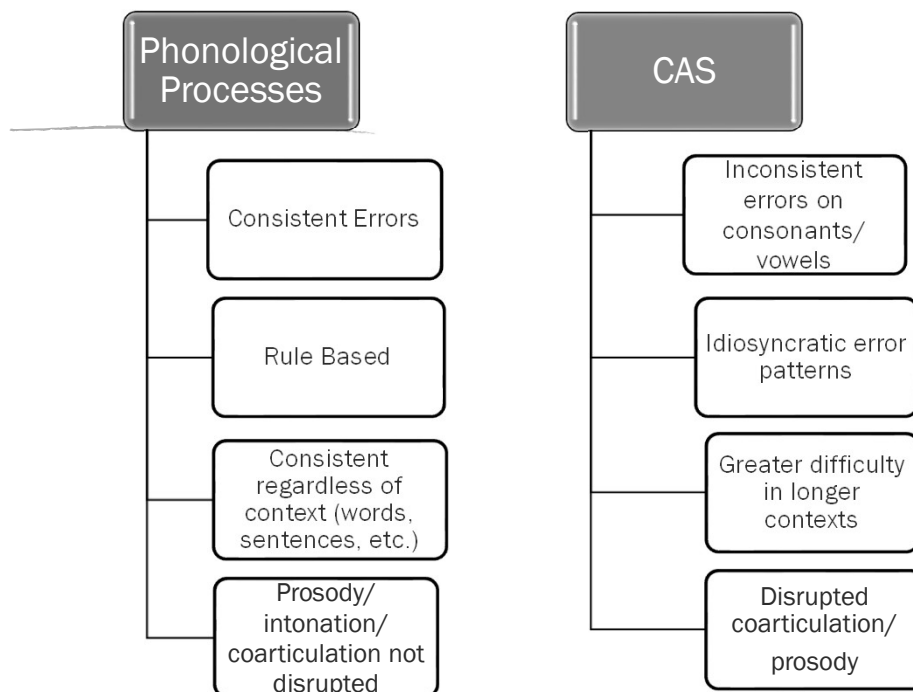
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Breakout Activity 4

1. Discuss the difference between a phonological processing disorder and a neurological disorder (CAS).
2. How do you determine a differential diagnosis?
1. Why is a differential diagnosis important?

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Keep In Mind: Motor Planning

- x Continuous movement (CV, VC, CVC, C1V1C1V1, C1V1C1V2, etc.) and NOT specific speech sounds which are isolated movement.
- x Assessment and treatment should be focused on the continuous movement within the syllable or string of syllables and not on specific speech sounds.

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Determining Severity & Prognosis 63

Mild	Moderate	Severe/Profound
Requires minimal cueing to obtain syllable production	Considerable cueing needed to produce syllable shape	With considerable cueing, cannot produce syllable shape
- Improvement is more rapid Prognosis: Good - Larger stimulus set (8-10) and can include words from more than one syllable shape - More random practice	- Prognosis is good but longer duration in therapy - Larger stimulus set and can consider words from more than one syllable shape	- Prognosis is guarded - Smaller stimulus set (3-5) - May not be able to include words from other motor shapes - More block practice - Increased frequency and type of feedback

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Childhood Apraxia of Speech Evaluation

(See Appendix A for more information)

64-
71

Hearing ☐ Passed a complete audiological assessment ☐ Failed a complete audiological assessment ☐ Hearing screening: Date: _____		The frequency and characteristics of early vocalizations can be affected by perceptual factors impacted by chronic otitis media (Petinou, et al 1999. Rvachew, et al 1999)			
Results		500 Hz	1000 Hz	2000 Hz	4000 HZ
Right Ear					
Left Ear					
Preverbal					
Child has communication intent ☐ yes ☐ no Child shows joint attention ☐ yes ☐ no ☐ Limited cooing and babbling ☐ Delayed onset of first words ☐ Limited vowel production		Cooing - 0-3 months Babbling – 3 months 4 months: consonants begin to emerge 7-8 months: “verbal turn taking” Canonical babbling (7-10 months) Variegated babbling (11-13 months)			

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Page 3 Linguistic continued

☐ Inconsistent sound errors that are not a result of immature speech

☐ Learning Difficulties

☐ Spelling

☐ Reading

☐ Writing

Comments from Teacher/Parent (or review of benchmark assessment student report)

Receptive and Expressive Language

☐ Receptive language better than expressive language

Test Given: _____

Results:

	Age	Standard Score	Percentile
Receptive Language			
Expressive Language			
Significance			

Comments: _____

Assessment of Motor Speech Skills

DEMSS (<https://products.brookespublishing.com/Dynamic-Evaluation-of-Motor-Speech-Skill-DEMSS-Manual-P1100.aspx>) (criterion referenced recommend for 3 years and older MK Courter Communications CAS Screener (www.courtercommunications.com under therapy materials))

Testing should be dynamic and should include productions with and without cueing in order to determine severity of the disorder.

1. Determine cues that are more effective
2. Determine response to cues
3. Determine syllable pattern to begin therapy

Caution should be used if administering an articulation test to determine CAS. If only errors are scored, the standard score may be skewed. Each answer must be transcribed to assess inconsistent production of phonemes, prosody, voicing and vowel errors.

Test Given: _____

☐ Consonant errors are inconsistent

☐ Voicing errors

☐ Errors on vowel production

☐ Limited vowel repertoire

☐ Single word production better than:

☐ Sentences

☐ Connected Speech

☐ Syllable shape where breakdown occurs _____

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Dynamic Evaluation of Motor Speech Skill (DEMSS)

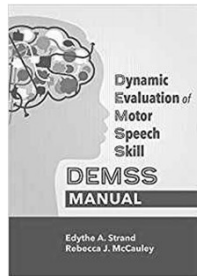
Dr. Edith Strand and Dr. Rebecca McCauley

Jslhr.pubs.asha April 2013

Ages 3-6.5

Movement accuracy

- Vowel Errors
- Consistency
- Prosody

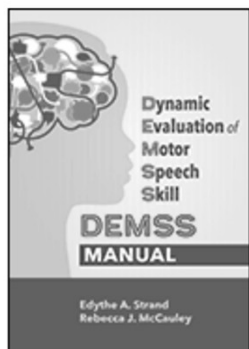


Subtests

- Consonant-Vowel (me; hi)
- Vowel-Consonant (up; eat)
- Reduplicated Syllables (mama; booboo)
- CVC1 (mom; peep; pop)
- CVC2 (mad; bed; hop)
- Bisyllabic 1 (baby; puppy)
- Bisyllabic 2 (bunny; happy; today; canoe)
- Multisyllabic (banana; video)

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Brookes Publishing



Dynamic Evaluation of Motor Speech Skill (DEMSS) Manual

Authors: Edythe A. Strand Ph.D., CCC-SLP, Rebecca J. McCauley Ph.D., CCC-SLP

ISBN: 978-1-68125-309-1

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Original on www.courtercommunications.com website

MK Courter Communications Dynamic CAS Screener

This screener is designed to assess syllable shapes (motor plans) from the simplest to the most complex. It is designed to use as a dynamic assessment to determine consonant and vowel production without and with cueing to determine where to begin therapy and how the student responds to the cues utilized.

Directions:

1. Begin with consonant – vowel (CV) and move through the screener.
2. Have the student look at you when you say the word. Do not provide any other cueing for the first production. Score production as a 1 for correct or a 0 for incorrect.
3. If the student does not produce the correct consonants and/or vowels, repeat the syllable shape. Take notes on any changes.
4. If still not produced correctly, add cueing (of your choice) to measure change of production with cueing. Score again in the space provided next to each word.

Scoring:

Overall Production	Vowels	Take Notes
1 = correct 0 = incorrect	2 = correct 1 = mild distortion 0 = Incorrect	☐ Type of cue provided ☐ Voicing errors ☐ Inconsistent production ☐ Vowel distortions ☐ Prosody errors
1. Score initial production with eye contact as correct or incorrect. 2. Score the second production 3. Score cued response as correct or incorrect.	1. Score vowel in first production as correct, mild distortion, or incorrect 2. If vowel is distorted or incorrect, exaggerate the vowel and score again as correct, mild distortion, or incorrect. 3. Score the second production as correct or incorrect when cueing for the vowel occurs 4. Add additional words to assess vowels if errors are noted	Use the note section to indicate student responses including other characteristics of CAS.

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MK Courter Communications Dynamic CAS Screener

Stimulus	Attempt 1 or 0	Vowels 2,1,0	Notes
CV			
1. pay			
2. bee			
3. my			
4. boy			
4. too			

2

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82
correct

168

70

Characteristics of Childhood Apraxia of Speech

To be classified as positive for CAS, a speaker is required to meet criteria for at least 4 of the 10 listed signs ([Shriberg et al., 2010a](#)).

Segmental

- ☐ Vowel distortion
- ☐ Voicing errors
- ☐ Distorted substitutions
- ☐ Difficulty achieving initial articulatory configuration or transitional movement gestures
- ☐ Grouping
- ☐ Intrusive schwa
- ☐ Increased difficulty with multisyllabic words

Suprasegmental

- ☐ Difficulty with syllable segregation (Noticeable gaps between syllables" when producing words of 3+ syllables. Within-word pauses)
- ☐ Slow speech and/or diadochokinetic rate
- ☐ Equal stress or lexical movement (prosody)

- ☐ The student demonstrates _____ out of 10 characteristics
- ☐ meets the criteria of CAS ☐ does not meet the criteria of CAS

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Oral apraxia may impact oral motor movement necessary for moving to foods with consistencies. With young children with feeding issues when textures are increased should assessed for oral apraxia.

- ☐ Student does not exhibit feeding issues

Check all that apply:

- | | |
|--|--|
| ☐ Difficulty forming bolus | ☐ Stores food in cheeks |
| ☐ Overstuffs mouth | ☐ Swallowing difficulties |
| ☐ Choking noted on textures | ☐ Gagging noted |

☐ Picky Eater

Textures: Difficulty with

- ☐ Smooth
- ☐ Slightly lumpy
- ☐ Lumpy
- ☐ Mixed
- ☐ Crunchy
- ☐ Other: _____

Tastes: Prefers

- ☐ Bland
- ☐ Salty
- ☐ Sour
- ☐ Bitter
- ☐ Other: _____

Temperatures: Prefers

- ☐ Room temperature
- ☐ Warm
- ☐ Hot
- ☐ Cold
- ☐ Other: _____

Chewing pattern (see www.beckmanoralmotor.com Jaw Patterns)

- ☐ Munching (tolerates soft, lumpy foods and ground meats)
- ☐ Lateral jaw shift (side to side movement)
- ☐ Diagonal movement (lateral, downward movement of jaw)
- ☐ Diagonal rotary (lateral, downward movement with horizontal sliding)
- ☐ Circular rotary (most mature -movement across midline)

Overall Notes

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Intervention Based on Motor Learning Principles

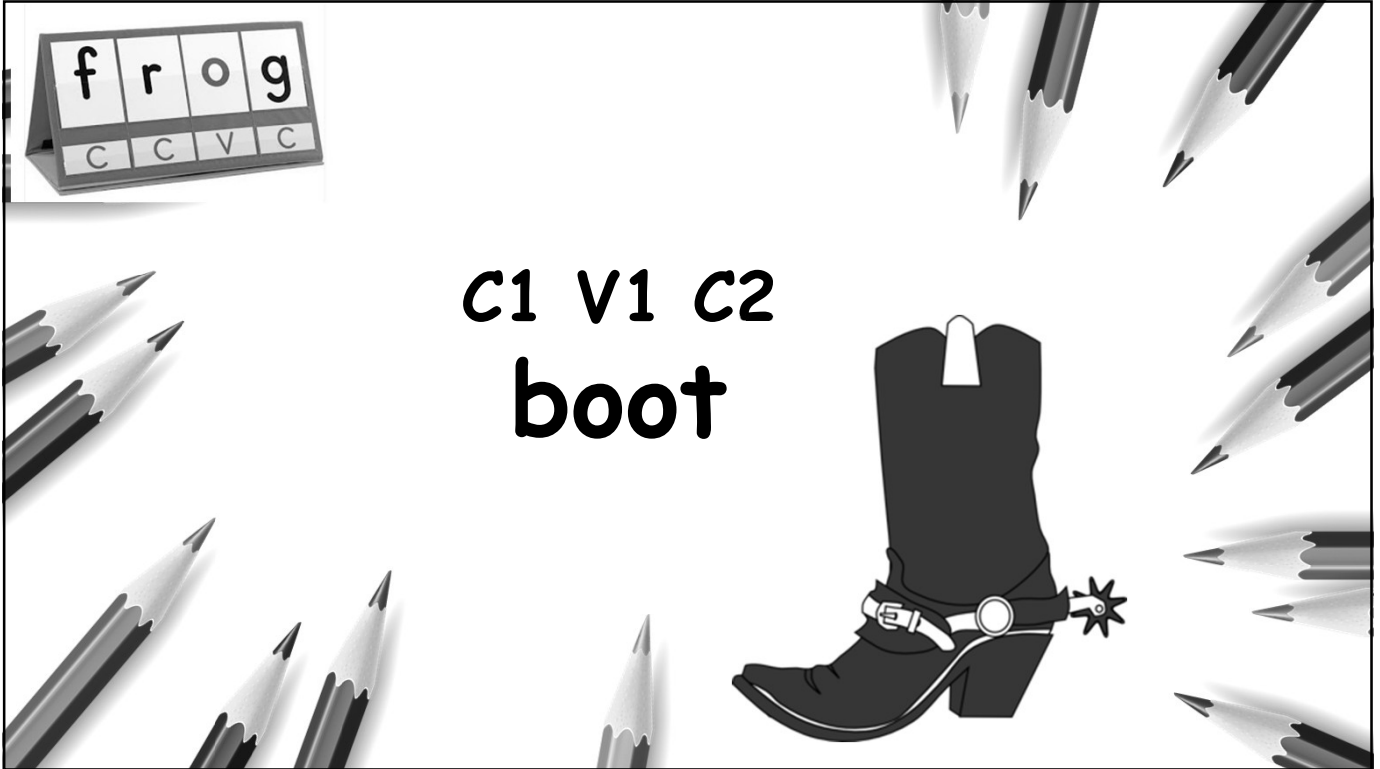
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- x The primary focus of intervention based on motor learning principles is the movement from one sound to another, one syllable to another, and one word to another with correct vowels, consonants, voicing, prosody, and intonation.

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f r o g
C C V C

C1V1
my

C2V2C3
red

C4V3C5
boot



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Breakout Activity 5

In Breakout Room, come up with a couple of words for each motor shape

V/VV	(would not target vowels or VV outside of a syllable shape) USE THIS SPACE FOR DOCUMENTATION
C	(I would not typically target a consonant by itself outside of a syllable shape) USE THIS SPACE FOR DOCUMENTATION
CV	
VC	
VCV	
C1V1C1V1	
C1V1C1V2	
C1V1C2V2	
C1V1C1	
C1V1C2	
CVCVCV	
CVCV + CVC	

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Intervention Approaches

- x Speech Motor Chaining
- x Dynamic Temporal and Tactile Cueing

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Speech Motor Chaining

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- x University of Syracuse (Preston)
- x Designed to facilitate acquisition of simple speech targets through frequent and specific feed back
- x Based on success, treatment is adapted through 5 levels.
- x Procedure involves selection of a target sound in a syllable position (i.e.: /k/ in onset and /s/ is coda which is the final consonant or the final consonant part. (i.e.: “alt” is the coda in “salt”).)

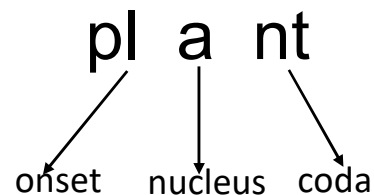
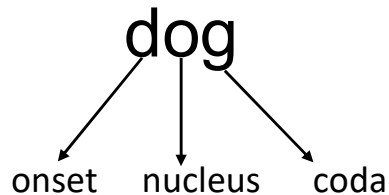
<https://chaining.myspeechlink.com/Identity/Account/Login>

Now requires a yearly membership: \$55/year

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Examples: Sounds can be in the onset or coda



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Procedure

1. Target sound in syllable position is selected (e.g., /k/ in onset or /s/ in coda,
 - a. Appropriate targets are typically sounds that are below 50% accuracy in a particular syllable position when tested at the word level.
 - b. Typically, two broad targets are treated per child for each session (e.g., onset /t/ and coda /k/).

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Example

1. Select 2 target sounds
2. Sound sequence variants chosen (CV, VC, CC)

Table 1. Examples of target sound/position and four possible variants (sound sequences) for practice across a range of phonetic contexts.

Target sound/position	Variant 1	Variant 2	Variant 3	Variant 4
/ɪ/ onset	/ɪa/	/ɪi/	/ɪɪ/	/ɪk/
/s/ onset	/si/	/so/	/sk/	/sn/
/k/ rhyme	/ɪk/	/æk/	/sk/	/kt/
/tʃ/ rhyme	/itʃ/	/ætʃ/	/ʌtʃ/	/nɪtʃ/

onset

coda

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Procedure

3. During practice, additional movements are gradually added before the target sequence (backward chaining) or after the target sequence (forward chaining).
 - a. For example, when training the target /s/ in onset, one representative sound sequence is /sn/.
 - b. Chaining for each sequence begins in a syllable (e.g., /snæ/),
 - c. followed by a monosyllabic word (e.g., snap),
 - d. a multisyllabic word (e.g., snapping, resnap),
 - e. a short phrase (e.g., resnap the jacket, or He was snapping), a
 - f. eventually a self-generated sentence (e.g., using the word ssnap or snapping in a sentence).

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Procedure

4. Practice at the higher levels of linguistic complexity only occurs when there is success at the previous level.

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Session: Prepractice

- x Explicit Instruction: Correct or incorrect of variants with cueing as needed (knowledge of performance)
- x Knowledge of response: cueing and immediate response for correct production.

Prepractice is continued until client achieves several correct productions (at least three of each variant in a simple motor plan such as CV, VC, CC)

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Practice

Table 2. Examples of chains.

Levels 					Self-generated sentence
Sound/position	Syllable	Monosyllabic word	Multisyllabic word	Phrase	
/ɪ/ onset	/ɪə/	rot	rotten	rotten food	?
/ɪ/ rhyme	/ɔɪ/	for	before	just before	?
/k/ onset	/ki/	keep	keeping	keeping my money	?
/k/ rhyme	/ʊk/	book	bookshelf	on the bookshelf	?
/s/ onset	/sɪ/	sit	sitting	sitting down	?
/s/ rhyme	/æst/	cast	broadcast	national broadcast	?
/tʃ/ onset	/tʃeɪ/	champ	champion	world champion	?
/tʃ/ rhyme	/ɪtʃ/	witch	sandwich	eat a sandwich	?

Note. Observe that the target sequence (in bold) remains consistent throughout the chain.

- * 5-6 correct responses before moving to the next level
- * Failure to achieve 5-6 – move to new chain
- * A chain is considered mastered when consistent over two sessions.
- * When mastered: move to new chain with the same variant (i.e.: rot, rotten moves to rock, rocket)

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Consideration

While using an approach such as Speech Motor Chaining, the severity of the student needs to be considered and whether they are able to move through multiple patterns. If yes, this is the best approach for quickest acquisition. If not, a more sequential approach that moves through each syllable shape would need to be considered.

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Consideration: Complexity of Speech Chains from a Syllable Shape Perspective

Speech Chain Patterns /s/ Initial

V									
VV									
CV	see /si/	si /	se	say	sa	su	so	saw	soo
VC									
VCV									
CIVICIV1									
CIVICIV2									
CIVIC2V2									
CIVIC1		sis	set	safe	sad	suck	sock	saws	suit
CIVIC2	seize								
VC + CVC				unsafe					
CIVIC2V2C3	season						socket		
CVCVCV		sister							
CVCVC			setup		sadden	sucking			
CVCCV				safety					
CVCCVC		system						hacksaw	lawsuit
CVCV + CVC									

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Dynamic Temporal and Tactile Cueing

Edith Strand developed DTTC based in Integral Simulation Therapy. This approach is based on the following core elements :

- (a) the focus on the movement (rather than the sound or phoneme) in terms of modeling, cueing, feedback, and target selection; (b) emphasis on facilitating the child's intent to improve motor skills; and (c) attention to proprioception

https://pubs.asha.org/doi/10.1044/2019_AJSLP-19-0005
Strand (2020)

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Dynamic Temporal and Tactile Cueing

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Edith Strand developed DTTC based in Integral Simulation Therapy. This approach is based on the following principles:

1. Improve the efficiency of neural processing for the development and refinement of sensorimotor planning and programming.

https://pubs.asha.org/doi/10.1044/2019_AJSLP-19-0005

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2. Schema principles

- a. One theory, from which much of the research in motor learning arose, is schema theory (Schmidt, 1975, 2003), which was intended to explain discrete actions (fast simple movements vs. Complex movements; Schmidt, 2003; Wulf & Shea, 2002).
- b. A schema as a relationship between outcomes from previous attempts at executing motor programs and the specifications of movements used during those attempts.

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3. Motor Learning Theory as Related to Speech Production

- a. Initial Condition: Articulatory placement, voicing, prosody, intonation, phrasing
- b. Motor Commands Needed: Timing and amplitude of production
- c. Sensory Consequences:
 - i. Tongue and lip movement for production
 - ii. Tactile awareness of articulatory placement
- d. Outcome: Were the speech sounds, voicing, intonation, and prosody correct?

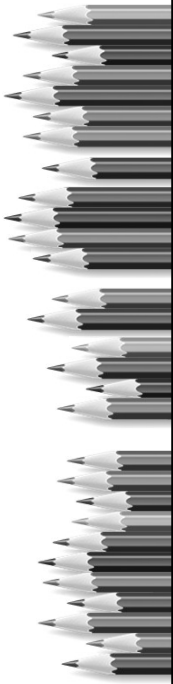
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- 4. Providing auditory and visual models, shaping the movement through slowed rate and visual and tactile cues, adding and fading cues as needed, providing specific feedback about the movement (knowledge of performance [kp]) early on, and fading to knowledge of results (kr) to facilitate learning and retention.
- 5. Modeling and provision of kp in which the child is given specific information about their errored movement helps the child refine the appropriate response specification (e.g., direction, range, speed, force) for the intended movement. The initially slowed rate and use of simultaneous production provide more time for the proprioceptive feedback

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Therapy, just at for Speech Motor Chaining, concentrates on syllable patterns and not specific phonemes. clinicians implementing therapy based DTTC are encouraged to also think about vowels (as vowels are often distorted in motor planning disorders), syllable length and shape, and errors in prosody (e.g., segmentation, equal or incorrect stress) in target selection (Strand, 2020)



Motor Shapes

V/VV	(would not target vowels or VV outside of a syllable shape) USE THIS SPACE FOR DOCUMENTATION
C	(I would not typically target a consonant by itself outside of a syllable shape) USE THIS SPACE FOR DOCUMENTATION
CV	
VC	
VCV	
C1V1C1V1	
C1V1C1V2	
C1V1C2V2	
C1V1C1	
C1V1C2	
CVCVCV	
CVCV + CVC	

210

General Guidelines: Step 1 Stimulus

- x 8-10 stimulus (less for more severe cases)
- x Carefully selected
- x May start with one syllable shape if more severe.
- x Less severe: could start with current pattern with a few in the next pattern

Mild	Moderate	Severe/Profound
Requires minimal cueing to obtain syllable production	Considerable cueing needed to produce syllable shape	With considerable cueing, cannot produce syllable shape
- Improvement is more rapid Prognosis: Good - Larger stimulus set (8-10) and can include words from more than one syllable shape - More random practice	- Prognosis is good but longer duration in therapy - Larger stimulus set and can consider words from more than one syllable shape	- Prognosis is guarded - Smaller stimulus set (3-5) - May not be able to include words from other motor shapes - More block practice - Increased frequency and type of feedback

210

211

General Guidelines: Step 2 Stabilize Existing Consonants and Vowels

Sounds may be produced correctly in certain positions or contexts and not in others. Stabilize the consonants and vowels that the student is able to produce in various motor shapes.

211

212

General Guidelines: Step 3 Produce Stabilize Stabilized Consonants and Vowels

- VC (in)
- CV (no)
- VCV (oh no)
- CVCV (mama)

212

213

General Guidelines: Step 4 Target New Vowels and Consonants

- Choose sounds for which the child is most stimulable
- Select sounds that occur more frequently in English
Schwa /a/, /s/, /t/, /r/, /o/, /e/, /a/
- Select sounds that are visible (i.e.: /p/, /b/, /m/)
- Select sounds that are developmentally appropriate

213

General Guidelines: Step 4 Expand Motor Shapes

V/VV	(would not target vowels or VV outside of a syllable shape) USE THIS SPACE FOR DOCUMENTATION
C	(I would not typically target a consonant by itself outside of a syllable shape) USE THIS SPACE FOR DOCUMENTATION
CV	
VC	
VCV	
C1V1C1V1	
C1V1C1V2	
C1V1C2V2	
C1V1C1	
C1V1C2	
CVCVCV	
CVCV + CVC	

General Guidelines: Step 6 Increase Variability

- x Concentrate of current motor shape while adding another one in proximity (based on the severity of the disorder).
- x New shape may require more cueing.

	C1V1C1V1	
Current target →	C1V1C1V2	mommy, daddy
Proximity target →	C1V1C2V2	pony, happy
	C1V1C1	
	C1V1C2	
	CVCVCV	
	CVCV + CVC	

216

General Guidelines: Step 7 Vary Prosody

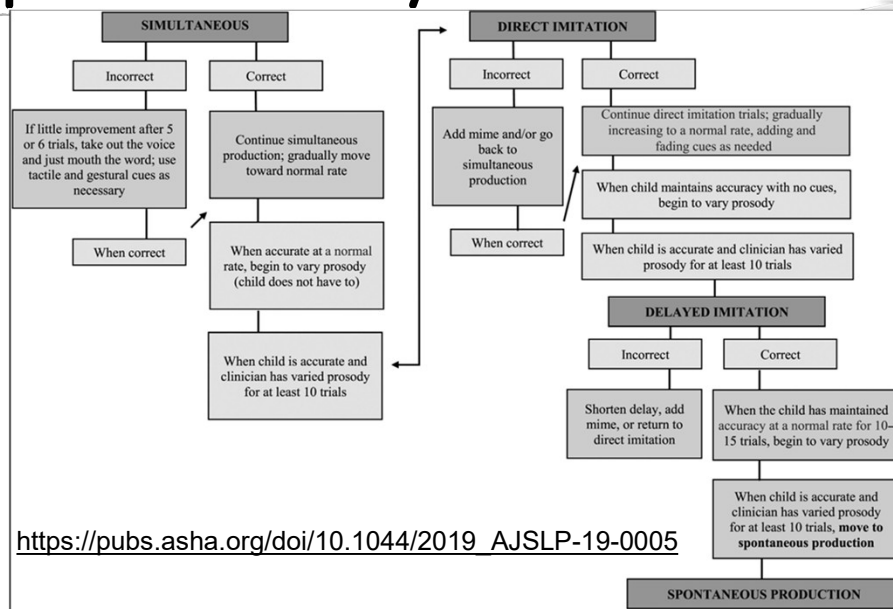
- x Once the student can produce the stimuli over several repetitions, begin to vary the production with rising and following intonation, louder/softer, etc. to support motor learning. (Example: no, no!, no?)

216

217

*** Temporal Hierarchy

Goal: varying the amount of time between the clinician's model and the child's imitative response



217

219

Can't Remediate that /R/: Assessment and Intervention

219

220

Questions

- x Where is /r/ produced?
- x How many /r/s in English?

220

221

Why is /r/ so difficult?

83

- x Articulatory placement (alveolar, to post alveolar, to palatovelar)
- x Student hasn't responded to standard techniques
- x Instruction regarding placement is the wrong motor plan for that student
- x At least 21 different /r/s!

No other sounds in English have so many place of articulation or variations.

221

Dynamic /r/ Screener

MK Courter Communications Dynamic /R/ Screener

This screener is designed to assess /r/ from a motor planning approach.. It is designed to use as a dynamic assessment to determine /r/ production without and with cueing to determine where to begin therapy and how the student responds to the cues utilized.

Directions:

1. State each word.
2. Have the student look at you when you say the word. Do not provide any other cueing for the first production. Score production as a 1 for correct or a 0 for incorrect.
3. If the student does not produce the word correctly, repeat the word adding a cue. Take notes on any changes.
4. If still not produced correctly, add a different cueing (of your choice) to measure change of production with cueing. Score again in the space provided next to each word.

ADD A FOOTER

223

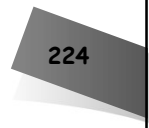
223



Scoring:

Production	Take Notes
1 = correct 0 = incorrect	☐ Type of cue provided 1 st attempt ☐ Type of cue provided 2 nd attempt ☐ Inconsistent production ☐ Prosody errors ☐ Other
1. Score initial production with eye contact as correct or incorrect. 2. Score the cued production if 1 st attempt was not correct 3. Score cued response as correct or incorrect.	

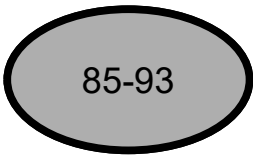
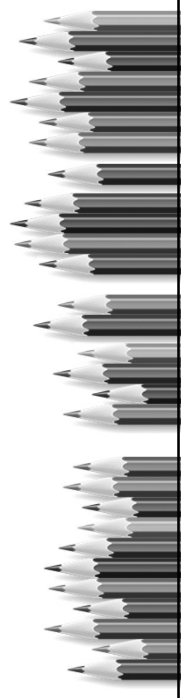
ADD / SCREEN



224

226

MK Courter Communication Dynamic Assessment /R/ Screener

226

Stimulus	Attempt	Notes
	Score: 1 or 0	
/ar/		
1. art		
2. bark		
3. car		
/er/		
4. earn		
5. learn		
6. her		
7. father		

For Motor Planning, imitation is the most difficult

227

Stimulus	Attempt	Notes
	Score: 1 or 0	
Other		

https://drive.google.com/file/d/1F-rocp8A8l0r1UI0tBeRm2HOsO8Te_Jt/view?usp=sharing

235

**If Probe Does Not
Yield a Correct /R/**

If motor planning, asking a student to produce a bunched or retro flex /r/ based on verbal directions would be contraindicated

236

236

**Ways to Elicit
/R/: Step 1**

ELICIT CORRECT PLACEMENT AND SOUND
PRODUCTION

PRODUCE /L/ OR /TH/ AND SLIDE BACK

HARD /G/ AND SLIDE FORWARD FOR /GER/

/Y/ AND RAISE TONGUE TIP TOWARD PALATE AND
SLIGHTLY BACK

*** MAY TRY OTHER CONSONANTS SUCH AS /SH/

237

Step 2

Once Placement is Achieved

- x The student produces a correct /r/, therapist taps student's arm and asks the student to hold the position
- x Student describes tongue position



238

Step 3: Right to Correct Position

- x 1. Continue sliding from one sound to /r/ until the student can go right to the correct tongue placement
- x 2. Once the student can produce the /r/ then have the student go to the correct /r/ placement
- x 3. Therapist continues to tap to hold the place

Reminder, if motor planning, asking a student to produce a bunched or retro flex /r/ based on verbal directions would be contraindicated

239

How to Begin to Remediate

- x 1. Therapist chooses which /r/ to begin with (by using a mastered /r/ from the screener or choosing which /r/ if there are no mastered /r/s.
- x 2. A mastered /r/ can be used to move to a unmastered /r/

240

If /r/ is established by sliding from one phoneme to the /r/



1. Therapist chooses if no /r/ mastered



2. Greatest impact on intelligibility



3. Which /r/ will make it easier to get to the next /r/

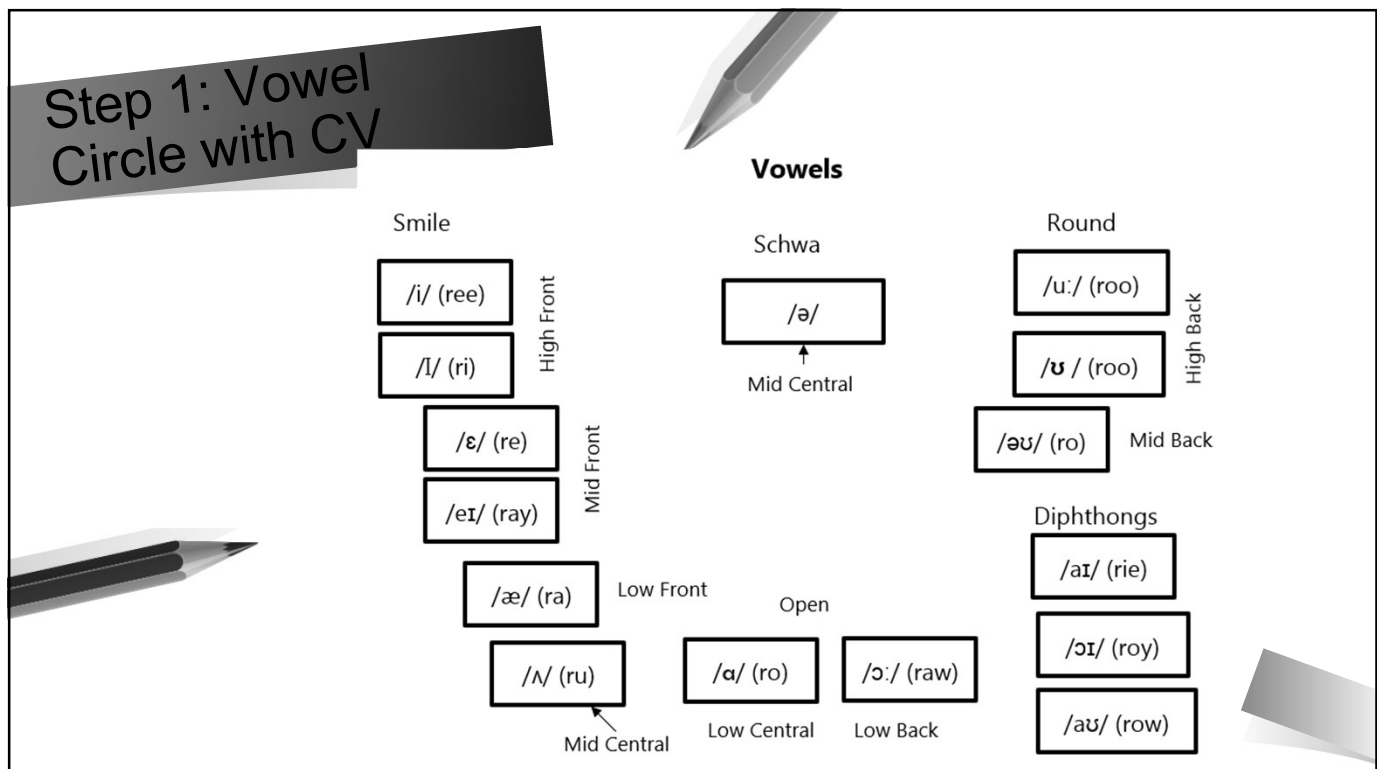
241

241

Example: Initial /r/

x Therapist chose initial /r/ to target first

242



243

Premise

- x Student may be stimutable for one or some but not necessarily all
- x Target the ones that are correct (8-10 words)
- x If more than one are correct, split the words between the correct ones
- x Once maintained, rescreen (vowel + /r/)

Acquisition through practice

Maintenance (retention)

Generalization (transfer)

244

Premise

- x 5. Once all /r/ + vowels + consonants are generalized, therapist would move to a new /r/ (vocalic /r/)
- x 6. To determine which vocalic /r/ to target, rescreen all /r/s
- x 7. If no vocalic /r/ is mastered, therapist chooses
- x 8. Base next /r/ on the prevalence in English

Acquisition through practice

Maintenance (retention)

Generalization (transfer)

245

Example

****ree	roo (root)	
ri	roo (roof, foot)	
re	roe	rie
ray		row
ra		roy
ru	ro raw	rue (are you)

246

8-10 Target Words

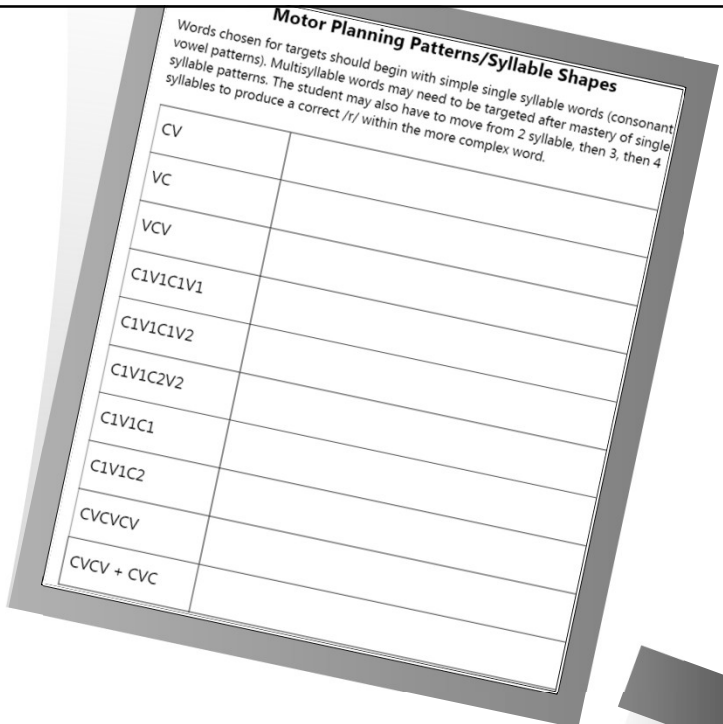
read	wreath
reef	reach
reek	respect
real	redo
ream	
reap	



247

Step 2: Determine 8-10 Stimulus

- redo
- respect
- regard
- response
- ripple
- radio
- ripped



Motor Planning Patterns/Syllable Shapes

Words chosen for targets should begin with simple single syllable words (consonant vowel patterns). Multisyllable words may need to be targeted after mastery of single syllable patterns. The student may also have to move from 2 syllable, then 3, then 4 syllables to produce a correct /r/ within the more complex word.

CV	
VC	
VCV	
C1V1C1V1	
C1V1C1V2	
C1V1C2V2	
C1V1C1	
C1V1C2	
CVCVCV	
CVCV + CVC	

248

****ree

****ri

re

ray

ra

ru ro raw

roo (root)

roo (roof, foot)

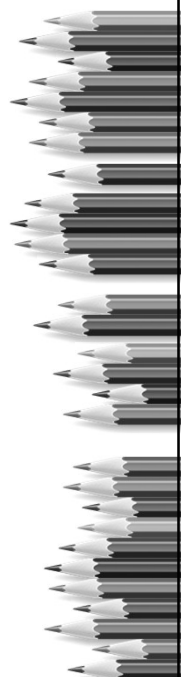
roe

rie

row

roy

rue (are you)



249

8-10 Target Words

reed	rid
reef	rig
reek	rim
real	rip
ream	
rib	

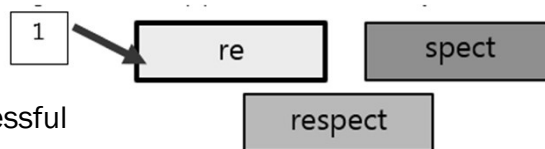


250

Forward Chaining

97

1. Always keep the initial sound and the vowel together for coarticulation.
2. Have the student state the first part
 - a. Provide multisensory cues
 - b. Could attempt simultaneous production (saying it together)
3. Once the student is successful with the first part, have them state the second part
4. Blend the two together.
 - o May need to use cues initially
 - o Fade cues as student is successful



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Backward Chaining

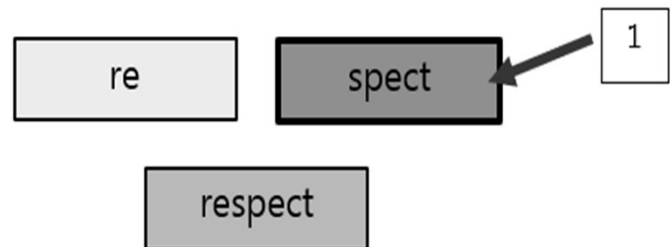
1. Consonants and vowels in the word must be produced correctly.
2. If the student is able to produce the first syllable correctly, but let's say, produced the vowel or another sound incorrectly in the second syllable (or any syllable in a multisyllabic word), backward chaining could be used to get the correct production of the incorrect syllable.
3. Use multisyllable cues to demonstrate the correct production of the incorrect sound.

254

Re is produced correctly.

spect is in error (i.e.: student states "spict" or "pect").

Correct the error in the second syllable.

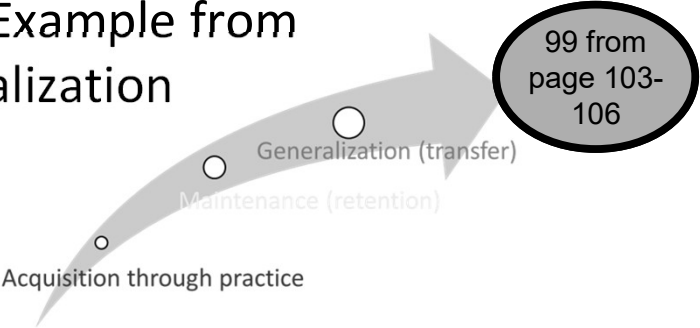


Then add the first syllable. May need to continue to cue the second syllable and fade as soon as possible

255

Step 3 and 4 Initial /R/ Example from Practice to Generalization

Practice



Read	Reef	Real	Ream	Reek	Reap	Respect	Reason	Really
+	+	+	+	+	+	+	+	+

256

Targets and Documentation

Maintenance

Read	Reef	Real	Ream	Reek	Reap	Respect	Reason	Really
++	+- visual/ tactile	+- visual/ prosodic	-- prosodic /visual					

257

Targets and Documentation

Maintenance

2 repetitions maintained without cuing

Read	Reef	Real	Ream	Reek	Reap	Respect	Reason	Really
++	++	++	++	++	++	++	++	++

Once the student is able to produce 2 repetitions without cuing, move to 3 then 4 repetitions

258

Targets and Documentation

Maintenance

Once the student is able to produce 2 repetitions without cuing, move to 3 then 4 repetitions

259

5 Repetitions (not yet maintained)

Read	reef	Real	Ream	reek
+++++	++— -	——++	-- +++	- - +++
	Visual/Tactile	Visual/tactile/ Prosodic	Prosodic/Visual	Visual/Tactile

260

5 Repetitions (maintained without cuing)

Read	reef	Real	Ream	reek
+++++	+++++	+++++	++ +++	+++++

261

Repeat Word 3 Times Then New Word

Once the student can do 5 repetitions **without cues or errors**, have the student repeat the same word three times then switch to another word.

C1V1C1	read	read	read	reap	reap	reap
1 change						

change

262

Repeat Two Times, Change, Repeat Two Times, Change

Once the student can make the one change as the example above without cues or errors, then have the student make two changes. Repeat the same word a couple of times, then switch to a new word then switch again.

C1V1C1	read	read	reap	reap	reek	reek
2 changes						

change

change

263

Alternating Patterns

An alternating pattern may be more difficult than the above patterns.

C1V1C1	read	reap	read	reap	read	reap
alternate						

264

Generalization Pivot Phrases and Documentation

One syllable	2 syllables	3 syllables	4 syllables
My _____	Open _____	Open the ____	Can I have ____
Help _____	Put on _____	Put on a ____	I don't want ____
No _____	Take off _____	Take off the ____	Help me open
Help _____	I want _____	I want a ____	
On _____	Help me _____	Help me on _____	
Hi _____	Begin _____		
Bye _____	Enjoy _____		
Blue _____			

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Next Step: /R/ Therapy Progression

The goal is to use an /r/ that has been remediated, maintained, and generalized to target the next /r/.

From initial
/r/ to /er/

99

Moving to the Next /r/

- Once the next target is determined, the therapist can use a previous target to target the new /r/.

New target		/r/ initial word that is the easiest to produce
her	rrrrrrr	rabbit
burr	rrrrrrr	rabbit
sir	rrrrrrr	rabbit
fur	rrrrrrr	rabbit

272

- May have to delete the /r/ from the new word so that the student does not motor plan the incorrect /r/ first.

h ɔ	rrrrrrr	rabbit
-----	---------	--------

273

Moving /r/ Medial Using Forward Chaining

- x Final /er/ is mastered so need to move it to the medial position

her	t	her	d
her	z	bur	n
bur	p	fur	n

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Goals and Objectives: SMART

101

Specific

- This is the specific goal or goals that are being targeted
- (Name of student) will produce initial /r/ and vocalic /r/

Timely

- This is the timeframe of your goal. Are you writing for an IEP cycle, calendar year, or shorter time increment?
- By _____ (date or timeframe)

281

Realistic/Achievable	Measureable
• This is the opportunity to determine how realistic the goal is based on the student. • Pick: at the single word level, with 5 repetitions, with alternating patterns, in phrases, sentences, structured tasks (reading sentences, reading paragraphs, spontaneous speech), unstructured tasks, or spontaneous speech	• This is the data collection. How will the goal be measured? (# of trials, percent correct, etc) • with 95% accuracy (over three consecutive sessions, in the classroom, in spontaneous production, etc)

282

Goal (Long Term)

By the end of the fourth quarter (timely), student will produce initial /r/ and vocalic /r/ in unstructured task such as spontaneous speech (specific and reasonable) with 95% accuracy while talking with peers or in class (measurable).

283

Objectives (Short Term)

1. Student will produce _____ (initial /r/ or specific vocalic /r/ or other speech sounds being targeted) in (single, with 2, 3, 4, or 5 repetitions, alternating patterns,) words using 8-10 words (stimulus) with 100% accuracy (with cues, without cues) over three consecutive sessions.

284

2. Student will produce _____ (initial /r/ or specific vocalic /r/ or other speech sounds being targeted) in structured tasks for generalization (phrases, sentences, reading) with 95% accuracy (with cues, without cues) over three consecutive sessions.

3. Student will produce _____ (initial /r/ or specific vocalic /r/ or other speech sounds being targeted) in unstructured tasks for generalization with 95% accuracy (with cues, without cues) while conversing with peers over three consecutive sessions.

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Targets and Documentation: Considerations

103-
106

1. Target 8-10 stimulus at a time within the pattern
2. Mastery of at least 95% is required to move onto the next level as listed below.
3. Incorporate activities and reinforcers to keep the child motivate.
 - a. Take a step back toward a wall or other object each time the word is said.
 - b. Shoot a ball into a basket
 - c. Bounce on a ball after practice the number of times repeated (i.e.: 5 repetitions then bounce 5 times)
 - d. Make a craft (i.e.: bead bracelet, perler bead picture). Add a bead after desired number of repetitions. (Can hold bead by your face to increase attention)

286

Next

4. Develop sentences of any complexity
5. Move to paragraphs with only mastered /r/
6. All maintained /r/ patterns should be included for practice

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Next Steps

Step 1:

Rescreen all /r/s

Step 2:

Pick the next /r/ and follow the above steps

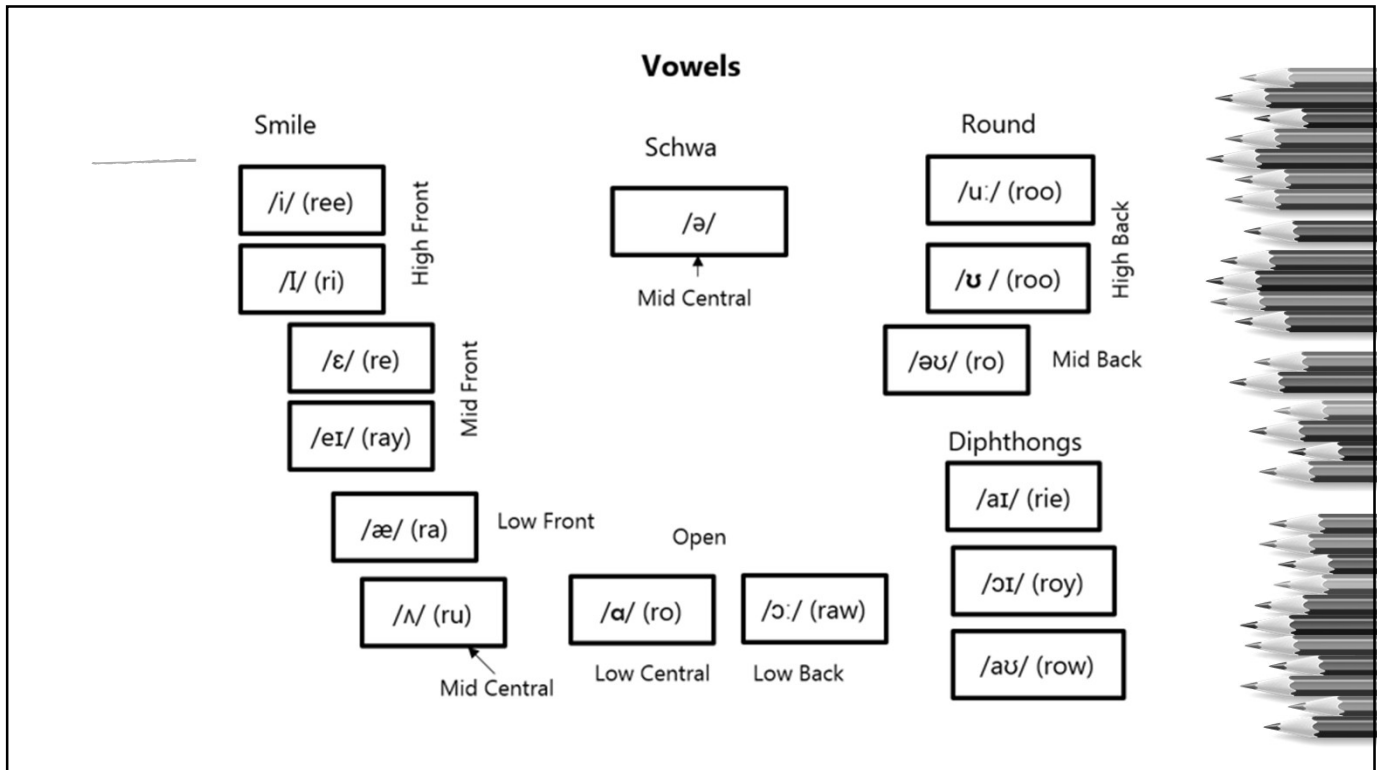
288

Example 2: Using /ar/ as a starting point

Student can produce /ar/ in the final position. How do you use this /ar/ to get to the next target?

/ar/		/r/ initial in a CV pattern
car	rrrrrr	re
bar	rrrrrrr	ri
far	rrrrrrrr	re
star	rrrrrrrrr	rae

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290

Let's Chat

What if your student can only produce /ar/ in the medial position like in bark, park, farm, yarn, cart, large, march, heart. What would you need to do first?

291

Generalization of Persistent Speech Sound Disorders

109

We often see difficulty with generalization with students with PSSD.

When attentional issues are added, the ability to generalize becomes a heavy burden for the student. The following section will provide some strategies for generalization for PSSD.

292

Generalization of Persistent Speech Sound Disorders

293

- X Goal Setting – Explicit Instruction
- X The right approach (developmental vs neurological)
- X Distributed Practice – 3-5 x/week with 100 productions
- X Random Practice (prosody, syllables, words, phrases)
- X Knowledge of Results (general feedback)

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Generalization of Persistent Speech Sound Disorders

- X** High Interest Activities and Discussion
- X** Practice in a Variety of Contexts and Environments to lead to quicker generalization
- X** Introduce Distractions into Therapy – increase the cognitive load
- X** Invite a Friend to Therapy

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Generalization of Persistent Speech Sound Disorders

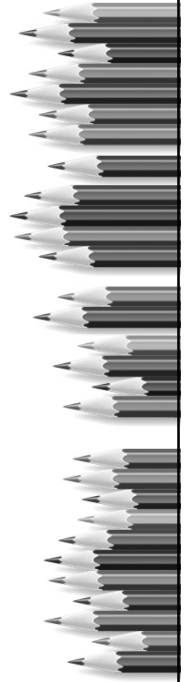
- X** Homework
 - Talking time: Ask parents to have the student share the best part of their day.
 - Talking time during a meal: Each person shares something about their day without interruption of other family members.

295

296

Generalization of Persistent Speech Sound Disorders

- X Choose a Word of the Day
- X Collaboration with Classroom Teacher

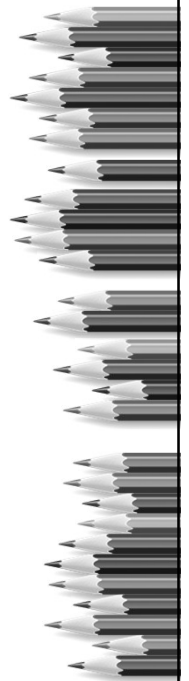


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297

You Decide: Best Approach

The following case studies are designed for you to determine the best treatment approach.



297

Case Study #1

- Age at evaluation: 5;9
- Background: normal pregnancy and birth history, no history of ear infections, physical development delayed, language development delayed. Significant family history for speech and language disorders

Clinical Evaluation of Language Fundamentals Preschool:
Auditory Comp standard score: 93. Expressive: 83

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Case Study continued

Speech: Kaufman Test of Speech Praxis

Oral motor: standard score 12

Simple movement: below norms

Complex movement: below norms



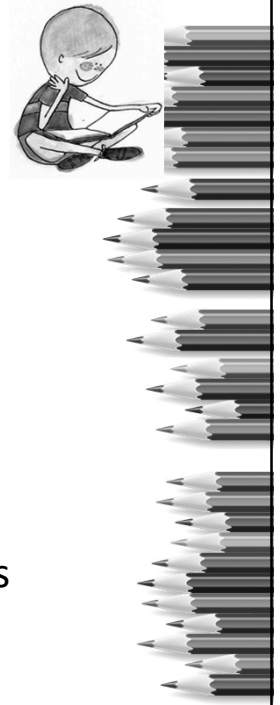
299

Case Study continued

Information reported:

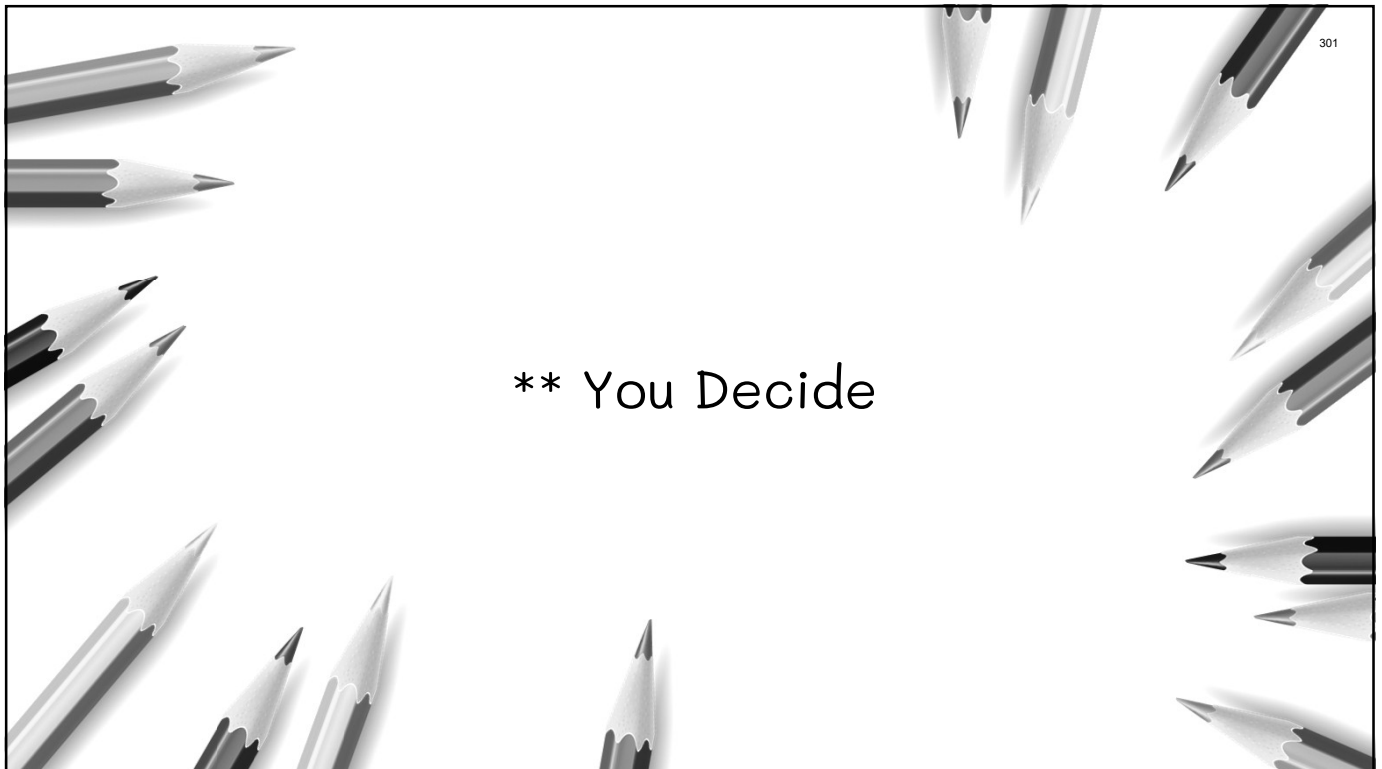
- Difficulty with moving articulators on demand
- Difficulty maintaining the same speech patterns twice
- Difficulty imitating with increased complexity
- Difficulty with diadochokinesis
- Vowel distortions and errors
- Better production of single words than longer utterances

Intelligibility: 90% unintelligible in connect speech



300

** You Decide



301

Diagnostic Statement: Case Study 1

This 5 year 9 month old child who is exhibiting average receptive language and low average expressive language skills, and a severe impairment in speech acquisition with the following characteristics:

- Difficulty moving her articulators on demand
- Difficulty maintaining the same speech movement twice
- Difficulty imitating speech patterns with increasing complexity
- Difficulty performing diadochokinesis
- Vowel distortions/errors
- Better production on single words than longer utterances

These are due to primarily difficulty with planning and programming movement gestures for speech production (CAS). There is no evidence of dysarthria. She is pragmatically and socially appropriate, attends to the speaker, and attempts most tasks.

302

Case Study #2

- Age at evaluation: 3;6
- Background: Full term, uncomplicated birth
- Born with patent ductus arteriosus (PDA) required surgery at 2.6 years of age
- One diagnosed ear infection
- Developmental milestones on target for language development
- Family history of learning disabilities
- Language Sample: Using 6-8 word utterances. Could retell past events, verbal turn taking noted

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Case Studies cont.



- Structured Photo Articulation Test
 - Final consonant deletion
 - Medial consonant deletion
 - Voicing errors
 - Substitutions (i.e.: /w/ for voiced /th/ in the initial position and /y/ in the medial, /y/ for /s/ initial, /f/ for /sw/, /d/ for /st/, /w/ for /br/ and /tr/)
 - Blend reduction
 - Fronting
 - Could produce multisyllable words although sound errors or deletions were present

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305

Phonemic Inventory Probe: Targeting /p/, /t/, /k/, /w/, /l/, /r/

Child Name AW

Target	# Cons	Production	Target	# Cons	Production	Target	# Cons	Production	Phoneme(s)
1. whif	1/2	wɪf	20. writ	0/2	wɪt	39. wɪht	0/2	wɪt	
2. hip	1/2	hi	21. hear	1/2	hi	40. hi	1/2	hi	
3. jock	0/2	q	22. wroek	0/2	wɔ	41. walk	1/2	wɔ	
4. talk	1/2	a	23. tall	1/2	tɔ	42. wall	1/2	wɔ	
5. wing	1/2	wi	24. w ring	0/2	I	43. king	1/2	ti	
6. tea	1/1	ti	25. pea	1/1	I	44. key	0/1	ti	
7. tape	1/2	te	26. tail	1/2	te	45. whale	1/2		
8. snake	1/3	jei	27. spail	1/3	jɔi				
9. toes	1/2	tau	28. wrope	0/2	ou				
10. page	1/2	pei	29. tpage	0/2	te				
11. faye	0/2	ei	30. waye	1/2	wɛ				
12. pie	1/1	pɛ	31. Y/wai	1/1					
13. pig	1/2	pi	32. wig	1/2	wɪ				
14. fake	0/2	ei	33. w rake	1/2	wɛi				
15. cup	0/2	ti	34. fur	0/2	ti				
16. boat	0/2	pɛ	35. bowl	1/2	bɔ				
17. toe	1/1	tau	36. wlow	0/1	wɔ				
18. bike	0/2	pɛ	37. bite	0/2	pɛ				
19. pen	1/2	pe	38. tex	1/2	te				
							85		

Stoel-Gammon (1986) stipulated that two occurrences are required for sounds to be included in the phonemic inventory. Circle sounds for which there are two occurrences on the above task: (p) (t) (k) (w) (l) (r)

Gierut & Champion (2001) indicated that a child must have the second and third consonants of a three-element cluster in his/her phonemic inventory to teach a three-element cluster. Circle permissible three-element clusters for treatment based on the phonemes indicated above:

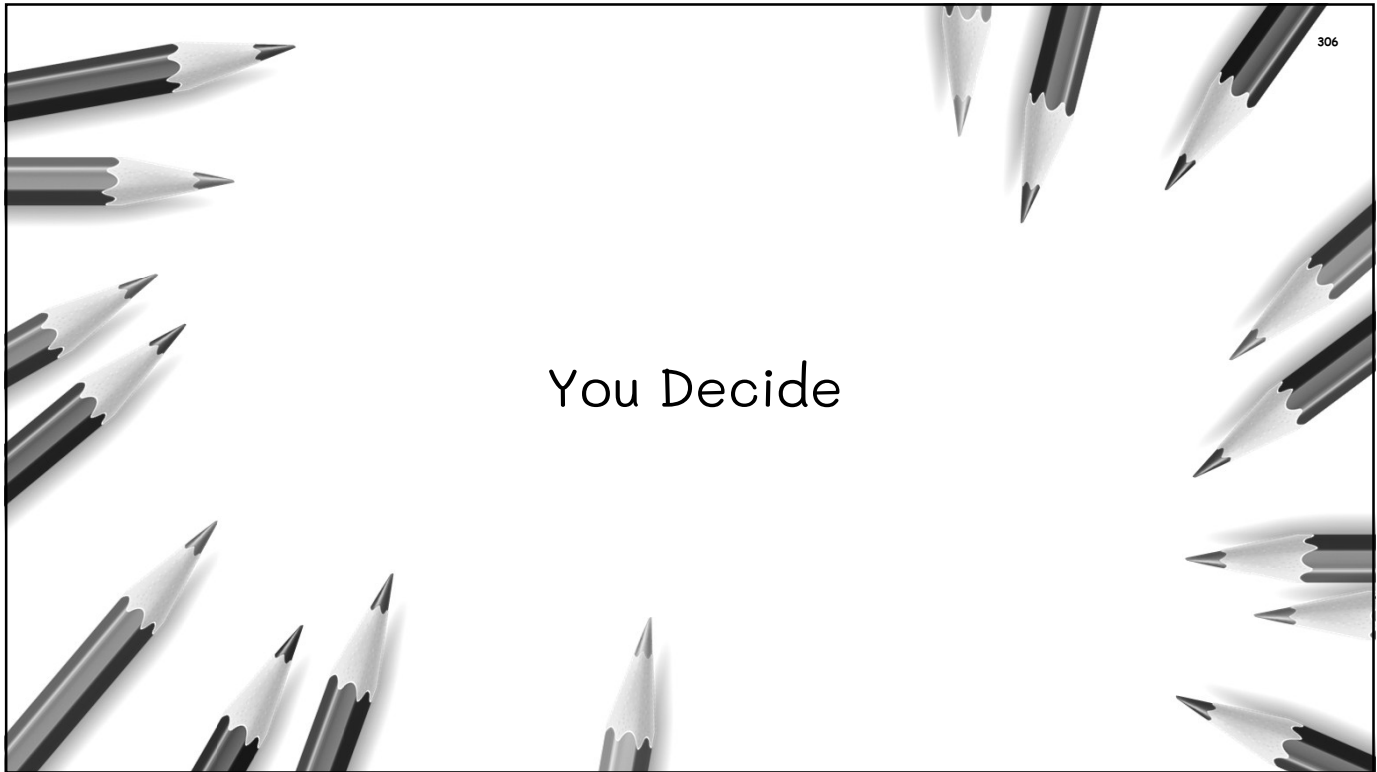
/skt/ /spk/ /skw/ /skw/ /spk/

Total # of Consonants = 85 (Correct # of consonants) 29 /85 = 25 %

Percentage Consonants Correct (PCC) = # correct consonants/total # of consonants

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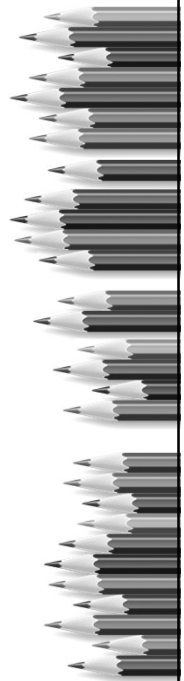
305



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Diagnostic Statement: Case Study #3

This 3 year 6 month old child who is exhibiting average receptive and expressive language skills by evidence of a language sample but a severe impairment in speech acquisition, phonological impairment in medial and final consonant deletions, gliding, blend reduction, fronting, and voicing errors. She does not demonstrate difficulty with multisyllabic word production demonstrating consistent errors as seen in single syllable words, vowel repertoire, slow rate or prosody. There is no evidence of dysarthria or motor programming or planning. She is pragmatically and socially appropriate, attends to the speaker, and attempts most tasks.



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Case Study #3

- Age at evaluation: 6;2 (first grade)
- Background: normal pregnancy and birth history, no history of ear infections, physical development on time, language development delayed. No family history for speech and language disorders

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Case Study #3

- Receptive and Expressive Language Skills: Low average range (Began receiving speech therapy services in preschool) for severe phonological impairment and expressive language delay
- Pragmatic/Social Language: Gets along well with peers but peers comment that he sounds like a baby
- Oral Motor: Structure and function adequate

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Case Study continued



Intelligibility: Very low to familiar and unfamiliar listeners

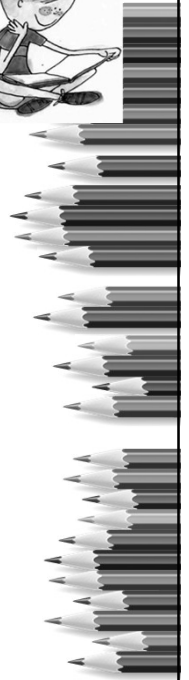
Multiple phonological patterns:

Velar fronting: t/k, d/g, palatal fronting s/sh, s/ zh

Deaffrication s/ch, z/dʒ

Cluster reduction

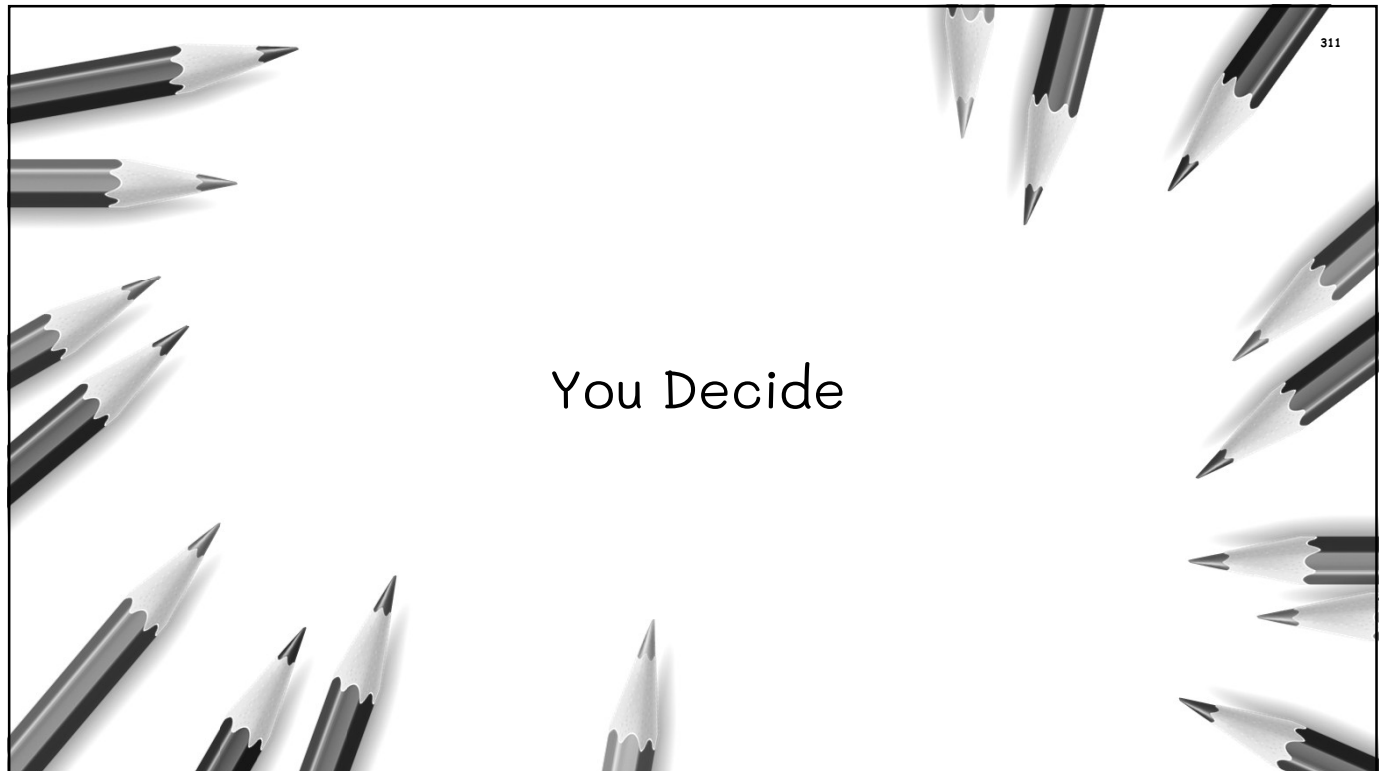
Gliding



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You Decide

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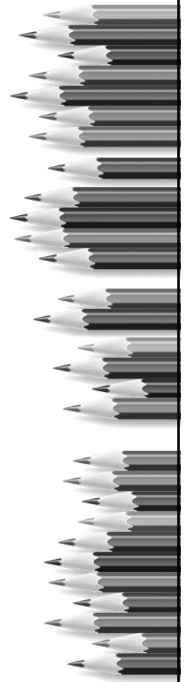
311

Diagnostic Statement: Case Study 6

This 6 year 2 month old child who is exhibiting below average receptive language and low average expressive language skills, and a severe impairment in speech acquisition with the following characteristics:

- Oral motor structure and function: adequate
- Multiple phonological processing errors
- Decreased overall speech sound development
- Low intelligibility

The student presents with multiple errors that requires an approach (Complexity Approach) to increase accurate speech production due to moderate to severe phonological impairment with low intelligibility and limited phoneme inventory. Language skills will also be targeted with building phonological awareness, morphology, syntax, and semantics through articulation targets. He is pragmatically and socially appropriate, attends to the speaker, and attempts most tasks.



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What is Good Enough?

Story of Jack



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SSD and Educational Impact: IDEA

Academic performance (i.e., class grades) is not the only factor that should be considered in making eligibility decisions (Dublinske, 2002; Posny, 2002).

- x Academic
- x Social-emotional (child's perceptions, feelings, and attitudes about how others view his or her communication, as well as the perceptions, feelings, and attitudes held by those who interact with the child.)

Great Resource: Wisconsin Department of Public Instruction: Considerations for Speech Impairment <https://dpi.wi.gov/sites/default/files/imce/sped/pdf/sl-speech-rubric.pdf>

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SSD and Educational Impact: IDEA

Researchers have consistently found that having a communication disorder results in long-term negative academic outcomes (Lewis & Freebairn, 1992; Sices, Taylor, Freebairn, Hansen, & Lewis, 2007) and social interactions (McCormack, Harrison, McLeod, & McAllister, 2011; McCormack, McLeod, McAllister, & Harrison, 2009). Negative academic outcomes and social interactions may lead to a reduction in quality of life through adulthood (Feeney, Desha, Ziviani, & Nicholson, 2012).

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From ASHA

Termination Due to Lack of Progress

An apparent "lack of progress" is based on the assumption that the prescribed treatment goals, methods, data collection, and use are all appropriate for the individual with disabilities and their family. However, *it is possible that the perceived lack of progress is actually an indication that the procedures being implemented are not well-suited to the individual with disabilities. In other words, lack of progress might indicate that the intervention is a poor fit. It is important to examine whether the intervention itself is optimal for the individual, their family, and their other caregivers and educators.*

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Before we go ...!

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Takeaways

- x Differential diagnosis leads to the right approach!
- x There are so many reasons for persistent speech sound disorders (developmental, neurological, hx of speech delays, hx of normal development but failure to achieve accurate production of 1 or 2 sounds, one syllable words OK but multisyllable difficult)
- x PSSD 1-2% and can persist into adulthood causing possible lower skilled jobs and unemployment

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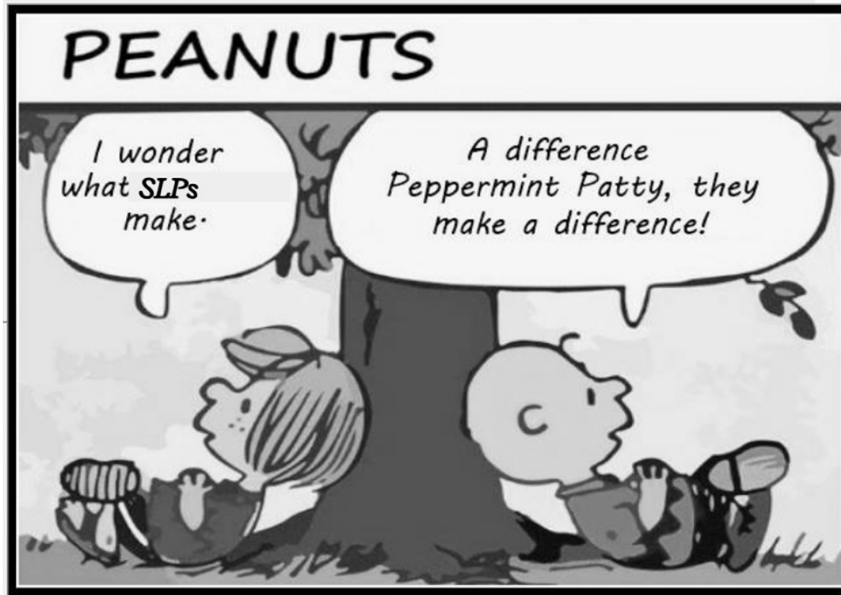
Takeaways

- x Perception of others regarding academic, social, and behavioral performance are impacted by SSD
 - Teachers have lower expectations
- x Research shows that children as young as 4-5 were successful with treatment of later acquired sounds
- x Strong link between SSD & phonology and morphology
- x Explicit, Systematic, and Sequential instruction works!
- x Generalization for PSD can cause cognitive overload

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Thank you for making a difference!



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