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TREATMENT FOR SCHOOL-AGE CHILDREN WITH CAS

SpeechPathology.com

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ASHA FINANCIAL DISCLOSURE

FINANCIAL

- Paid an honorarium for this presentation.
- Author of the book, *Here's How to Treat Childhood Apraxia of Speech, Second Edition*, for which royalties are received. This book is listed in the references section of your handout.

NONFINANCIAL

- Serves on Professional Advisory Board for the Childhood Apraxia of Speech Association of North America (CASANA)
- Serves as Topic Area Advisor for the SpeechPathology.com Advisory Board

Level of Instruction: **Introductory**

Participant Learning Objectives:

- 1) List at least **five ongoing speech-related challenges** commonly observed in school-age children with CAS.
- 2) Describe at least **five ways to facilitate improvement** of speech skills in children who have ongoing difficulty with **prosody**, production of **complex phoneme sequences**, **voicing errors**, and **generalization**.
- 3) Explain how to **modify four treatment variables** in therapy to achieve successful treatment outcomes.

ONGOING SPEECH-RELATED CHALLENGES

- **Prosody**
- **Voicing contrasts**
- **Complex phoneme sequences**
- **Omissions – particularly sentence-level**
- *Later developing phonemes, phonological patterns, and vowels*
- *Comprehensibility*
- **Generalization**

5 FEATURES OF PROSODY

- Stress
- Intonation
- Rhythm
- Juncture
- Tone of Voice

VOICING ERRORS

- Initial consonant voicing*
 - **b/p**
 - **d/t**
 - **g/k**
- Final consonant devoicing

COMPLEX PHONEME SEQUENCES: Common Challenges

- Multisyllabic words
- Clusters (double/triple; l/M/F)
- Place & manner shifts
- Challenging phonemes w/in same word
- Words with less common lexical stress patterns
- Phoneme confusion

PHONEME/SYLLABLE OMISSIONS

Sentence-level challenges:

- Final consonant deletion
- Omission of medial consonants
- Weak syllable deletion
- Cluster reduction
- Combinations of the above

REDUCED COMPREHENSIBILITY

May be related to:

- Speaker factors
- Listener factors

LACK OF GENERALIZATION

May be related to:

- Severity
- Dependency on models/cueing, feedback
- Contextual limitations
- Insufficient challenge
- Cognitive resource allocation
- Poor practice habits

ADDRESSING FEATURES OF PROSODY: Stress

Lexical Stress– Word-level stress

Suggested treatment sequence

1. Identification??
2. Imitation SW – *Rule of thumb* – **trochaic** first
3. Spontaneous SW
4. Imitation sent.- *trochaic* first
5. Spontaneous sent.








ADDRESSING FEATURES OF PROSODY: Stress

• **Lexical Stress**

- Examples **trochaic** sentences
 - Do you **have** the (tiger/dragon/watermelon)?
 - Put the (basket/candle/penny) **on** the table.
- Examples **iambic** sentences
 - I **bought** a **big** (giraffe/balloon/aquarium).
 - I **know** you **won't** (agree/believe/participate).

Bowen, C. (2015). *Children's speech sound disorders*. Oxford, UK: Wiley-Blackwell.

LEXICAL STRESS VISUAL CUES

H APPY	 
B ALLOON	 
B AN A NA	  

STRESS in DERIVATIONAL PAIRS

VERBS	NOUNS	VERBS	NOUNS
address	address	consider	consideration
conduct	conduct	continue	continuation
conflict	conflict	con verse	con versation
insult	insult	e conomize	e conom ics
invite	invite	inform	in form ation
present	present	investigate	in vestiga tion
suspect	suspect	multiply	multi plica tion
upset	upset	repeat	re peti tion

ADDRESSING FEATURES OF PROSODY: Stress

- **Sentence-Level Stress**
 - **Phrasal Stress** (*natural stress* of a specified language – in English, greater relative stress on **Content** words than **Function** words)
 - Naturalness
 - Intelligibility/naturalness balance
- e.g., “My sister was walking to school last Saturday.”

ADDRESSING FEATURES OF PROSODY: Stress

- **Sentence-Level Stress**
 - **Contrastive Stress** (applying emphasis to specific word(s) in a sentence) **VARIABILITY!**
 - Classic children’s stories
 - Prediction and review
 - Statement-Question-Response
 - Fix the sentence

Statement-Question-Response

S: The dog ate 12 bones.

Q: Who ate 12 bones?

R: The **DOG** ate 12 bones.

Q: How many bones?

R: The dog ate **12** bones.

Fix the Sentence

Sentence: The dog ate 12 bones.

Incorrect: The dog ate 10 bones.

R: No, the dog at **12** bone.

Incorrect: Oh, the dog at 12 pizzas.

R: No, the dog at 12 **bones**.

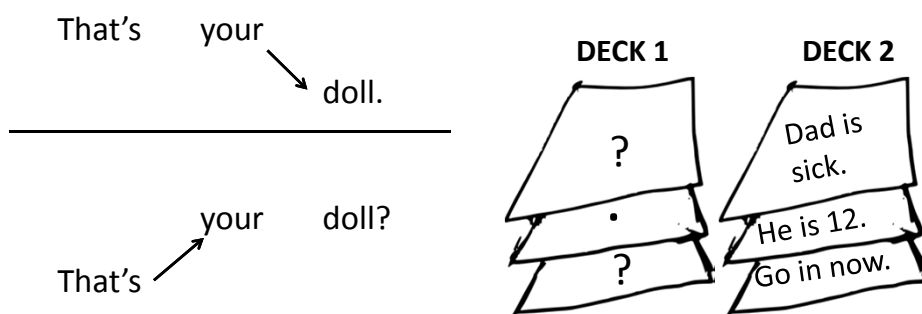
ADDRESSING FEATURES OF PROSODY -Intonation

- Intonation is bound by grammar
 - **Rising** – yes/no questions, tag questions, declarative questions
 - **Falling** – declarative statements, “wh” questions

ADDRESSING FEATURES OF PROSODY -Intonation

- **Rising and Falling Intonation**

– Contrasted declarative sentence pairs (?) (.)



ADDRESSING FEATURES OF PROSODY: Intonation

- **Rising and Falling Intonation**

– Visual Cues

- gestural cues  
- arrows ↗ ↘

< Mom, can I go to a movie? ↗ Sure, after you do your homework. ↘ Can you drive us? ↗
Yes, I can. ↘ How long will you be gone? ↘ >

ADDRESSING FEATURES OF PROSODY: Rhythm

- **Rhythm** – English is a *stress timed language*; relatively regular intervals of stress

My	dad	made	soup	for	lunch.
My	dad	made	a pot of soup /ə.pa.də sup/	for	lunch.



Go for **efficiency!**

ADDRESSING FEATURES OF PROSODY: Juncture

- **Juncture** – brief pauses in connected speech
 - **natural phrase breaks** - variable
 - **lists** – variable pauses - depends
 - **establish subtle meaning differences**

e.g., “My brother, the singer, and my mom had dinner.”

My brother,// the singer,// and my mom came for dinner.

My brother, the singer, // and my mom came for dinner.

ADDRESSING FEATURES OF PROSODY: Juncture

- **Juncture** – through chunking and pausing
 - Nursery rhymes – “Hickory Dickory Dock”
 - Silly sentence creation – (Webber Funny Flips by Super Duper Inc.)
 - Defined pause breaks (visual marking)
 - Build-a-sentence – Color-coded
 - Round robin sentences – w/ or w/out visuals

JUNCTURE: Defined Pause Breaks

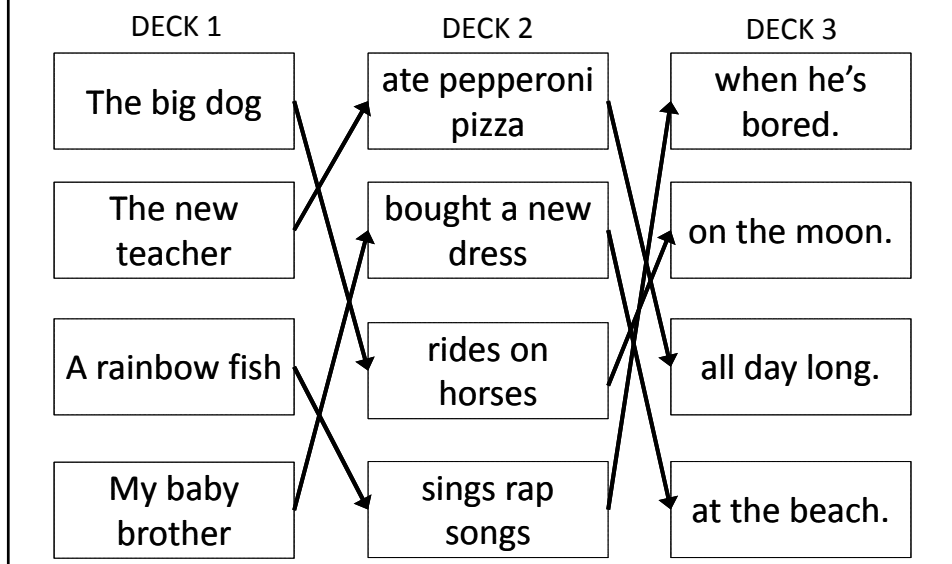
The boy lost his wallet // because he was careless.

We went out for recess // after we ate our lunches.

After Tommy ate the candy // he had to brush his teeth.

If I finish all my homework // I can play video games.

JUNCTURE: Build a Sentence Round Robin



ADDRESSING FEATURES OF PROSODY: Tone of Voice

- **Tone of Voice** – *altering vocal quality, rate, pitch, rhythm, and/or intensity to express mood/feelings, sarcasm, irony, personality ... **VARIABILITY!***
 - Identification
 - Say it like you're...
 - Genuine or sarcastic?
 - Familiar children's stories- 3 Bears, Little Red Riding Hood
 - Comic strips, other – Scooby Doo, Disney, Peanuts, Star Wars

ADDRESSING VOICING ERRORS

Intervention Sequence for reducing Initial Consonant Voicing:

1. Discrimination (if needed)
2. SW productions w/ aspiration- **phhhea (pea)**
3. SW productions w/progressively reduced aspiration-
/phi/, /p^hi/
4. Contrast pairs- **pea/bee, tea/D, coat/goat**
5. Sentence-level productions- "I have a new **coat**."
6. Sentence-level w/ contrast pairs- "The **goat** has a new **coat**."

SAMPLE CONTRAST PAIRS: Initial consonant voicing

/p/	/b/	/t/	/d/	/k/	/g/
Paul	Ball	Toe	Dough	Kate	Gate
Pin	Bin	Tea	D	Coat	Goat
Pie	Bye	Ten	Den	Curl	Girl
Pea	Bee	Tart	Dart	Coast	Ghost
Peep	Beep	Town	Down	Clue	Glue
Peach	Beach	Time	Dime	Grapes	Crepes
Path	Bath	Tile	Dial	Could	Good
Pole	Bowl	Tear	Deer	Cold	Gold

ADDRESSING COMPLEX PHONEME SEQUENCES: MULTISYLLABICS

Examples from a child's speech sample

TARGET WORD	CHILD'S PRODUCTION	TRANSCRIPTION
suspicious	"spishous"	/spɪ.ʃəs/
mysteriously	"tearouswee"	/tɪr.əs.wi/
evacuation	"backawation"	/bæk.ə.wɛɪ.ʃən/
temporarily	"teparily"	/tɛ.pɛ.rə.li/
appreciated	"peashaded"	/pi.ʃɛɪ.dəd/







ADDRESSING COMPLEX PHONEME SEQUENCES: Multisyllabics

- ***Rate reduction***
- Backward chaining
- Forward chaining
- Visual syllables/rebus
- Printed word w/ or w/out syllable breaks
- **Squeeze** or tap & squeeze

*Look to children's **textbooks** for targets*

ADDRESSING COMPLEX PHONEME SEQUENCES: COMPLEX MULTISYLLABICS

- Backward chaining + syllable pictures (e.g., evacuation)

				
		u	a	
		u	a	
e		u	a	






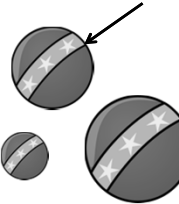
ADDRESSING COMPLEX PHONEME SEQUENCES: COMPLEX MULTISYLLABICS

Forward chaining- *Teachers Pay Teachers Freebie-see handout*

some	summer	summertime
me	meaty	medium
miss	mister	mystery
soup	super	superman
bass	basket	basketball
Ann	Anna	animal
pear	perish	parachute

ADDRESSING COMPLEX PHONEME SEQUENCES: COMPLEX MULTISYLLABICS

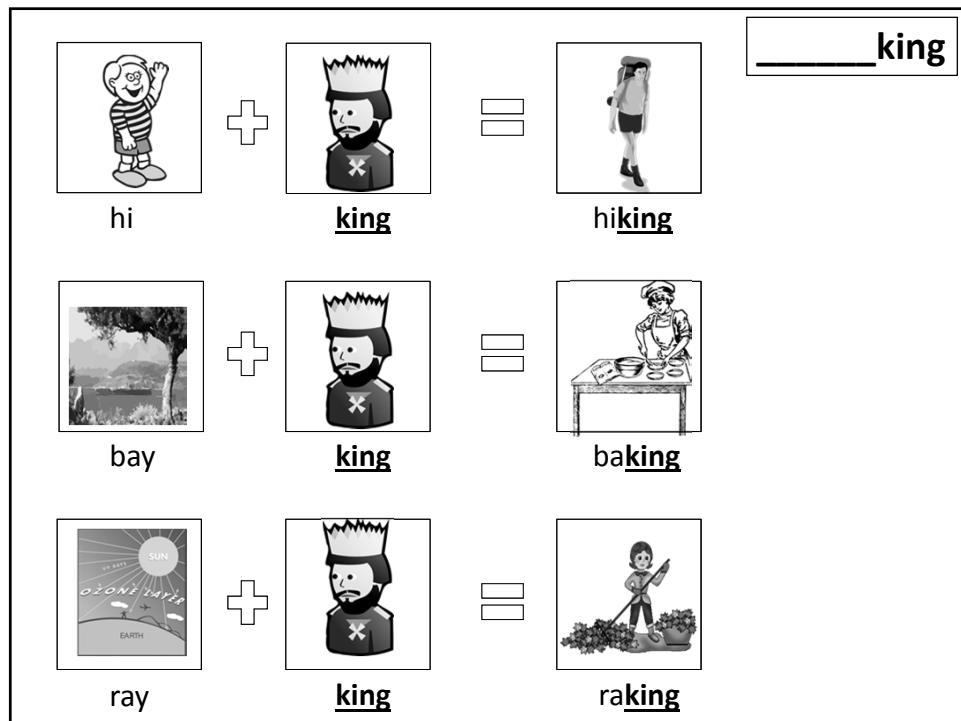
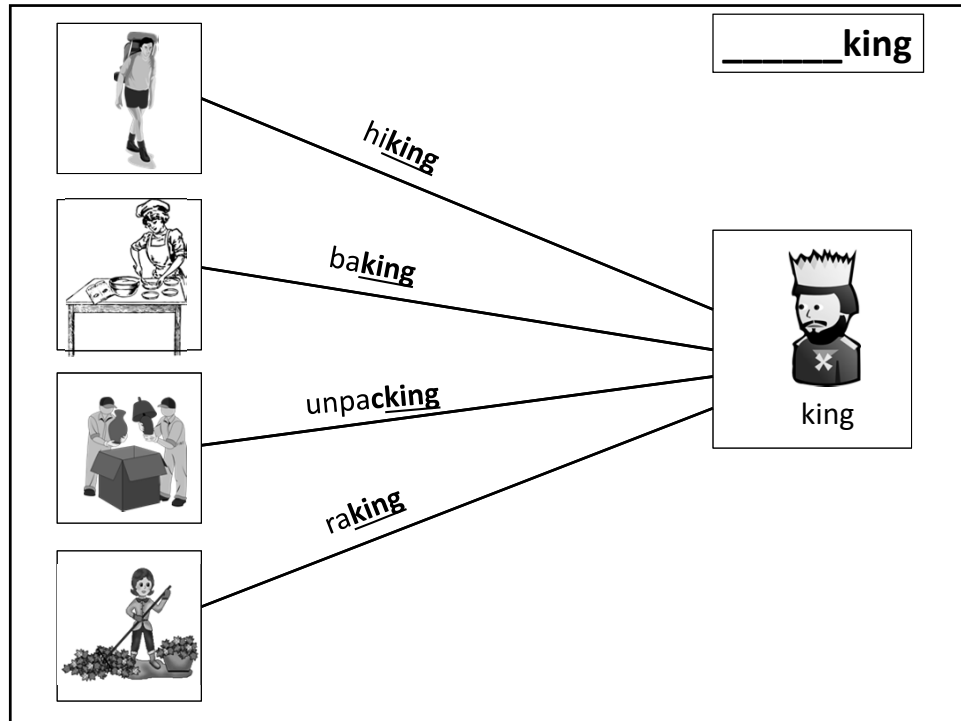
Visual Syllables w/ backward or forward chaining

Sue 	purr 	man 	Superman 
me	D 	um	medium 

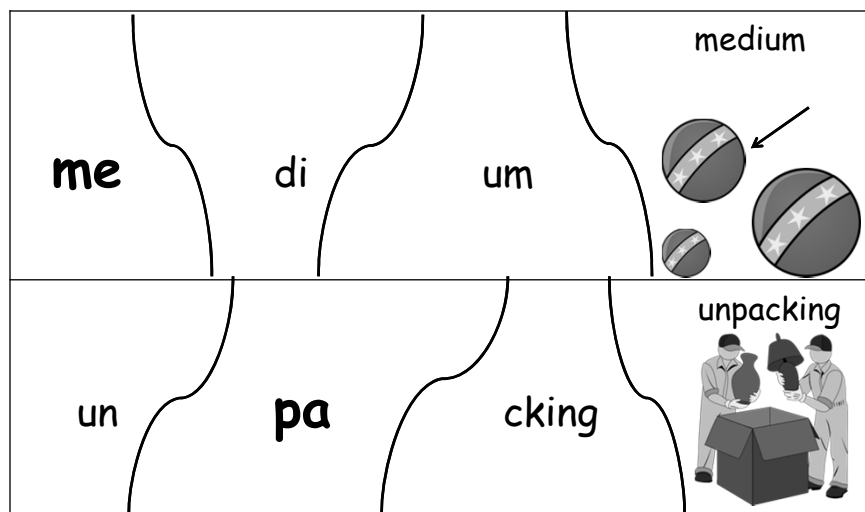
GROUPING WORDS WITH SIMILAR ENDINGS

Present progressive -ing

- king** (walking, taking, remarking, unpacking)
- ding/ting** (hiding, riding, pretending, recommending
letting, melting, communicating, operating)
- sing** (crossing, dressing, introducing, balancing)
- ming** (humming, swimming, assuming, vacuuming)
- ping** (hopping, hoping, developing, unzipping)
- wing** (sewing, mowing, borrowing, following)
- ching** (catching, teaching, researching, approaching)



PRINTED WORD CUES



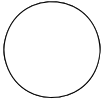










PRINTED WORD CUES

benefit	ben – e - fit
responsible	re – spon – si - ble
graduation	grad- u – a - tion

SQUEEZE or TAP AND SQUEEZE

benefit	ben	e	fit	
responsible	re	spon	si	ble
graduation	grad	u	a	tion

SQUEEZE or TAP AND SQUEEZE

benefit				
res pon sible				
graduation				

ADDRESSING COMPLEX PHONEME SEQUENCES: CLUSTERS

- Address :
 - **All** word positions
 - Doubles and **triplets** (e.g., **spring**, **asks**)
 - Targets w/ **multiple clusters** (e.g., **accomplished**, **consequence**, **equivalent**, **frustrated**, **suspense**, **splashed**)
 - Targets w/in **curriculum materials**
 - **Morphological markers**

ADDRESSING COMPLEX PHONEME SEQUENCES: CLUSTERS

- Specific strategies:
 - Backward chaining
 - Forward chaining
 - Semantically meaningful contrast pairs
 - Visual cueing
 - Morphological marker groupings

ADDRESSING COMPLEX PHONEME SEQUENCES: CLUSTERS

- **Backward chaining w/ or w/out visual cueing**

top	s...top	stop
s	hat...s	hats
reak	sh...reak	shreak







- **Forward chaining w/ or w/out visual cueing**

hat		hat...s		hats	
talk		talk...ed		talked	
pun	pun...ch	punch	punch...ed		punched

ADDRESSING COMPLEX PHONEME SEQUENCES: CLUSTERS

- Using power of **semantically meaningful differences** through contrast pairs

- Bikes/bike
- Stop/top
- Bench/Ben
- Lamb/lamp/slam
- Can't/can/cat
- Mom's/mom
- Store/tore/sore

		<p><i>Meaningful</i> semantic contrasts Make it visual</p> <p>2 card sets I have _____. Give me the _____.</p>
bed	bed <u>s</u>	
		
hat	hat <u>s</u>	
		
book	book <u>s</u>	

ADDRESSING COMPLEX PHONEME SEQUENCES: CLUSTERS

Morphological marker groupings by final cluster

/kt/	/ks/	/t's/
walk <u>ed</u>	truck <u>s</u>	what' <u>s</u>
bark <u>ed</u>	bike <u>s</u>	it' <u>s</u>
look <u>ed</u>	duck <u>s</u>	let' <u>s</u>
/ft/	/mps/	/n't/
splash <u>ed</u>	bump <u>s</u>	can' <u>t</u>
crash <u>ed</u>	jump <u>s</u>	won' <u>t</u>
wash <u>ed</u>	limp <u>s</u>	don' <u>t</u>

ADDRESSING COMPLEX PHONEME SEQUENCES: Place/Manner Shifts

- Note challenging shifts – **unique** to each child, for example:
 - Alveolar to velar (talk)
 - Velar to alveolar (good)
 - Alveolar to bilabial (top)
 - /s/ to stop in clusters (spoon)
- Choose targets that address place/manner shifts challenging to **individual** child

ADDRESSING COMPLEX PHONEME SEQUENCES: Multiple Challenge Phonemes w/in Same word

Suggested sequence:

1. Solidify production of target phonemes w/in separate words (e.g., /s/ soap, /v/ have)
2. Gradually introduce 2 of same target w/in a word (e.g., /s/ sauce, /v/ valve)
3. Move to 2 different targets w/in a word (e.g., /s, v/ solve, stove, vase, vessel)
4. Move to sentence-level productions

ADDRESSING COMPLEX PHONEME SEQUENCES: Multiple Challenge Phonemes w/in Same word

Treatment recommendations:

- **Use cues** as needed
 - Highlight letters
 - Use different highlighting colors (for readers) or blocks (for nonreaders)
 - Touch cues
 - Tactile cues
 - Rate reduction
- Gradually **reduce** cues

Visual Cues – Color Highlighting

Target phonemes: /s, r, sh/	rush
	sunshine
Target phonemes: /l, r/	ladder
	explored

Examples of HPCSD Tier II Vocabulary

Grades 1-2	Grades 3-4	Grades 5-6
comfortable	accomplish(ed)	consequence
explored	construct	equivalent
frustrated	distribute	frequent/frequency
important	endangered	influence
problem	experience	peculiar
responsible	scarce	suspense
squirm	slumber	transfer
suggestion	threatens	unexpected

ADDRESSING COMPLEX PHONEME SEQUENCES: Phoneme Confusion

- Challenging target **examples**:
 - w/r – world, worried, warrior
 - s/j – sunshine, seashell, association, “
 - f/θ; v/ð- feather, father, thieves, they’ve
 - t/k; d/g – talked, dog, rocket, dragged
- Tongue twisters
 - create tongue twister carrier phrases
 - Where were the (warriors). I wondered where the (warriors) were.
 - Sasha shares her (seashells).
 - Doggies dug up the (gold).

ADDRESSING COMPLEX PHONEME SEQUENCES: Phoneme Confusion

- Requires **high accuracy level of target phoneme**
- Requires **substantial volitional effort** initially
 - Complexity of syllable structure
 - Language
 - Cognitive
 - Motor
- Use visual cues
- Gradually increase length and complexity

Visual Cues – Color Highlighting

Target phoneme: /r/ Former substitution: /w/ for /r/	worried I wonder why he's worried.
Target phonemes: /sh/ Former substitution: /s/ for /sh/	selfish What a selfish shellfish!

Visual Cues – Varied Shapes

Target phoneme: /r/ Former substitution: /w/ for /r/	
Target phonemes: /sh/ Former substitution: /s/ for /sh/	

= W
 = R

= S
 = SH

PHONEME/SYLLABLE OMISSIONS

Sentence-level challenges:

- **Final consonant deletion**
- **Omission of medial consonants**
- *Weak syllable deletion*
- *Cluster reduction*
- Combinations of the above

ADDRESSING PHONEME/SYLLABLE OMISSIONS: Medial & Final Consonants

- Observe individual **trends**
- Note “**function**” words – i.e., prepositions, auxiliary verbs, conjunctions
- Increase **awareness** – judgment of accuracy-partner/self
- **Sentence build-ups**
- Use **contrastive stress** initially

SENTENCE BUILD-UPS

	is				
	<u>is</u>	driving			
He	is	driving			
				his	
				his	house
			to	his	house
He	is	driving	to	his	house.

ADDRESSING MEDIAL/FINAL CONSONANT OMISSIONS

Contrastive Stress

Clinician: He's **NOT** driving to his house?

Student: No, he **IS** driving to his house.

Clinician: He's driving to **HER** house?

Student: No, he is driving to **HIS** house.

SKILL REFINEMENT

Optimum Challenge Point

The **constantly moving point in treatment** when the task is neither too easy nor too challenging.

Child should be reasonably challenged w/out being frustrated.

(Guadagnoli & Lee, 2004; Rvachew & Brosseau-Lapre, 2012)

SKILL REFINEMENT

To achieve optimum challenge point requires

Manipulation of four variables **in real time**

- Motoric/linguistic challenge, complexity, & variability
- Cueing
- Feedback
- Context

for more detail see Rvachew & Brosseau-Lapre (2012)

SKILL REFINEMENT: Motor/Linguistic Challenge and Complexity

Manipulation of:

- Word complexity
- Linguistic complexity
- ***Variability***

Target	Accuracy
"Science"	85% ↑
"Scientist"	80% ↑
"My science teacher"	80% ↑
" MY science teacher"	92% ↑
"My science teacher"	↑
"He's a scientist."	40% ↓
"a scientist"	90% ↑
"He's a scientist."	85% ↑
" He's a scientist."	80% ↑
"He's a scientist ."	↑

SKILL REFINEMENT: Cueing and Cue Saliency (A/V/T/M)

- **Fading, Adding, Bundling, and Unbundling cues**
- **Sample metacognitive cues**
 - Hand cues, manual signs
 - Graphic cues
 - Syllable awareness (tapping/clapping/blocks/chips)
 - Metaphors
 - Phonetic placement cues
 - Visual syllables/Rebus

SKILL REFINEMENT: Feedback

- **Frequency**
 - Pre-practice
 - Practice
- **Type**
 - Extrinsic (KP or KR)
 - Intrinsic
- **Timing**

SKILL REFINEMENT: Context

- **Familiarity of:**
 - Setting
 - Communicative partners
 - Activity
- **Competing Motor Tasks**

Facilitating Generalization

Factors impacting retention and transfer

- Severity?
- # of practice opportunities in session?
- Contextual flexibility?
- Cueing?
- Feedback?
- Rate?

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Facilitating Generalization

How do these factor into retention and transfer?

- Variability?
- Coarticulatory transitions; pausing?
- Target utterance selection?
- Comprehensibility/sensitivity?
- Home/School practice?

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FACILITATING GENERALIZATION

- Home practice – LEVEL?
- Distraction
 - Motor
 - Language Content
 - Memory
- Treatment context
 - Location
 - Participants

FACILITATING GENERALIZATION

- Task structure
- Cueing & Feedback
- Manipulation of linguistic and phonetic complexity
- Practice chunking and pausing
- “Mind the **gap**”
- Comprehensibility & sensitivity to partner

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