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Assessment of Speech Sound Disorders in Children with Cleft Palate &/or VPD

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Disclosures

- ◉ Employee at Riley Hospital for Children at IU Health in Indianapolis, IN, as the Speech-Language Pathologist on the Cleft Palate/Craniofacial Team
- ◉ Member of the ASHA SIG 5 Speech Science and Orofacial Disorders Education Committee
- ◉ Collaborator for the NIH-NICDR funded project, "An Inter-center Comparison of Speech Outcomes for Children with Cleft Palate: The Americleft Project"

Terminology

What is a cleft lip and/or palate?

- Cleft lips can vary from a small defect to a complete opening that extends to/through the floor of the nose
- Cleft lips often, but not always, include part or all of the alveolus

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What is a cleft lip and/or palate?

- ◉ A cleft palate occurs when the two palatal plates do not fuse together in utero
- ◉ A cleft palate results in an abnormal opening between the oral and nasal cavities

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What is a cleft lip and/or palate?

- ◉ A submucous cleft palate occurs when the mucosal lining of the roof of the mouth develops over a cleft of the bony hard palate
- ◉ May be noted by three distinct features:
 - Bifid uvula
 - Midline division of the soft palate musculature
 - Notch at the posterior border of the hard palate

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What is a cleft lip and/or palate?

- ◉ Clefts occur in isolation or in combination
- ◉ May be unilateral or bilateral, complete or incomplete
- ◉ Clefts are among the most common birth defects in North America
- ◉ Appear to be due to a combination of genetic and environmental factors

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Velopharyngeal (VP) Function

- ◉ *Velo* = velum, soft palate
- ◉ *Pharyngeal* = pharynx, pharyngeal walls
- ◉ *Velopharyngeal Function* = referring to the movement of the velum and the pharyngeal walls during speech

Velopharyngeal Function

- Levator veli palatini muscle
 - Muscle mass of the velum
 - Primarily responsible for the elevation of the velum
 - Moves the velum superiorly and posteriorly to close against the posterior pharyngeal wall

Velopharyngeal Function

- Musculus Uvulae
 - Creates a bulge on the nasal surface of the velum to extend and contact the posterior pharyngeal wall

Velopharyngeal Function

- Superior Pharyngeal Constrictor
 - May contribute to the medial movement of the lateral pharyngeal walls and the anterior movement of the posterior pharyngeal wall

Velopharyngeal Function

- Palatopharyngeus
 - Form the posterior faucial pillars
 - Cause adduction of the faucial pillars and narrowing of the VP port
 - Also thought to work against the levator to lower the velum

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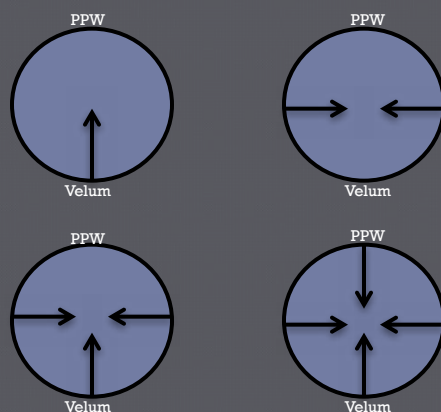
Velopharyngeal Function

- ◉ Palatoglossus
 - Act against the levator to depress the velum
 - Responsible for the rapid downward movement of the velum during speech

Normal VP Function for Speech

- ◉ Complete closure of VP port necessary for production of oral consonants
 - /p, b, t, d, k, g, s, z, f, v/, “sh,” “zh,” “ch,” “dg,” “th,” and voiced “th”/
- ◉ Closure can be variable for vowels
- ◉ VP port is consistently open for nasal consonants
 - /m, n/ and “ng”

VP Closure Patterns



Velopharyngeal Dysfunction

- Velopharyngeal *Insufficiency* = caused by a tissue insufficiency/abnormal structure
- Velopharyngeal *Incompetency* = tissue/structure is fine, but function/movement is inadequate
- Velopharyngeal *Mislearning* = VPD exists despite sufficient structure and *capable* function

Resonance

- ◉ Resonance is the energy created as air travels through the vocal tract
- ◉ Occurs on resonating sounds – vowels and voiced consonants
- ◉ Normal resonance has balance of oral and nasal energy
- ◉ “Normal” is on a continuum

Resonance

- ◉ *Hyponasality* – too little nasal resonance on nasal sounds
- ◉ *Hypernasality* – too much nasal resonance on oral sounds
- ◉ Mixed = combination of hyper- and hypo-
- ◉ Cul de sac = occurs when energy is trapped

Nasal Air Emission

- ◉ Airflow deviation out the nasal cavity
- ◉ Occurs during production of oral sounds
- ◉ May be audible or inaudible

ASSESSMENT

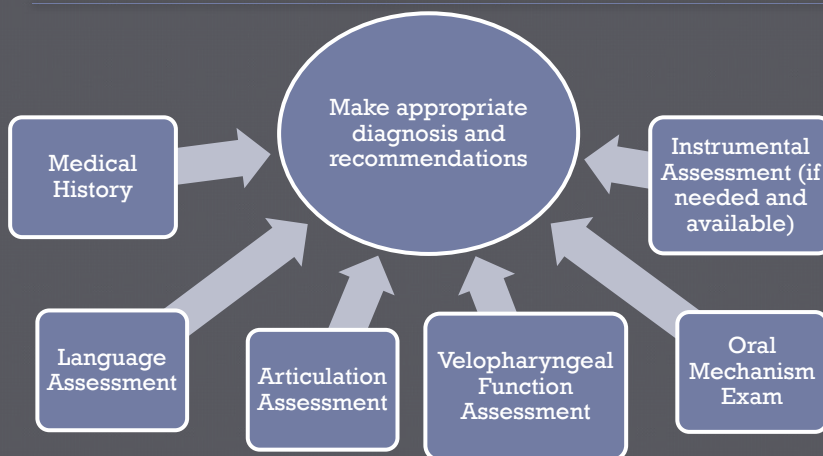
Goals of Assessment

What is the
child doing
now?

What is the
child capable
of doing?

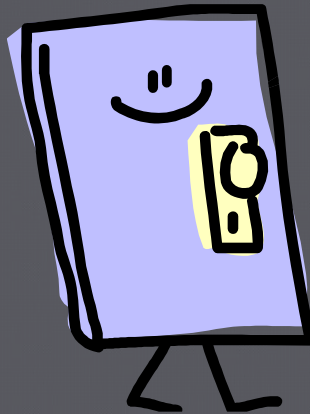
Where do I
go from
here?

Parts of Assessment



Medical History

- Leave your assumptions at the door!



- Medical diagnoses (related and unrelated to speech)
- Family history
- Feeding history
- Breathing issues
- History of ear infections
- Motor development
- Surgical history
- Speech therapy history

Language Assessment

- Children with cleft palate are at risk for delayed language development and cognitive delays
- May be due to early hearing issues, hospitalizations/surgeries during years of critical language development, parent-child language stimulation and speech production capabilities
- Can be overlooked when “speech” is the main focus
- Consists of parent report, informal/play based assessment, and standardized assessment

Articulation Assessment

- ◉ Conversational speech sample
- ◉ Structured speech tasks
 - CV utterances, words, sentences in imitation
 - Rote speech
- ◉ Standardized assessment

Articulation Assessment

Developmental Errors

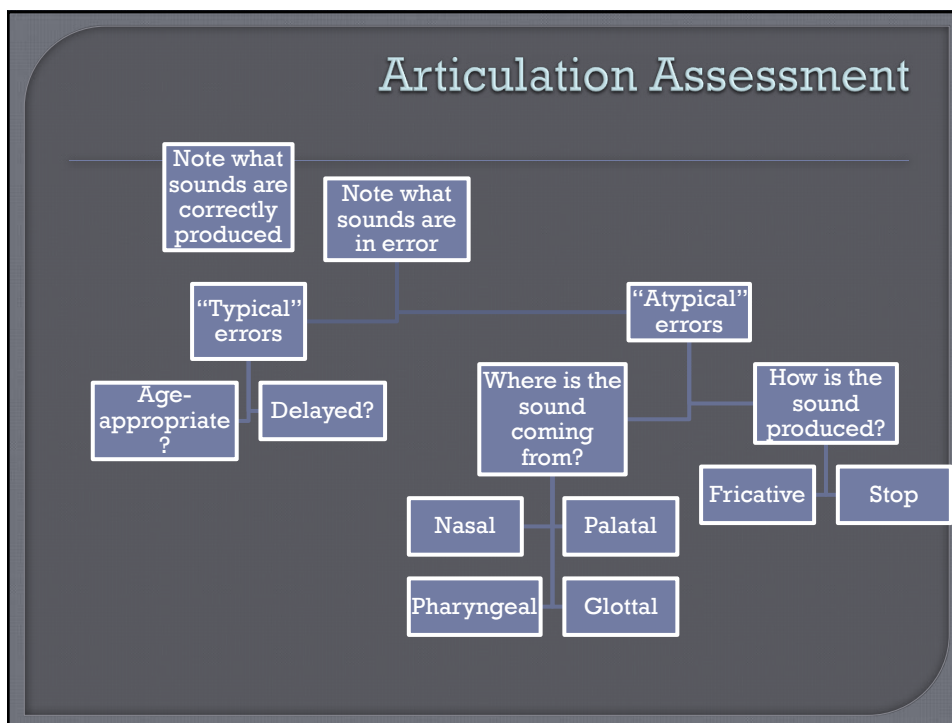
- Those errors that are considered “typical” as part of speech development
- Differentiate between “age appropriate” and a delay
- Ex., /t/ for /k/ substitution or /f/ for “th” substitution

Compensatory Errors

- Learned articulation errors – incorrect placement
- Manner is often maintained, but place is impacted
- Develop secondary to an inability to generate oral pressure for normal articulation
- May continue to be used once velopharyngeal port has been adequately repaired
- Ex., glottal stop substitutions

Obligatory Errors

- Errors that exist due to a present structural cause
- May not be improved until the structural cause is addressed
- Ex., nasalized oral consonants due to VPI



Articulation Assessment

- ◉ **Compensatory Articulation Errors**
 - Glottal stops
 - Stop consonant made at the glottis
 - Pharyngeal Stop
 - Lingual base contacts PPW, typically used for /k/ and /g/
 - Pharyngeal Fricatives
 - Fricative constriction between the lingual base and the PPW

Articulation Assessment

◉ Compensatory Articulation Errors

- Mid-dorsum palatal stop
 - Stop consonant made in the position of “y”
 - Sounds like a cross between a /t/ and a /k/ or a /d/ and a /g/
- Nasal fricative
 - Typically articulating a nasal phoneme with nasal air emission used in place of a fricative sound

Articulation Assessment

◉ Note any oral distortions present

◉ Weak oral consonants

- High pressure consonants are produced with weak oral pressure

◉ Nasal substitutions

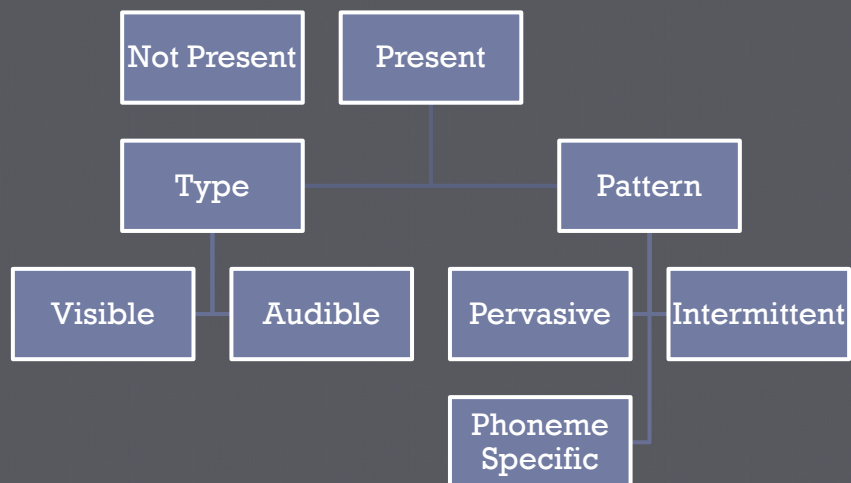
- Substituting a nasal phoneme (ex., /m/) for an oral phoneme (ex., /b/)

Articulation Assessment

◉ Stimulability Testing

- What is the child capable of doing?
- Differentiate compensatory errors from obligatory errors

VP Assessment - Nasal Emission



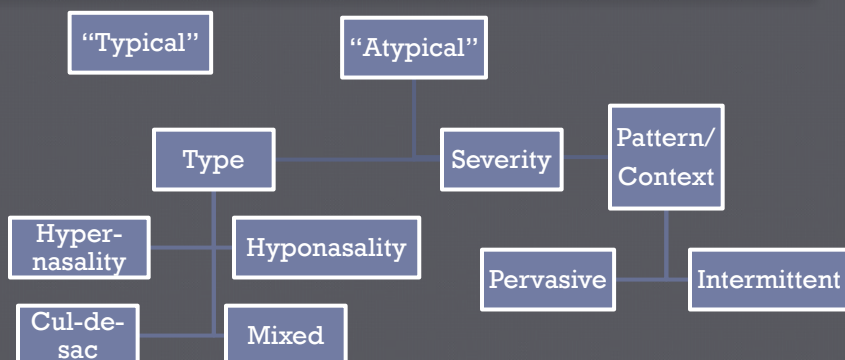
VP Assessment – Nasal Emission

- Look for “visible” nasal air emission
 - Use a mirror under the nose during production of pressure sounds
 - Look for a nasal grimace
- Listen for audible nasal air emission
 - Use a straw or something similar to amplify if necessary
 - Counting from 60-70 (high number of sibilants)
 - Counting from 70-80 (taxing due to nasal-alveolar plosive combo)

VP Assessment – Nasal Emission

- Sample multiple contexts
 - Imitation, rote speech tasks, conversational speech
 - High pressure phonemes or sentences
 - “I poured Paula a pop.” “Billy plays ball.” “I choose cheese.”
 - Counting from 60-70 (high number of sibilants)
 - Counting from 70-80 (taxing due to nasal-alveolar plosive combo)

VP Assessment - Resonance



VP Assessment - Resonance

- ◉ Perceptual assessment is still considered gold standard
- ◉ Articulation accuracy can affect your judgment of hypernasality – try to separate out resonance from articulation and nasal air emission

VP Assessment - Resonance

○ HYPERnasality

- Use of “cul-de-sac” test
 - Sustained vowels
 - Sentences with low pressure consonants
 - “You are here.” “We were away.” “You were away all year.”
 - “Read to Lee.”
- Sample multiple contexts: imitation tasks, rote speech, conversational speech
- Note the presence, severity, and pattern/context

VP Assessment – Resonance

Hypernasality

0	1	2	3	4
none	minimal	mild	moderate	severe

Normal	Hypernasality
--------	---------------

1	2	3	4	5	6	7
---	---	---	---	---	---	---

Normal

Severe Hypernasality

VP Assessment - Resonance

- Define scale to increase reliability

Severity	Descriptor
Mild	Increased nasality on high vowels Inconsistent across speech sample Considered socially acceptable Patient/parents have little concerns
Moderate	Hypernasality pervasive/distracting Considered socially unacceptable Most sounds maintain their identity
Severe	Hypernasality is pervasive and impacts understandability Socially very unacceptable Sounds lose identity (nasalized phonemes, vowel distortions)

Based off of Henningsson et al (2008). Universal parameters for reporting speech outcomes in individuals with cleft palate, *CPCJ*

VP Assessment - Resonance

- HYPONasality**
 - Use phonemes, words, or sentences loaded with nasal phonemes
 - "Make momma come home."
 - "Anna knew ninety songs."
 - Note if present or absent

Oral Mechanism Assessment

- ◉ Generally recommended to complete after your speech assessment
- ◉ Face, Nose, Lips
- ◉ Tongue
 - Size, ankyloglossia

Oral Mechanism Assessment

- ◉ Dentition
 - Class II occlusal deviations
 - Bilabials may become dentalized
 - Sibilants sound distorted
 - Class III occlusal deviations
 - Labiodentals may become distorted
 - Alveolar sounds may become distorted
 - Crossbites, missing/rotated teeth
 - Can contribute to lateral distortions

Oral Mechanism Assessment

- Hard Palate
 - Shape, fistulae
- Soft Palate and Uvula
 - Examine at rest and during phonation
 - Does not necessarily reflect VP function
- Pharyngeal walls
 - Note movement during phonation
- Tonsils
 - Presence, size

Instrumental Assessment

- ◉ Instrumental Assessment is dependent upon the child's speech sample – the child must be old/mature enough to cooperate adequately and must be attempting oral speech production

Instrumental Assessment

• Computerized Instrumental Assessment

- Aerodynamic measurements
 - Pressure flow studies estimating the sectional area of the VP space
- Nasometry
 - Measures “nasalance,” a ratio of acoustic energy derived from the speaker’s oral and nasal cavities
 - Provides a numeric output

Instrumental Assessment

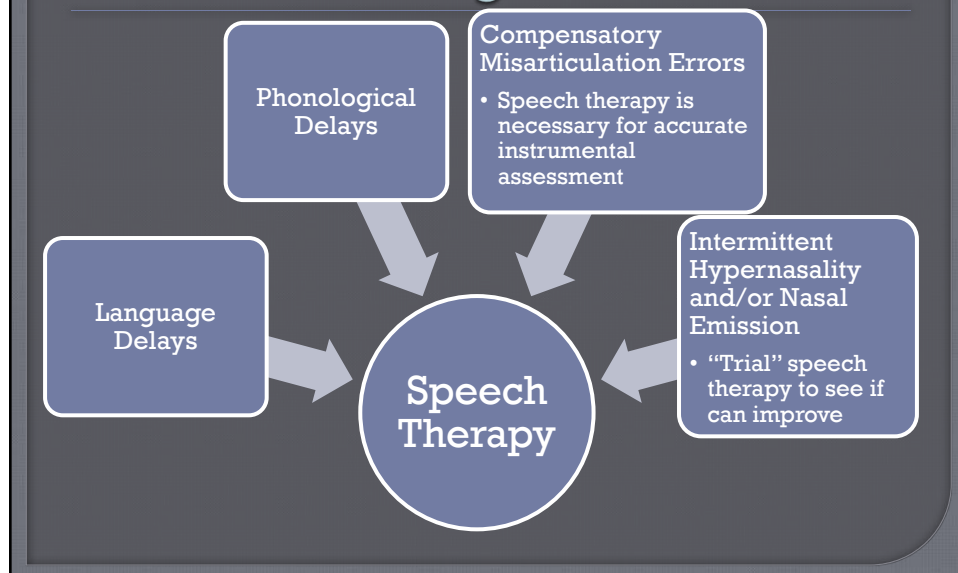
• Imaging Instrumental Assessment

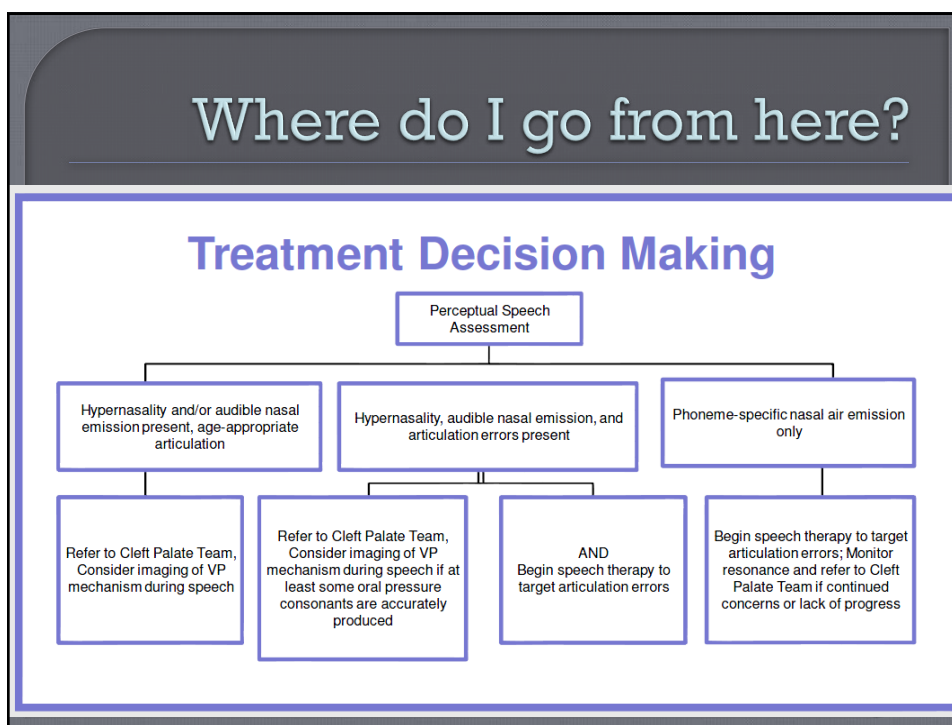
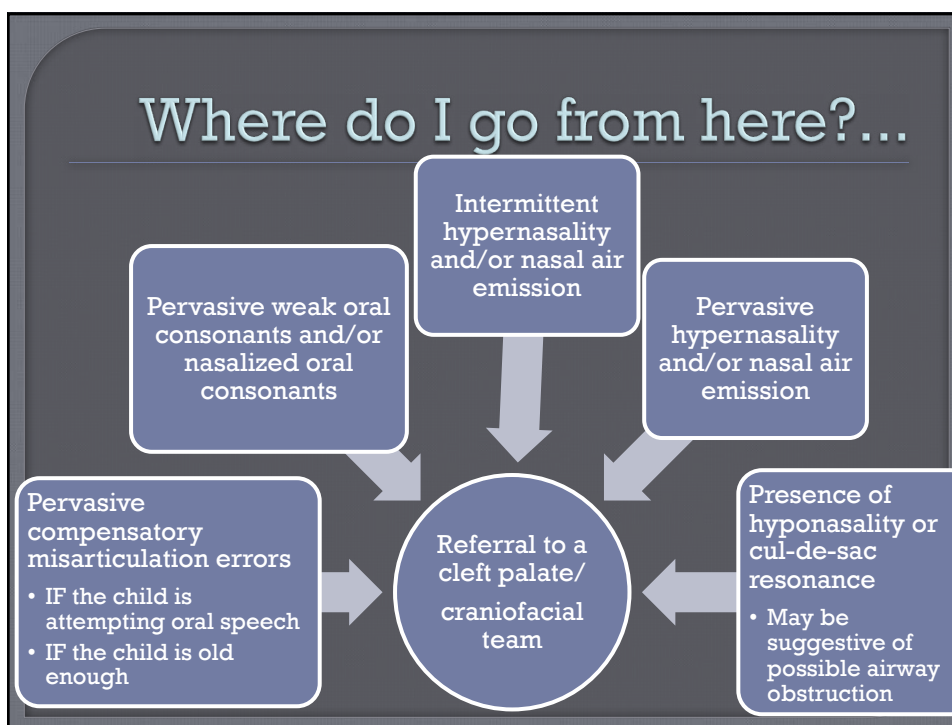
- Allows us to view the structures and functions of the speech mechanism that are not visible during the oral exam
- Natural speech can be observed
- Have seen improved outcomes in surgery for VPD due to imaging
- Most common = Videofluoroscopy or Nasopharyngoscopy

Instrumental Assessment

- **Imaging Instrumental Assessment**
 - **Videofluoroscopy**
 - X-ray image of VP function during speech
 - Requires at least 2 views to assess dynamic movements
 - Pros: Easy to tolerate
 - Cons: Exposure to radiation, provides a 2 dimensional pictures
 - **Nasopharyngoscopy**
 - Uses flexible endoscope inserted into the nostril and passed through to the velopharynx
 - Pros: color picture, 3D, direct view
 - Cons: invasive and can be hard to tolerate

Where do I go from here?...





/p/	Puppy will pull a rope	/z/	Zoey has roses
/b/	Buy baby a bib	/ʃ/	She washed a dish
/f/	A fly fell off a leaf	/tʃ/	Watch a choo-choo
/v/	I love every view	/dʒ/	George saw Gigi
/θ/	Thirty- two teeth	/h/	We are hanging on
/ð/	The other feather	/k/	A cookie or a cake
/n/	Anna knew no one	/g/	Give Aggie a hug
/l/	Your turtle ate a hat	/h/	Hurry ahead Harry
/d/	Do it today for Dad	/s/ cluster	I spy a starry sky
/l/	Laura will yell	/r/	Ray will arrive early
/s/	Sissy saw Sally race	/w/	We were away

Based off of American English Sentence Sample, 2007, developed by Judith Trost-Cardamone, PhD, modified 2011.

Audible Nasal Emission Present:

	Inconsistent	Consistent		Inconsistent	Consistent
Stops	p		k		
	b		g		
	t				
	d				
Affricates/Fricatives	f		s		✓
	v		z		✓
	θ		ʃ		
	ð		tʃ		
			dʒ		

Hypersensitivity

Stimuli	Trial 1				Trial 2			
	None	Mild	Moderate	Severe	None	Mild	Moderate	Severe
You are here.	✓				✓			
You were away all year.	✓				✓			
He will read to Lee.	✓				✓			
Will we leave at three?	✓				✓			
Conversational Speech	✓				✓			

/p/	Puppy will pull a rope	/z/	Zoey has roses
/b/	Buy baby a bib	/ʃ/	She washed a dish
/f/	A fly fell off a leaf	/tʃ/	Watch a choo-choo
/v/	I love every view	/dʒ/	George saw Gigi
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	v		z		
	θ		ʃ		
	ð		tʃ		
			dʒ		

Hypersensitivity

Stimuli	Trial 1				Trial 2			
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You are here.	✓				✓			
You were away all year.	✓				✓			
He will read to Lee.	✓				✓			
Will we leave at three?	✓				✓			
Conversational Speech	✓				✓			

continued™

Thank You!

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References

Peterson-Falzone SJ, Trost-Cardamone JE, Karnell MP, Hardin-Jones, MA: *A Clinician's Guide to Treating Cleft Palate Speech*. St. Louis: Mosby Elsevier, 2006.

Peterson-Falzone SJ, Hardin-Jones, MA, Karnell MP. *Cleft palate speech* (3rd ed)