

Introduction to Speech Disorders

Communication Disorders, Swallowing Disorders, and Speech Therapy - An Introduction

言语治疗概论

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言语治疗概论



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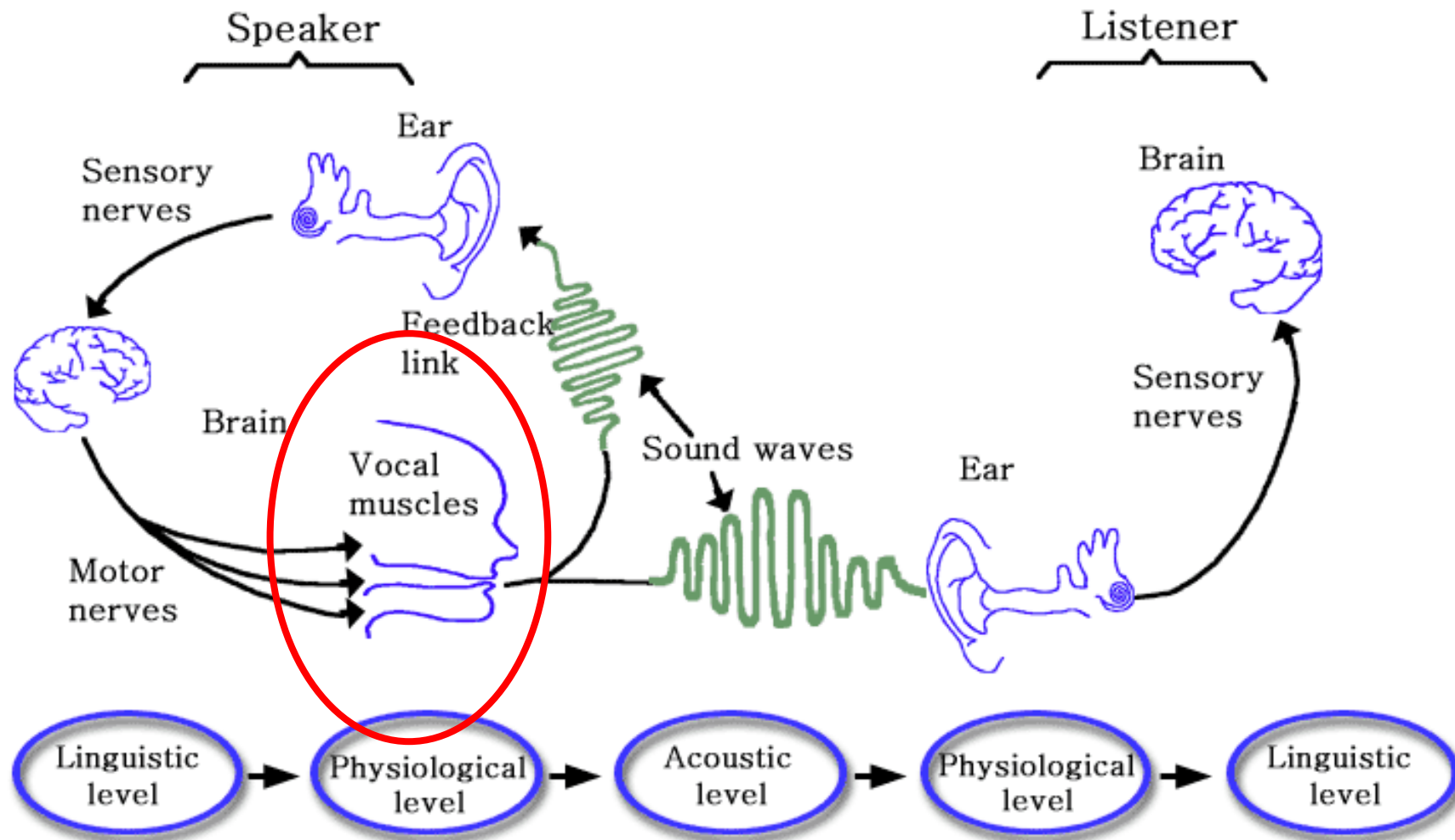
Agenda

- What is Speech Disorders?
- Types of speech disorders
 - Articulatory vs phonological
- Intervention

Speech Disorders



The Speech Chain



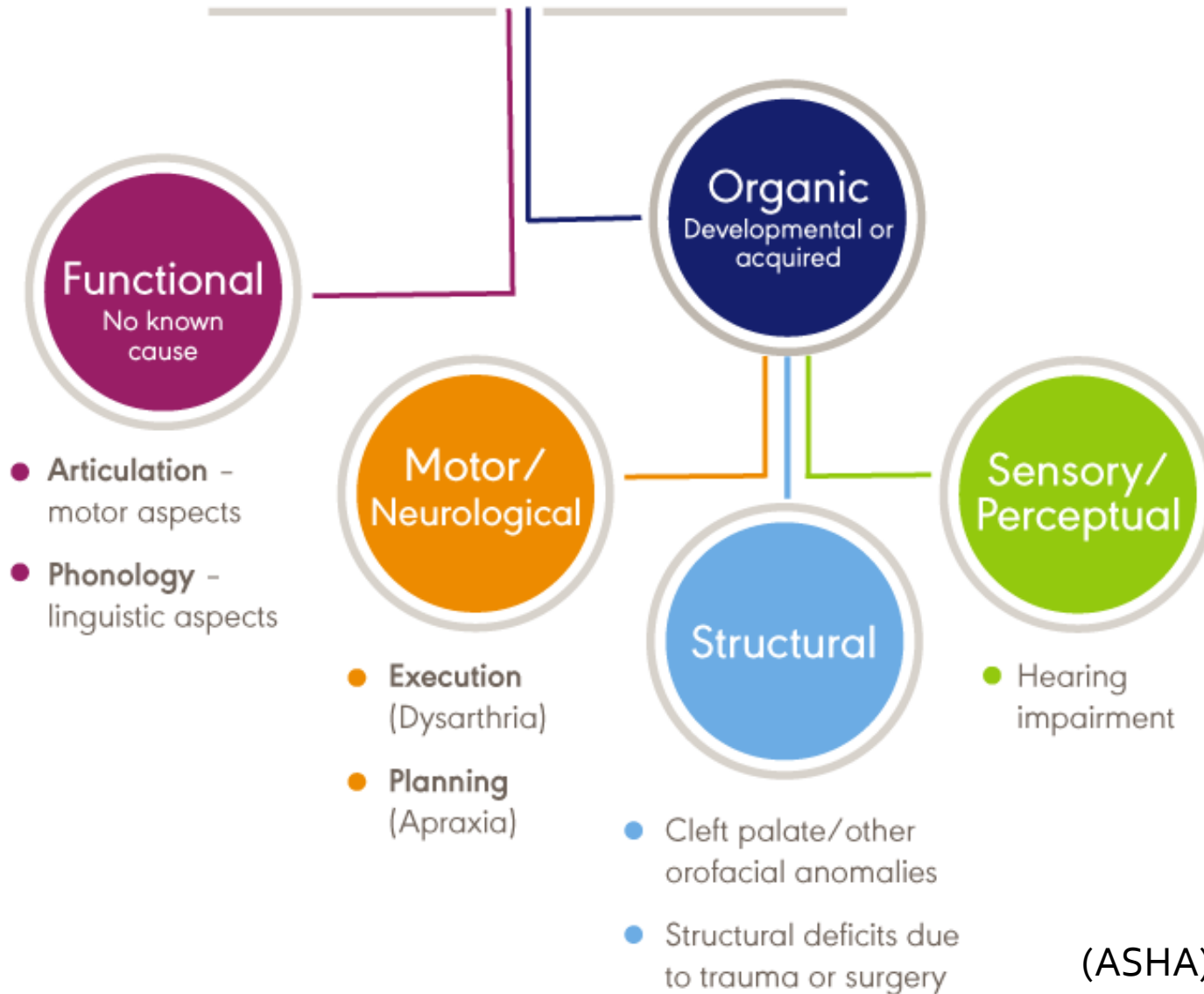
Speech Disorders

- An umbrella term for a condition in which a person has problems creating or forming speech sounds needed to communicate with others
- Examples of speech disorders:
 - Speech sound disorders in children
 - Articulation disorders (dysarthria)
 - Phonological disorders
 - Voice disorders
 - Fluency disorders

Speech Sound Disorders

- SSD: any difficulty or combination of difficulties with **perception, motor production, or phonological representation of speech sounds and speech segments** - including phonotactic rules governing permissible speech sound sequences in a language
- It can be organic (with underlying motor/neurological, structural, or sensory/perceptual cause) or functional (idiopathic)

Speech Sound Disorders



Organic Speech Sound Disorders

- Motor/neurological disorders
 - E.g., childhood apraxia of speech
- Structural abnormalities
 - E.g., cleft lip and/or palate
- Sensory/perceptual disorders
 - E.g., hearing impairment

Childhood Apraxia of Speech (CAS)

- A speech disorder in which a child's brain has difficulty coordinating the complex oral movements needed to create sounds into syllables, syllables into words, and words into phrases
- The errors are typically not caused by muscle weakness
- Error patterns:
 - Inconsistent errors (not like dysarthria);
 - Particular difficulty in producing more complex longer sentences;
 - Inappropriate intonation, stress, rhythm etc
- Cannot be outgrown
- Cause is usually unknown
- Irresponsive to oromotor treatment

Speech Characteristics of Hearing Impairment

- Problems in:

1. Timing and rhythm,
 2. Pitch and intonation,
 3. Velar control (nasality),
 4. Articulation, and
 5. Voice quality
- (Nickerson, 1975)

1. Extremely slow, labored, and excessively breathy speech;
 2. Prolonged production of vowels, resulting in either distortion or the creation of a new syllable;
 3. Tendency to devoice stops in all positions;
 4. Excessive use of nasality with vowels and consonants; and
 5. Abnormal rhythm across utterance
- (Hudgins, 1934)

Functional Speech Sound Disorders

- Articulation disorders
 - Distortion
- Phonological disorders

Speech Sound Disorders (SSD)



Causes of SSD

- Gender
 - M > F
- Pre-perinatal problems
 - Maternal stress or infections during pregnancy
 - Complication during delivery
 - Preterm and low birth weight
- Family history
 - Children with family history more likely to have SSD
- Persistent otitis media with effusion
 - Hearing loss
 - Associated with impaired speech development
- Unknown reason

Prevalence

- 2.3% - 24.6% of school-aged children showed speech delay or speech sound disorders
- Persistent speech sound errors seen in 1-2% of older children and adults
- 48.1% of 3-10 yo children, 24.4% of 11-17 yo children has speech sound problems only (National Center for Health Statistics, 2012)
- 11-40% of children with SSD showed concomitant impairment

Signs and Symptoms

- Similar to errors during phonological processes
- Influence of accent
- Influence of dialect

Phonological Processes

- Explains speech sound errors in children
- Seen also in normal phonological development among children
 1. Assimilation processes
 2. Substitution processes
 3. Syllable structure processes

Assimilation

- Assimilation (“*bub*” for “*bus*”)
- Denasalization (“*doze*” for “*nose*”)
- Final consonant devoicing (“*pick*” for “*pig*”)
- Prevocalic voicing (“*gomb*” for “*comb*”)
- Coalescence (“*foon*” for “*spoon*”)
- Reduplication (“*baba*” for “*bottle*”)

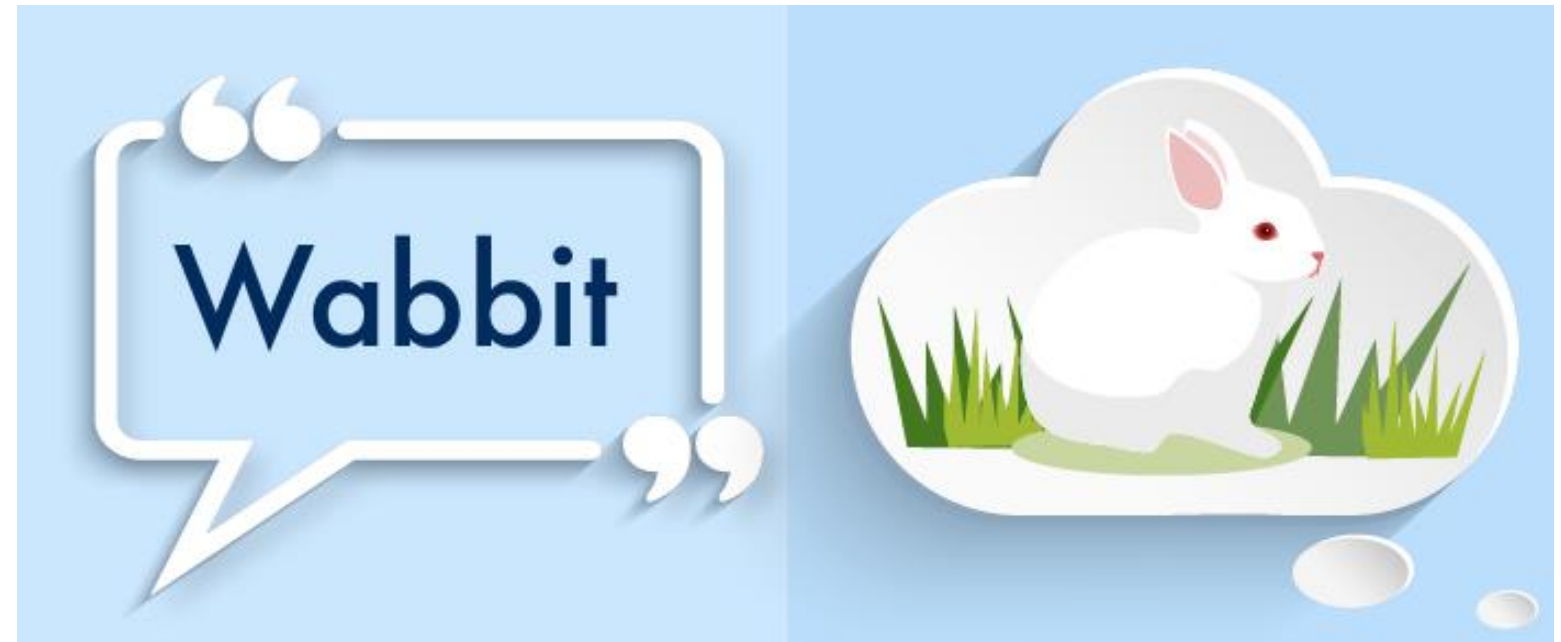
Substitution

- Backing (“*gog*” for “*dog*”)
- Fronting (“*tootie*” for “*cookie*”)
- Gliding (“*wabbit*” for “*rabbit*” or “*yeyo*” for “*yellow*”)
- Stopping (“*pan*” for “*fan*”)
- Vowelization (“*appo*” for “*apple*”)
- Affrication (“*joor*” or “*door*”)
- Deaffrication (“*ships*” for “*chips*”)
- Alveolarization (“*tu*” for “*shoe*”)
- Depalatalization (“*fit*” for “*fish*”)
- Labialization (“*pie*” for “*tie*”)

Syllable Structure

- Cluster reduction (“*pane*” for “*plane*”)
- Final consonant deletion (“*toe*” for “*toad*”)
- Initial consonant deletion (“*unny*” for “*bunny*”)
- Weak syllable deletion (“*nana*” for “*banana*”)
- Epenthesis (“*bu-lue*” for “*blue*”)

Phonological Processes



Reasons for Phonological Errors

- Normal variation (70% normal range of speech and language development)
- Environment problems
 - Prenatal
 - Perinatal
 - Postnatal
- Problems with anatomy and/or physiological (more on this)
- Can be a combination of >1

Speech Disorder

Normal Variation

- Speech sound acquisition:
 1. Laying the foundation for speech (0-1 year)
 2. Transitioning from words to speech (1-2 years)
 3. Growth of speech sound inventory (2-5 years)
 4. Mastery of speech and literacy (>5 years)

(McLeod, 2009)

Consonant, Vowel and Tone Inventories of Mandarin

Category	Bilabial	Labiodental	Dental/ alveolar	Post-alveolar (retroflex)	(Pre-) palatal	Velar	Labiovelar
1. Initial consonants							
Plosive	p, p ^h		t, t ^h			k, k ^h	
Nasal	m		n				
Affricate			ts, ts ^h	tʃ, tʃ ^h (tʂ, tʂ ^h)	tʃ̟, tʃ̟ ^h		
Fricative		f	s	ʃ (ʂ)	ç	x	
Approximant				ʃ ^a (ɻ)	j		w
Lateral			l				
2. Final consonants			-n			-ŋ	
3. Glides		j w ɥ					
4. Vowels and diphthongs		i y a ə ^b u ^c ai au ou ei					
5. Tones		T1 (high-level tone) T4 (high-falling tone)		T2 (high-rising tone) T0 (neutral tone)		T3 (low-rising tone)	

^a/j/ can exist as a syllabic consonant [j]. ^bAll the mid-vowel variants, [o, ɤ, e, ə], belong to the same vowel phoneme. We use /ə/ to denote the mid vowel. In addition, /ə/ can be rhotacized as [əɻ] in open syllables. ^c/u/ can be [u] in closed syllables.

Studies	So and Zhou (2000)		Zhu and Dodd (2000)				Huang et al. (2000)	Han (2005) ^a
<i>N</i>	600		129				200	212
Districts	Beijing, Nanjing, Xi'an, Chengdu		Beijing				Shanghai	Shanghai
Analysis	Acquisition ^b		Emergence		Stabilization		Acquisition	Acquisition
Phoneme	Not mentioned		1		2/3 (66.7%)		Accuracy 90%	Accuracy 90%
correct								
% of children	75%	90%	75%	90%	75%	90%		
1;6			t, t ^h , k, m, n, f, s, x, tɕ, tɕ ^h , ɕ, p ^h , p	t, t ^h , k, m, n, x, tɕ, tɕ ^h , ɕ	t, t ^h , m, n, x	t, m		
2;0	p, m	p, m	ɕ, tɕ, tɕ ^h , k ^h	f, s, tɕ	p, p ^h , k, k ^h , ɕ, tɕ, tɕ ^h	n		
2;6	p ^h , k ^h , k, n, f, x, -n, -ŋ, t ^h , t	p ^h , k ^h , k, n, f, x, -n, -ŋ	ts, l	p, l	f	p, t ^h , f, x, ɕ	p, m, t, x	p, m, t, tɕ, x
3;0	tɕ, tɕ ^h , ɕ	t ^h , ɕ, t	ɹ, ts ^h	p ^h , k ^h , tɕ ^h		k, k ^h	p ^h , t ^h , k, k ^h , n	p ^h , t ^h , k, k ^h
3;6	l	l, tɕ, tɕ ^h		ɕ		p ^h	f, tɕ, tɕ ^h , ɕ	tɕ ^h , f, ɕ, n
4;0	s, ts ^h , ts	s, ts ^h , ts		ts, ts ^h , ɹ	l, s, ɕ, ɹ	l, s, ɹ, tɕ, tɕ ^h	l	
4;6	ɕ, tɕ, tɕ ^h , z				tɕ, tɕ ^h , ts, ts ^h	ɕ, tɕ, tɕ ^h , ts, ts ^h	ts, s	
5;0		ɕ, tɕ, tɕ ^h z			>4;6 ^c	>4;6 ^c		ts, s
5;6							c	
6;0								ts ^h
6;6							tɕ ^h , tɕ, ɕ, ts ^h	tɕ ^h , tɕ, ɕ
7;0							>6;6 ^c	>6;6 ^c
7;6								

^aThe results were based on minimal pair comparison. ^bThe study by So and Zhou (2000) used age of emergence to report the results for the standardized phonological assessment. ^cExact age of acquisition or emergence in the study.

Assessment and Intervention

Assessment

- Case history
- Oral mechanism examination
- Hearing screening
- Speech sound assessment
- Language assessment

Oromotor Examination (OME)

- Observation of the oromotor anatomy (e.g., tongue, lips, teeth, palate etc.) is conducted to identify any possible structural abnormality that may affect speech production
- Examination of speech characteristics (based on story telling excerpt), including pitch, resonance (nasality), voice quality, loudness and rate of speech
- Diadochokinetic (DDK) task, looking at the coordination and sequencing of muscle movements for speech by asking the child to repeat certain sounds

Oromotor Examination (OME)



Assessment of Speech Sounds

- Single word testing
- Connected speech sampling
 - Accurate productions
 - Speech sound error
 - Error patterns
- Severity assessment
- Intelligibility
- Stimulability
- Speech perception testing
 - Auditory discrimination
 - Picture identification
 - Pronunciation accuracy

Phonological Processing Assessment

- Phonological awareness
- Phonological working memory
- Phonological retrieval

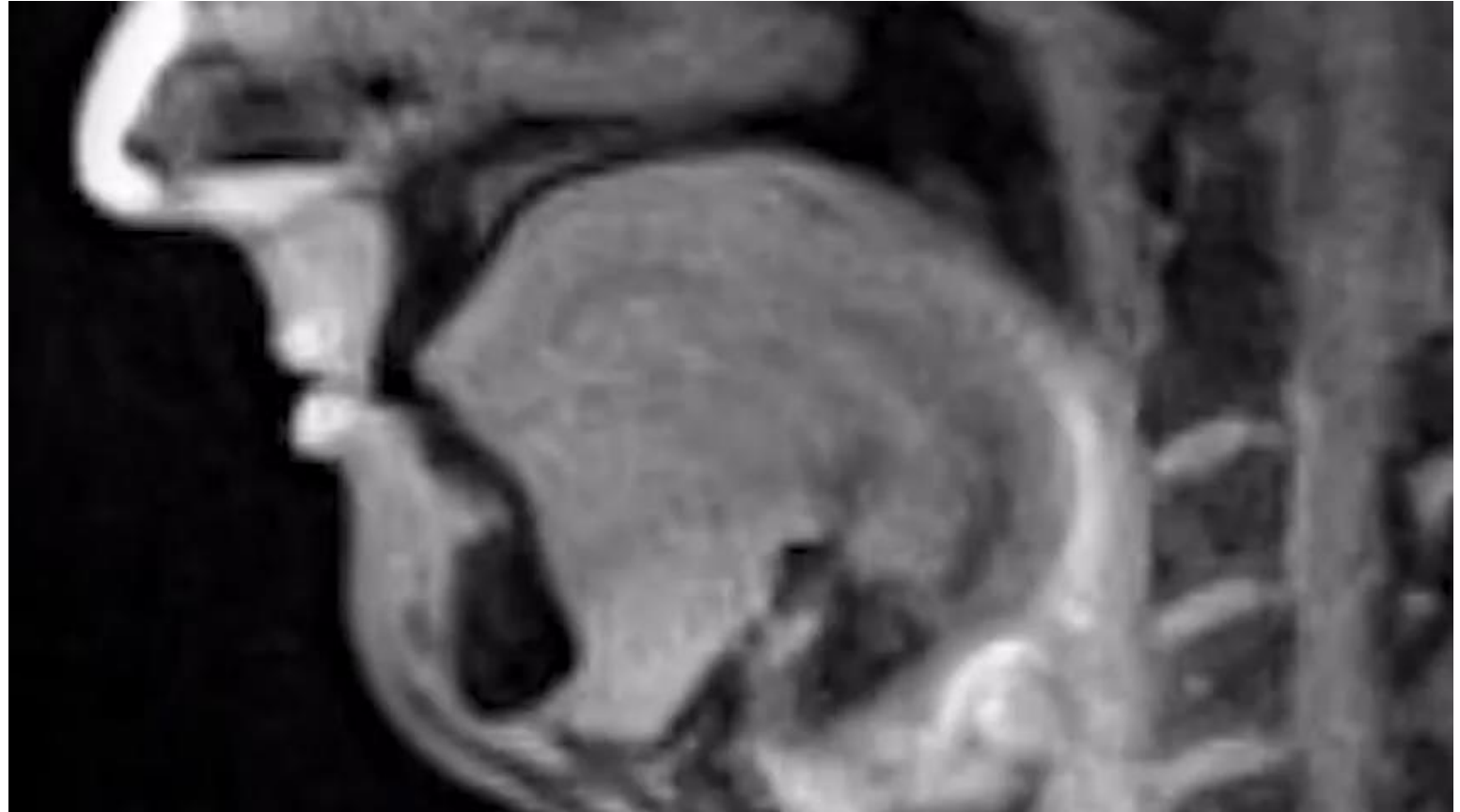
Language Assessment

- Spoken language assessment
 - Listening
 - Speaking
- Written language assessment
 - Reading
 - Writing

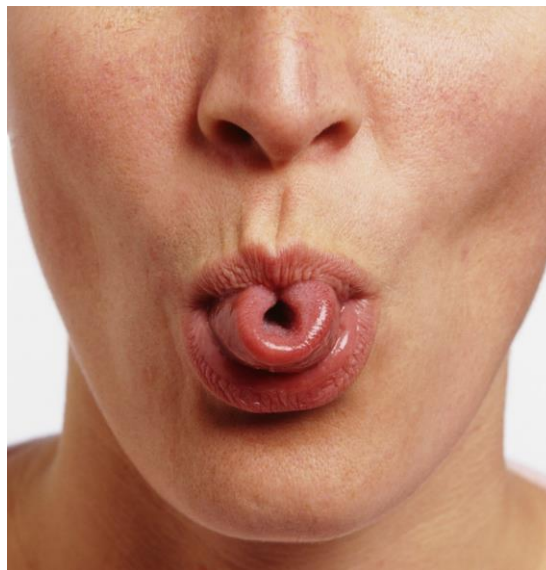
Intervention

- Factors related to SSD:
 - Structure and function of speech and hearing mechanism
 - E.g., otitis media, oromotor problems
 - Lips, teeth, tongue, hard palate, soft palate, oral sensory function deficit
 - Compensatory gestures

Tongue Movement



Flexibility of Tongue



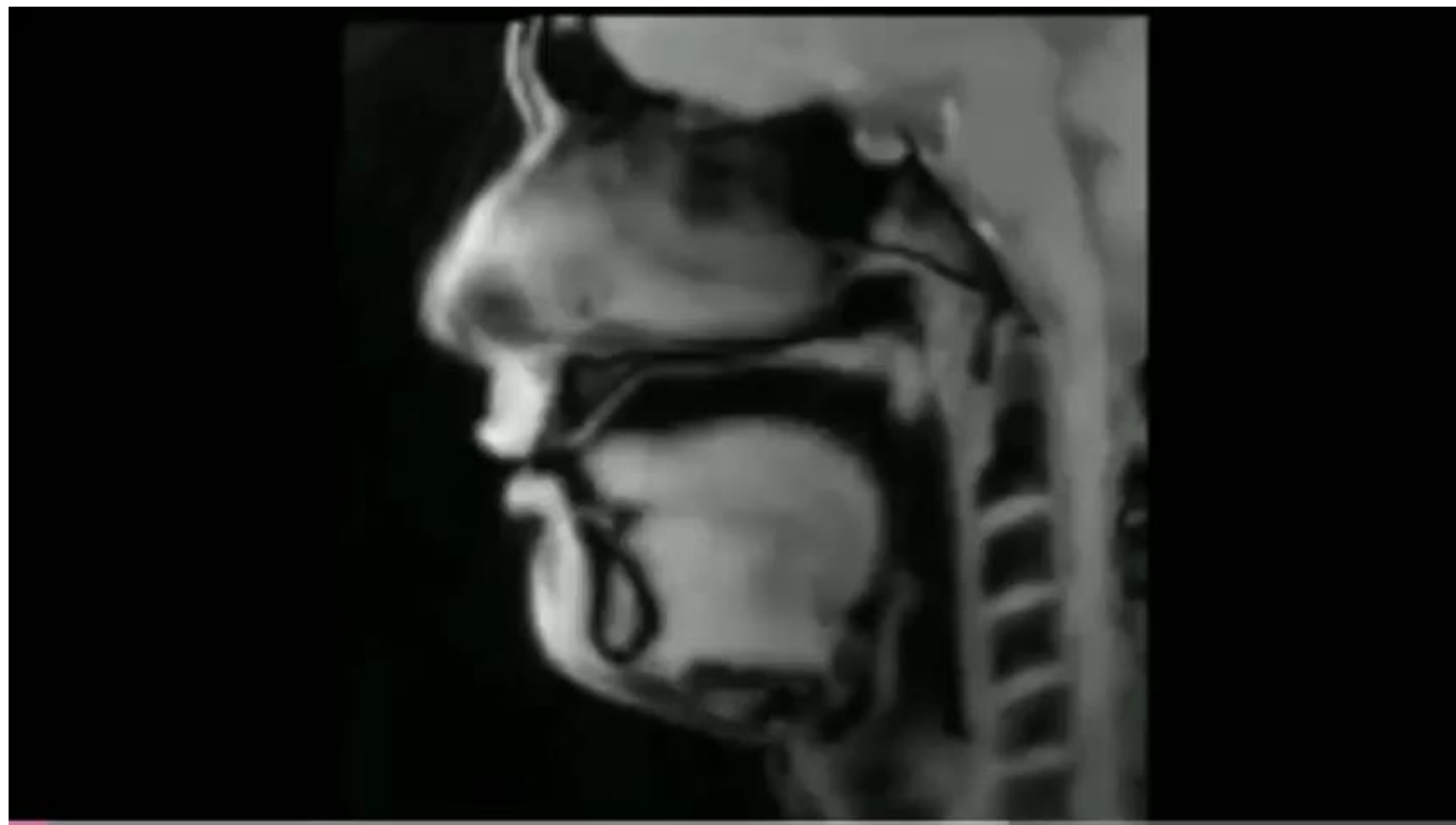
Ankyloglossia



Motor Abilities

- Muscle strength
- Speed of movement
- Range of movement (ROM)
- Accuracy of movement
- Coordination of complex movements
- Motor steadiness
- Muscle tone

Fast Tongue Movement



Intervention

- Stimulability
- Frequency of occurrence
- Developmental appropriateness

Speech Motor Training

- Perceptual training
- Production training
 - Isolation
 - Nonsense syllable
 - Words
 - Phrases
 - Sentences/Passages
 - Conversation

Intervention for SSD

Treatment for /s/



Oromotor Training

- Training oral-motor related muscles
- As a precursor to teaching sounds
- For immature or deficient oral-motor control or function

Oromotor
Training

**Sam doing Oral
Motor Speech
Therapy With
Jennifer Price
Hoskins**

Oromotor Training

End of Handout