

MSHA Annual Conference, April 18-20, 2024  
 VanDyk Mortgage Convention Center, Muskegon, MI

Incorporation of Myofunctional Treatment  
 to Enhance Speech Sound Production  
 Outcomes.



Andrews University  Marileda Cattelan Tomé, CCC-SLP

1

---

---

---

---

---

---

---

---

**Disclosures**

I receive a salary from Andrews University.  
 I am receiving an honorarium for this presentation

There are no relevant non-financial relationships to disclose

- Some of the clients shown throughout the presentation are from Dr. Roberta Martinelli.

2

---

---

---

---

---

---

---

---

**Learning Outcomes**

- Recognize different types of myofunctional disorders that can impact speech sound disorder treatment
- Analyze the most updated studies in myofunctional therapy related to speech sound disorders and lingual frenulum restriction.

3

---

---

---

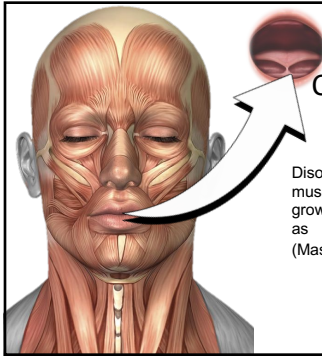
---

---

---

---

---



**Orofacial Myofunctional Disorders:**

Disorders involving oral and orofacial musculature that interfere with normal growth and developmental patterns, as well as the function of orofacial structures. (Mason, n.d.A).

4

---

---

---

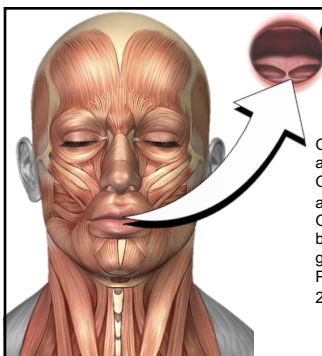
---

---

---

---

---



**Orofacial Myofunctional Disorders (OMDs)**

OMDs can be found in children, adolescents, and adults.  
OMDs can co-occur with a variety of speech and swallowing disorders.  
OMDs may reflect the interplay of learned behaviors, physical/structural variables, and genetic and environmental factors (Maspero, Prevedello, Giannini, Galbiati, & Farronato, 2014).

5

---

---

---

---

---

---

---

---



**Orofacial Motor Function / Orofacial Myology / Orofacial Myofunctional Therapy**

“Orofacial Motor Function is the field of Speech-Language-Hearing Pathology knowledge devoted to the study, research, prevention, assessment, diagnosis, development, improvement, intervention and rehabilitation of congenital or acquired of the myofunctional orofacial and cervical system and its functions.” (ABRAMO, 2013).

[http://www.fonoaudiologia.org.br/resolucoes/resolucoes.html/CFFa\\_N\\_330\\_06.htm](http://www.fonoaudiologia.org.br/resolucoes/resolucoes.html/CFFa_N_330_06.htm)



6

---

---

---


---

---

---

---

---



Orofacial myofunctional disorders (OMDs) can occur across the lifespan

The treatment of OMDs varies based on the age, cognitive ability of the patient, extension of the disorder, and family support.

7

---

---

---

---

---


---

---

---

From SLP

- “Speech Therapy” OR “Myofunctional therapy” OR “Orofacial myotherapy” OR “Orofacial myology”.



8

---

---

---


---

---

---

---


---



Who?

A patient with multifaceted problems associated with myofunctional disorders:

- **Speech sound errors**
- Structural issues
- Habitual open-mouth resting postures (lip incompetence; breathing disorder)
- Incorrect tongue resting postures
- Ineffective chewing
- Atypical/compensatory swallowing patterns
- Oral habits (thumb, fingers, pacifiers, etc.)
- Parafunctional habit patterns (bruxism, clenching, tongue, and jaw posturing)



9

---

---

---

---

---

---

---

---

### MFT - Myofunctional Therapy Caseload?

- Referrals from dentist (pre-post orthodontic treatment; pre-surgical – facial trauma, TMJ/orofacial pain)
- Referrals from pediatricians (speech)
- Referrals from ENTs (mouth breathing/breathing disorders)

---

---

---

---

---

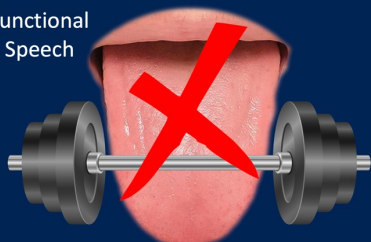
---

---

---

10

### Incorporation of Myofunctional Treatment to Enhance Speech



(Sanders & Mu, 2013)

---

---

---

---

---

---

---

---

11

> Int J Environ Res Public Health. 2022 Apr 29;19(9):5459. doi: 10.3390/ijerph19095459.

### Nonverbal Oro-Motor Exercises: Do They Really Work for Phonoarticulatory Difficulties?

Pablo Parra-López <sup>1</sup>, Marina Olmos-Soria <sup>1</sup>, Ana V Valero-García <sup>1</sup>

Affiliations + expand

PMID: 35564854 PMCID: PMC9104859 DOI: 10.3390/ijerph19095459

Isolated **Non Verbal Oromotor exercises** are not set to work with speech sound problems.

---

---

---

---

---

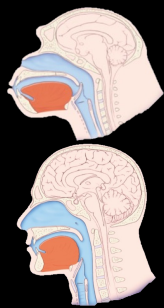
---

---

---

12

Anatomic features facilitated man's ability to speak and to develop language  
Evolution & anatomical changes:



- presence of a short face
- narrow elongated supralaryngeal vocal tract (SVT)
- acute oral cavity–skull base angle;
- a descended larynx;
- an anterior foramen magnum and oropharyngeal tongue;
- shortened soft palate with loss of the epiglottic–soft palate;
- Posteriorization of the tongue in the pharynx

(Davidson, 2003) 13

13

---

---

---

---

---

---

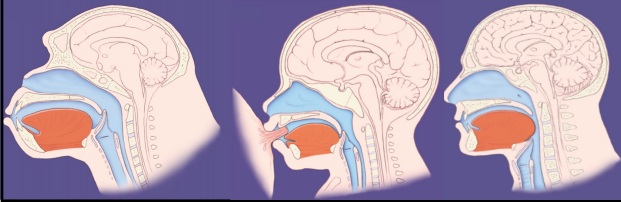
---

---

Chimpanzee: tongue exclusively inside the oral cavity, epiglottis/soft palate are close together, larynx higher positioned

Newborn: tongue inside the oral cavity, epiglottis/soft palate are close together, larynx higher positioned

Adult human being: tongue posteriorization to the pharynx, there's the epiglottis/ soft palate are separated, larynx descends.



14 Davidson TM. The great leap forward: The anatomic basis for the acquisition of speech and obstructive sleep apnea. Sleep Med 2003;4(3):185–94.

14

---

---

---

---

---

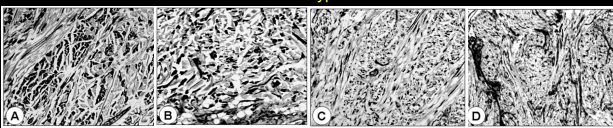
---

---

---

Normal adult human tongue muscles have by far the highest proportion of slow muscle fibers of any mammalian tongue studied to date. Moreover, adult human tongue muscles have multiple unique anatomic features.

More speech demands – tongue muscles with more fibers Type I



<b>A</b> Adult human superior longitudinal muscle (53%)	<b>B</b> Adult Parkinson superior longitudinal muscle (45%)	<b>C</b> Newborn superior longitudinal muscle (32%)	<b>D</b> Monkey superior longitudinal muscle (28%)
--	--	--	---

15 Sanders, I. et al. (2013). The human tongue slows down to speak: muscle fibers of the human tongue. The Anatomical Record, 296 (10): 1615–27.

15

---

---

---

---

---

---


---

---

Speech articulatory gestures don't demand strength but:

- precise control of localized changes and deformations in the shape of the tongue
- the shape -changing that contributes to speech articulation
  - fatigue resistance.

Sanders, I. et al. (2013) The human tongue slows down to speak: muscle fibers of the human tongue. *The Anatomical Record*, 296 (10): 1615-27.



16

---

---

---

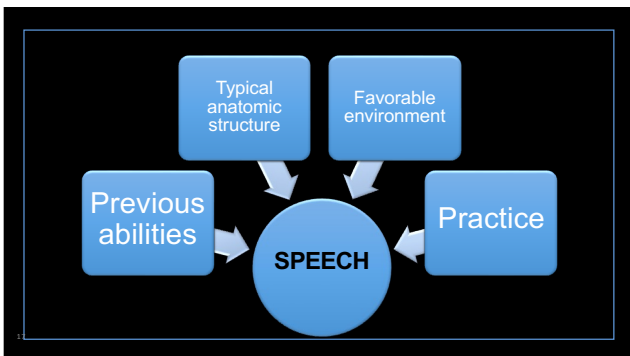
---

---

---

---

---



17

---

---

---

---

---

---

---

---

**Speech...**

... Complex process made up by production and perception



18

---

---

---

---

---

---

---

---

Knowledge of the production & perception of speech sounds and their compensations is fundamental for planning intervention.

19

---

---

---

---

---

---

---

---

**PERCEPTION**

125 250 500 1000 2000 4000 8000

0  
10  
20  
30  
40  
50  
60  
70  
80  
90  
100  
110  
120

19

---

---

---

---

---

---

---

---

**Chronic otitis media**

The tympanic membrane stiffness diminishes reducing sound **intensity**

Fluid in the middle ear diminishes the sound **intelligibility**

21

---

---

---

---

---


---

---

---

**PERCEPTION OF SPEECH SOUNDS**

Bimodal phenomenon: two modalities of information, auditory and visual, are integrated and unified as a single stimulus. Observable mouth movements profoundly influence speech perception. observable mouth movements elicit a motor plan in the listener that the listener would use to produce the observed movement. The audiovisual process allows greater speech intelligibility.



Skipper JI, van Wassenhove V, Nusbaum HC, Small SL. Hearing lips and seeing voices: how cortical areas supporting speech production mediate audiovisual speech perception. Cereb Cortex. 2007;17(10):2387-99.

22

---

---

---

---

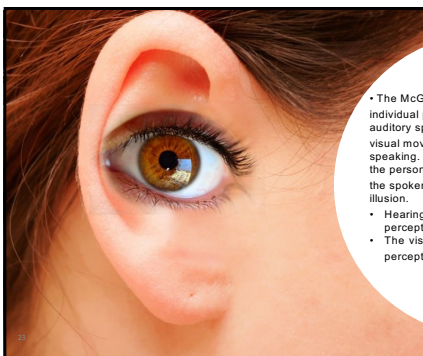
---

---

---

---

22



- The McGurk effect occurs when an individual perceives a mismatch between the auditory speech sounds they hear and the visual movements they see while someone is speaking. This can lead to the perception that the person's lip movements do not align with the spoken words, resulting in a perceptual illusion.
- Hearing and vision are important to speech perception
- The visual information received affects the perception of the auditory information

23

---

---

---

---

---

---

---

---

23

McGurk Effect

24

---

---

---

---

---

---

---

---

24





25

---

---

---

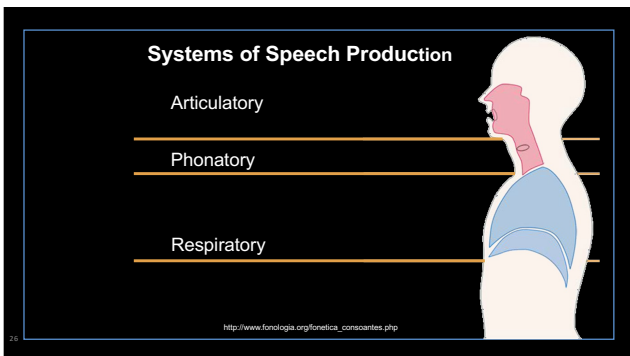
---

---

---

---

---



26

---

---

---

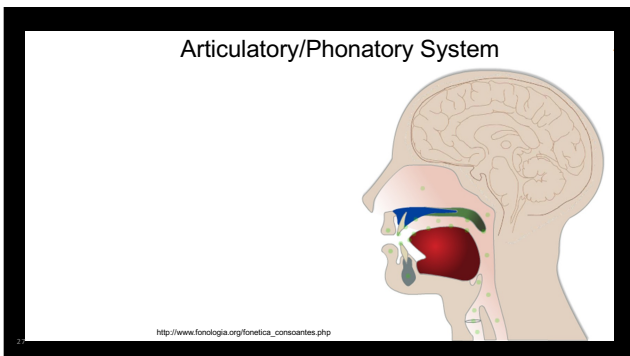
---

---

---

---

---



27

---

---

---

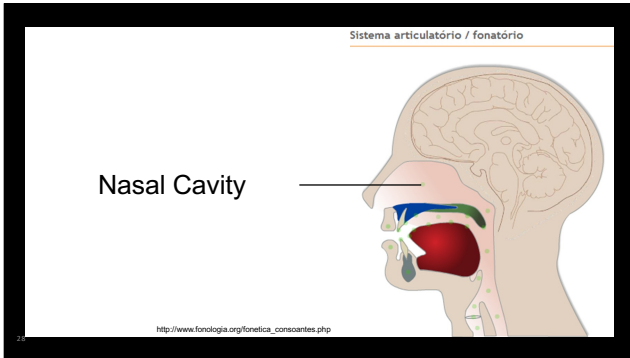
---

---

---

---

---



28

---

---

---

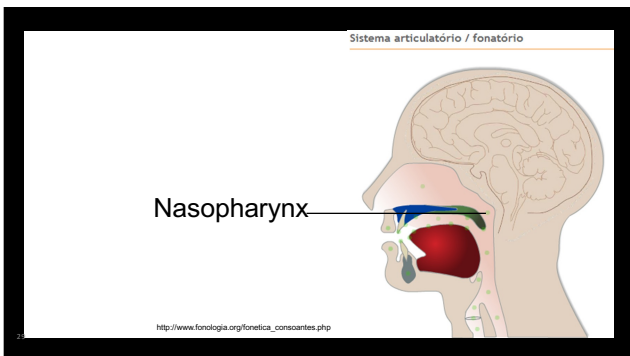
---

---

---

---

---



29

---

---

---

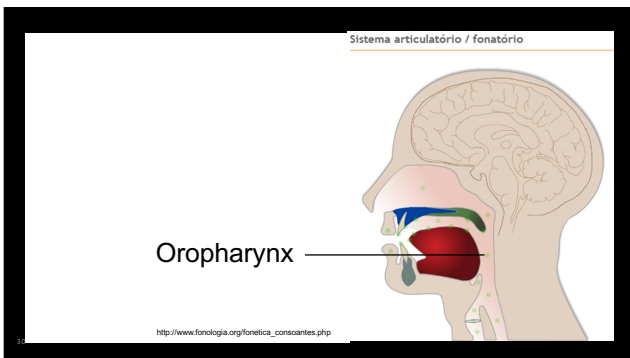
---

---

---

---

---



30

---

---

---

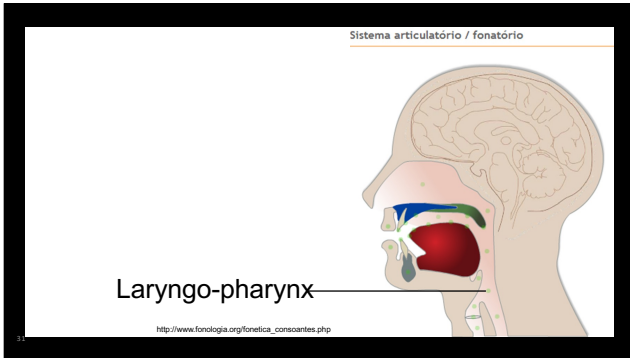
---

---

---

---

---



31

---

---

---

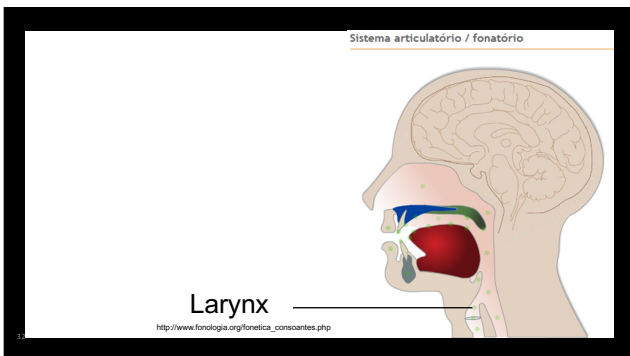
---

---

---

---

---



32

---

---

---

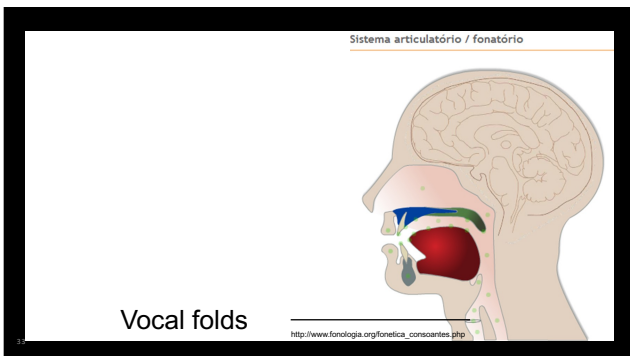
---

---

---

---

---



33

---

---

---

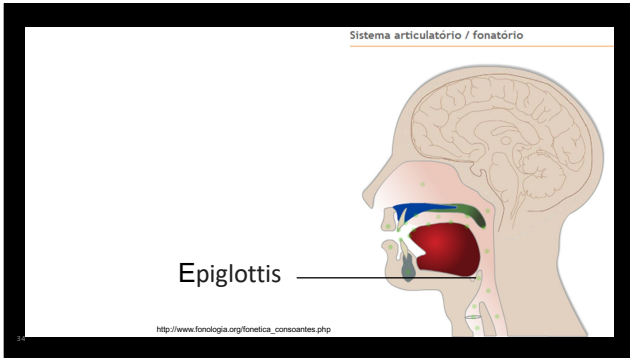
---

---

---

---

---



34

---

---

---

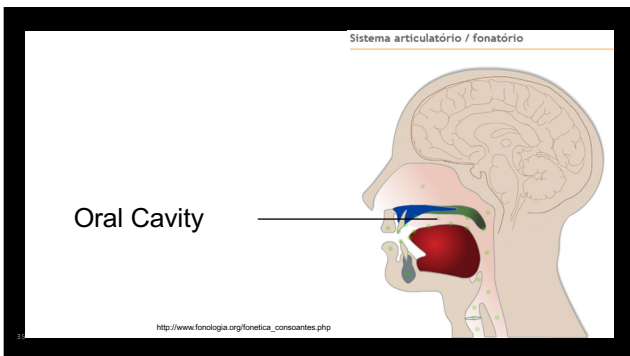
---

---

---

---

---



35

---

---

---

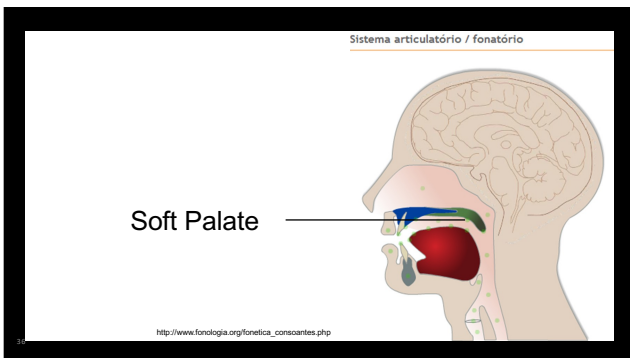
---

---

---

---

---



36

---

---

---

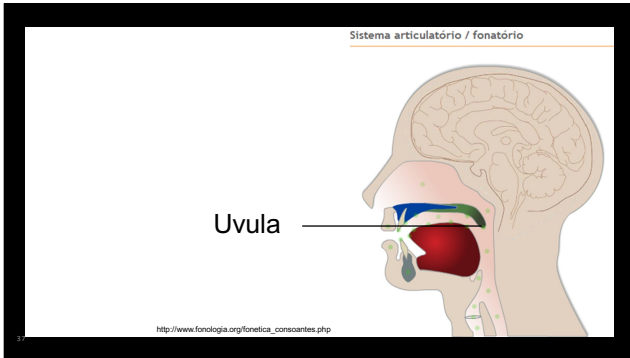
---

---

---

---

---



37

---

---

---

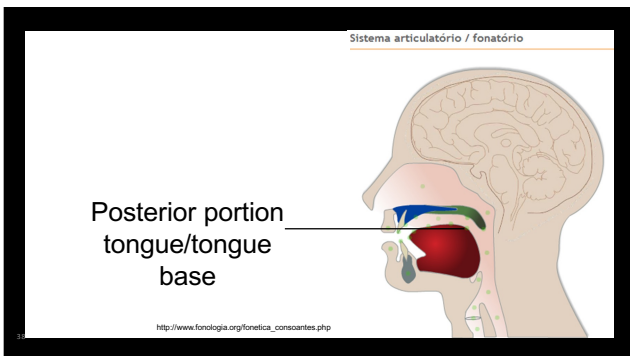
---

---

---

---

---



38

---

---

---

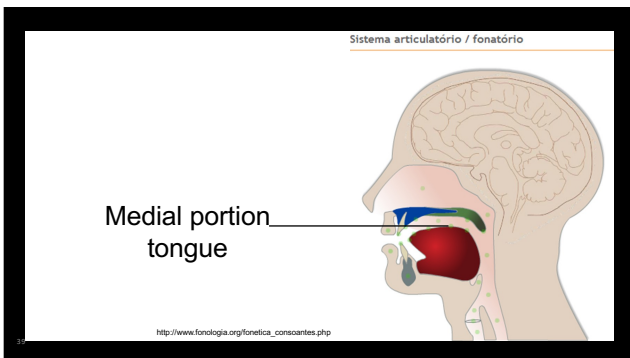
---

---

---

---

---



39

---

---

---

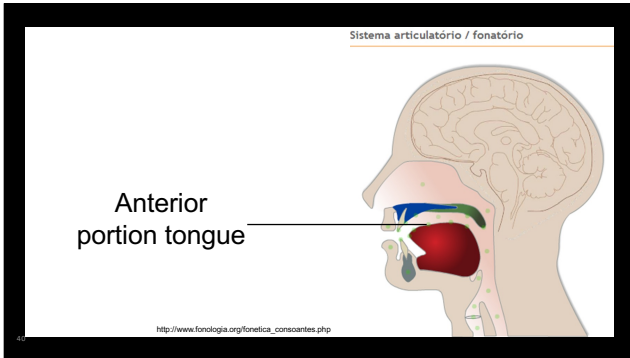
---

---

---

---

---



40

---

---

---

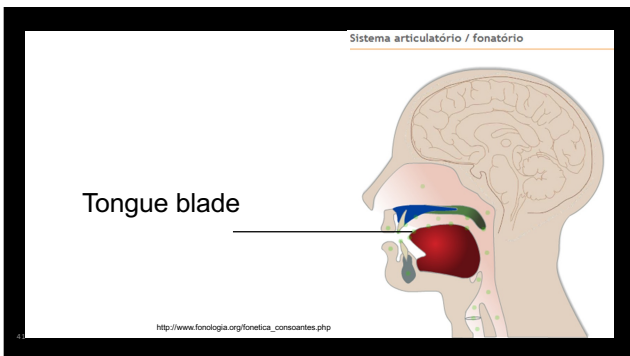
---

---

---

---

---



41

---

---

---

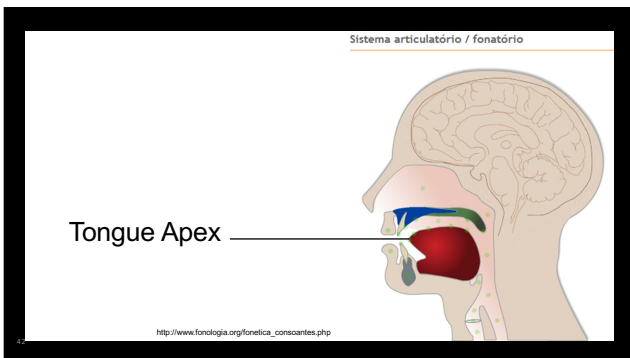
---

---

---

---

---



42

---

---

---

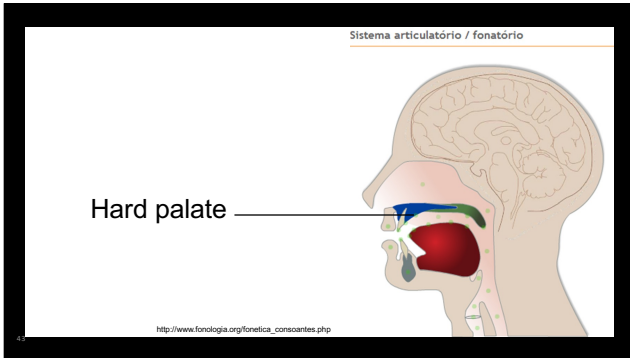
---

---

---

---

---



43

---

---

---

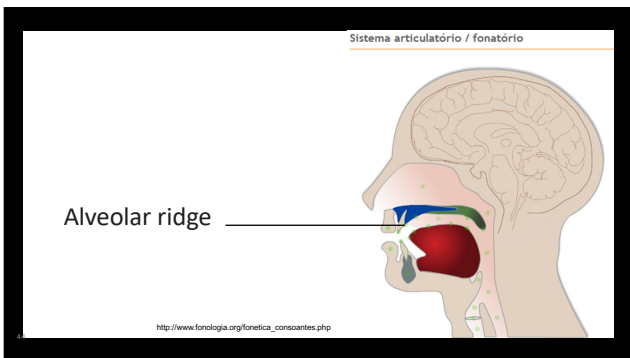
---

---

---

---

---



44

---

---

---

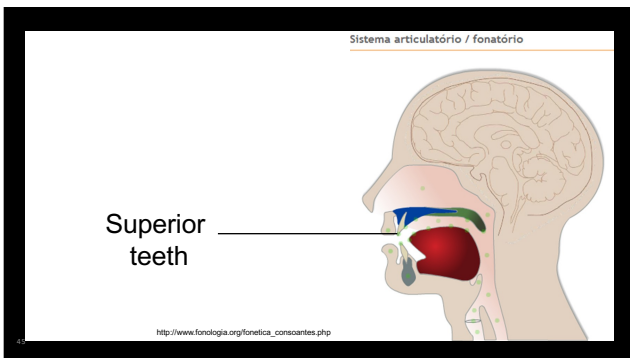
---

---

---

---

---



45

---

---

---

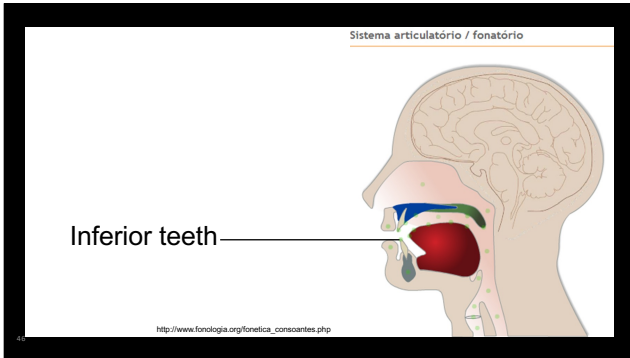
---

---

---

---

---



46

---

---

---

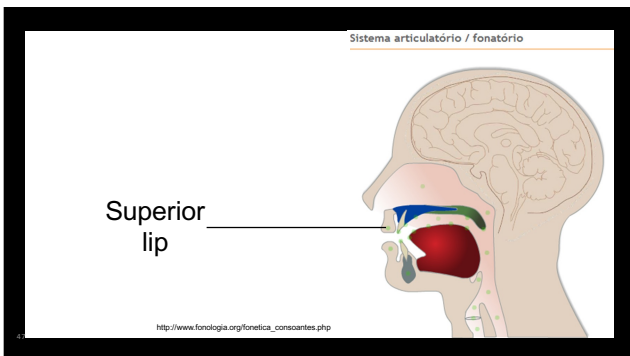
---

---

---

---

---



47

---

---

---

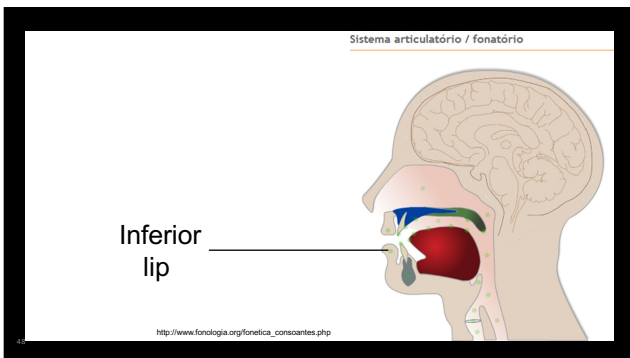
---

---

---

---

---



48

---

---

---

---

---

---

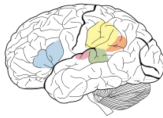
---

---

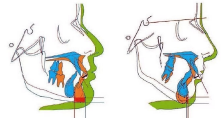


**Articulation Disorder (Dodd et al,2005)**

**Neuromotor Impairments**



**Muscle and skeletal causes**



Marchesan IQ. Alterações de fala de origem musculoesquelética. In: Ferreira LP, Belf-Lopes DM, Limongi SCO.Tratado de Fonoaudiologia. São Paulo: Roca; 2004. p.292-303

49

---

---

---

---

---

---

---

---

49

**Speech Disorders**

**Neurological Causes**

**Progressive Bulbar Palsy**



50

Roberta Martinelli

---

---

---

---

---

---

---

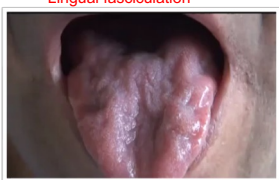
---

50

**Speech Disorders**

**Neuromotor impairment**

**Lingual fasciculation**



51

---

---

---

---

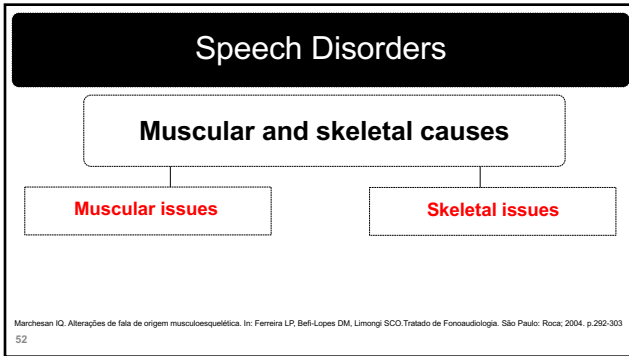
---

---

---

---

51



---

---

---

---

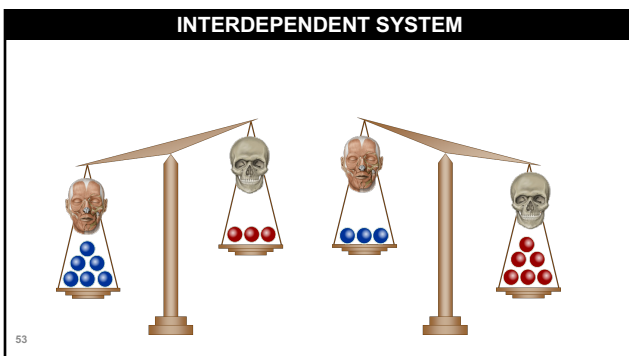
---

---

---

---

52



---

---

---

---

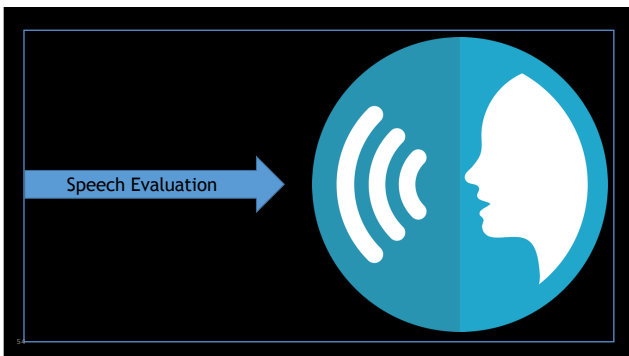
---

---

---

---

53



---

---

---

---

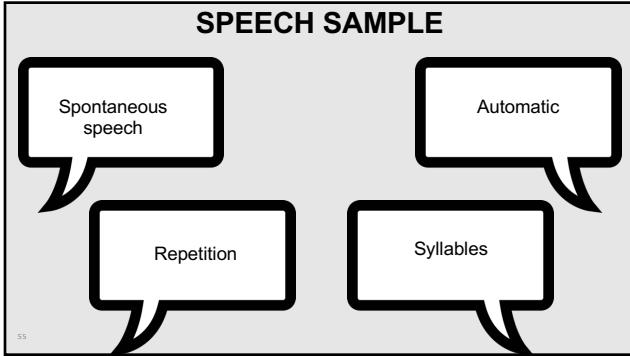
---

---

---

---

54



55

---

---

---

---

---

---

---

**PROTOCOLO MBGR COM ESCORES**  
**EXAME CLÍNICO MIOFUNCIONAL OROFACIAL**  
Murchison R2, Barnstein-Felix G, Corrao RP, Fagher MII  
Versão atualizada em outubro de 2018

Função #1 com figuras para a escolha da foto	Função #2 com figuras para a escolha da foto

56

56

---

---

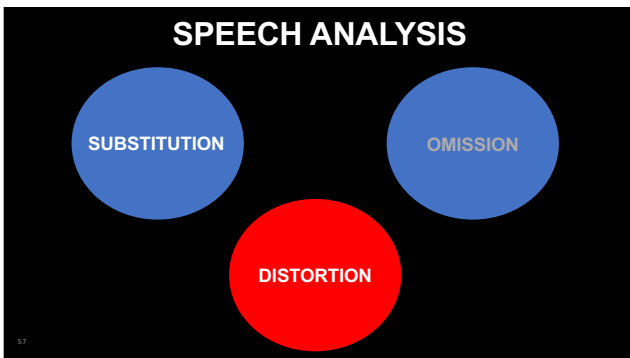
---

---

---

---

---



57

---

---

---

---

---

---

---

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			ʀ					ʁ		
Tap or Flap				ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulation judged impossible.

14 Marchesan IQ. Alterações de fala de origem músculoesqueléticas. In: Ferreira LP, DeF-Lopes DM, Limongi SCO. Tratado de Fonoaudiologia. São Paulo: Roca, 2004. p.292-303

---

---

---

---

---

---

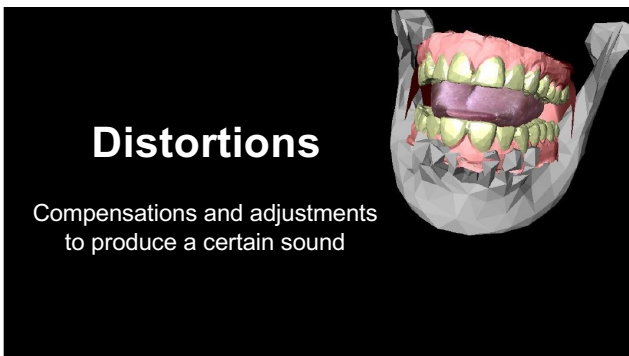
---

---

---

---

58




---

---

---

---

---

---

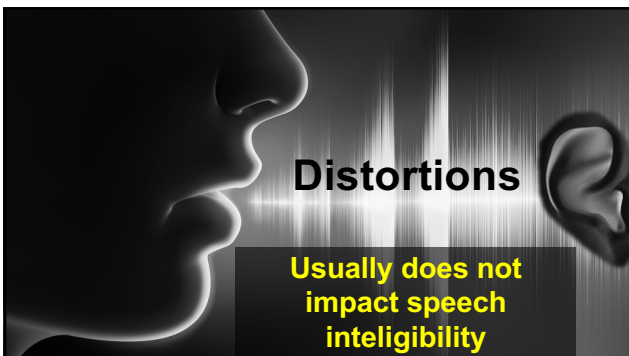
---

---

---

---

59




---

---

---

---

---

---

---

---

---

---

60

### Phonetic Inventory

p	t	k		
b	d	g		
m	n	ŋ		
f	s	ʃ		
v	z	ʒ	{S}	{R}
	l	ʎ	c/l/v	
	r	r	c/r/v	
	y	w		

→ Troca sistemática  
 - - - Troca assistemática  
 ○ Omissão sistemática  
 ○ Omissão assistemática  
 △ Distorção

61

61

---

---

---

---

---

---

---

---

### Phonetic Inventory

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill				r					ʀ		
Tap or Flap				ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

62

62

---

---

---

---

---

---

---

---

### Technology – static and dynamic images of speech production

**Frame by Frame**

63

63

---

---

---

---

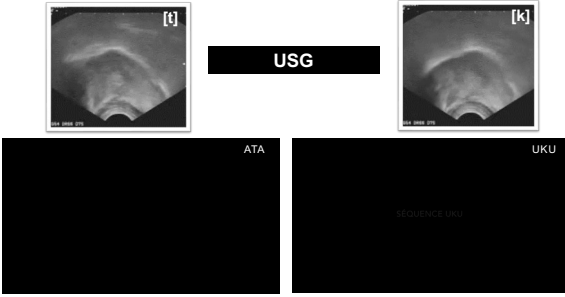
---

---

---

---

**Technology – static and dynamic images of speech production**



The image shows two ultrasound (USG) scans of the tongue. The left scan is labeled with the phoneme [t] and the label ATA. The right scan is labeled with the phoneme [k] and the label UKU. A central box contains the text 'USG'. Below the scans are two large black rectangular areas.

64 <https://www.youtube.com/7ghnBR&hpt>

64

---

---

---

---

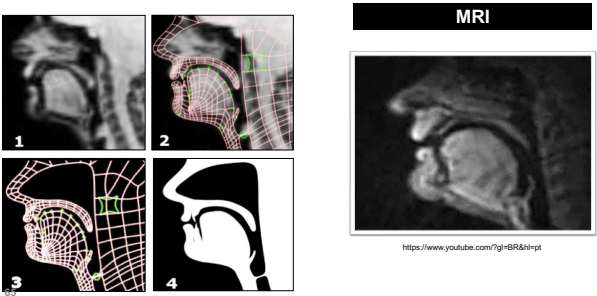
---

---

---

---

**Technology – static and dynamic images of speech production**



The image displays four MRI slices of the tongue, numbered 1 through 4, showing different cross-sections. To the right is a larger MRI image labeled 'MRI'. Below the images is a URL: <https://www.youtube.com/7ghnBR&hpt>.

65 <https://www.youtube.com/7ghnBR&hpt>

65

---

---

---

---

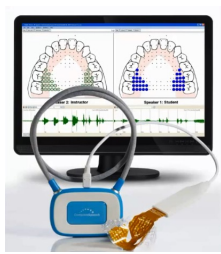
---

---

---

---

**Technology – static and dynamic images of speech production**



The image shows a computer monitor displaying a software interface for Eletropalatography. The interface includes a diagram of the tongue and palate with colored contact points, a waveform, and a play button. In front of the monitor is a blue and white device with a flexible sensor strip.

**Eletropalatography**

Real-time visual feedback of tongue contact on the palate, as well as movement and shape interferences during the speech sound production.

66

66

---

---

---

---

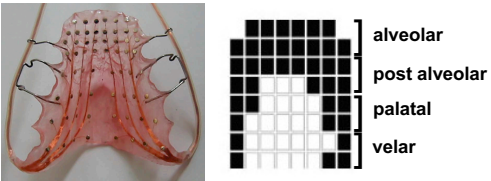
---

---

---

---

**Electropalatography**



alveolar

post alveolar

palatal

velar

Artificial palate showing 62 electrodes in 62 articulatory regions and palatogram

Jesus MSV, Reis C. Descrição fonética electropalatográfica de fonos alveolares. J Soc Bras Fonoaudiol. 2012;24(3):255-61.

67

---

---

---

---

---


---

---

---

67

**Electropalatography (EPG)**



https://www.youtube.com/7ghBR&h=pt

68

---

---

---

---

---

---

---

---

68

**Oral-Motor  
Techniques in Articulation &  
Phonological Therapy**

Pamela Marshalla Speech Language Pathologist  
Millennium Edition Revised, 2000  
[www.pammarshalla.com](http://www.pammarshalla.com)  
Chapter 6 The Tongue p.81-93

69

---

---

---

---

---

---

---

---

69

**Electropalatography (EPG) brought new information about tongue and palate contact during speech production**

White regions showing tongue and palate contact

70 (Pam Marshalla, 2000)

---

---

---

---

---

---

---

---

---

---

70

**TONGUE HISTORICAL DIVISION**      **TONGUE FUNCTIONAL DIVISION**

Although the tongue is considered one body, it can move each of its 16 portions separately.

71 (Adaptado de Pam Marshalla, 2000)

---

---

---

---

---

---

---

---

---

---

71

**Electropalatography provides 3D real-time speech analysis**

---

---

---

---

---

---

---

---

---

---

72





73

---

---

---

---

---

---

---

---

 A sagittal cross-section of the human head on the left, showing the vocal tract. To the right is a grid diagram representing the oral cavity, with a small black square at the top center labeled '[r]'.
 

Portugues [r] tongue contact on the tip of the tongue – quickly produced with a short duration.

(Jesus e Reis, 2012)

74

---

---

---

---

---

---

---

---

 A close-up image of the tongue tip, with a green line tracing a path across it, indicating rapid movements.
 

Rapid movements of the tongue tip: late acquisition and high incidence of disorders with this sound

(Jesus e Reis, 2012)

75

---

---

---

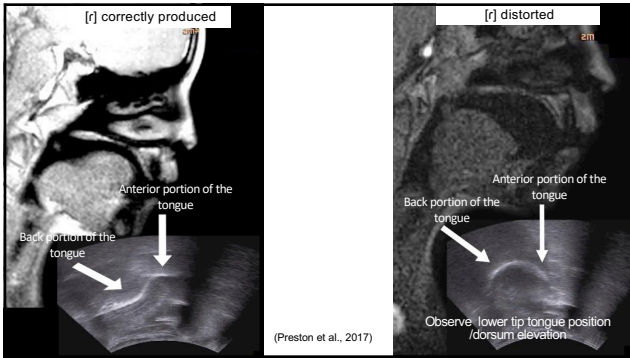
---

---

---

---

---



76

---

---

---

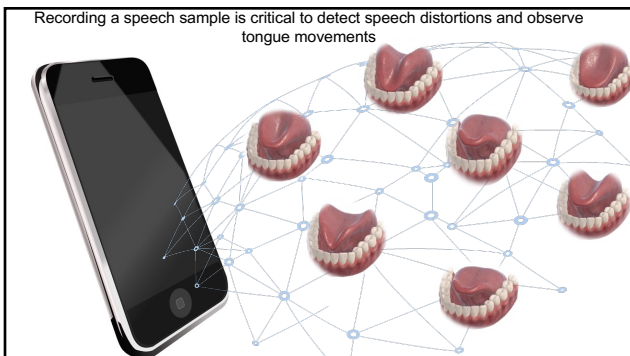
---

---

---

---

---



77

---

---

---

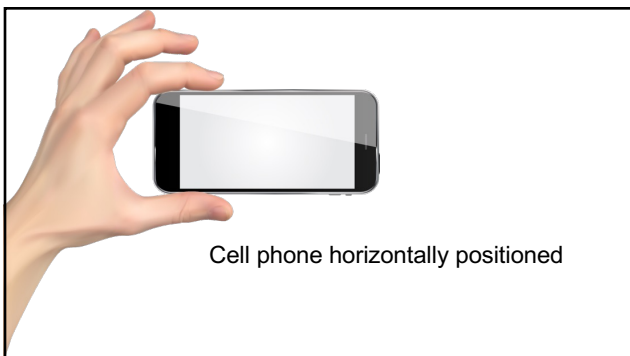
---

---

---

---

---



78

---

---

---

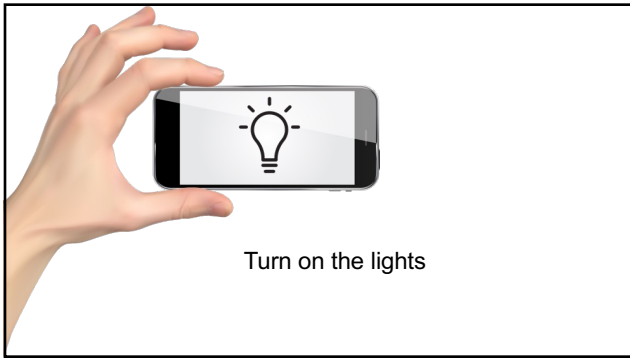
---

---

---

---

---



79

---

---

---

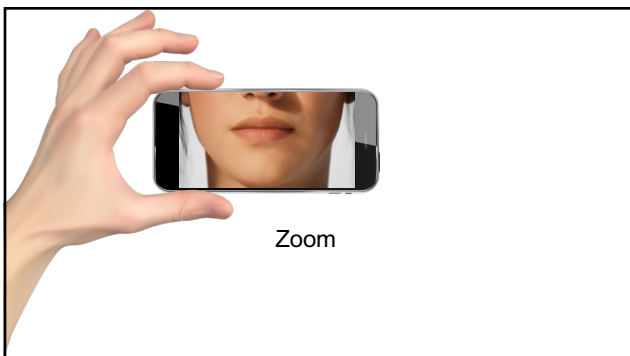
---

---

---

---

---



80

---

---

---

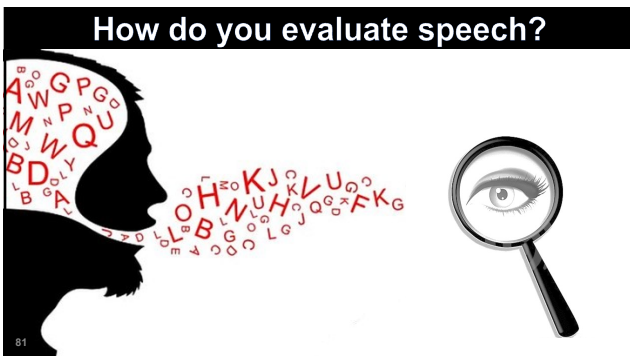
---

---

---

---

---



81

---

---

---

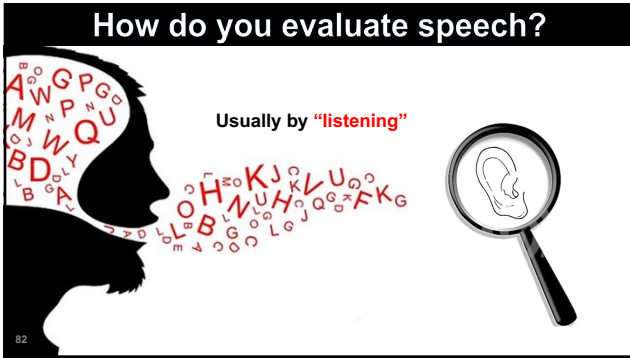
---

---

---

---

---



---

---

---

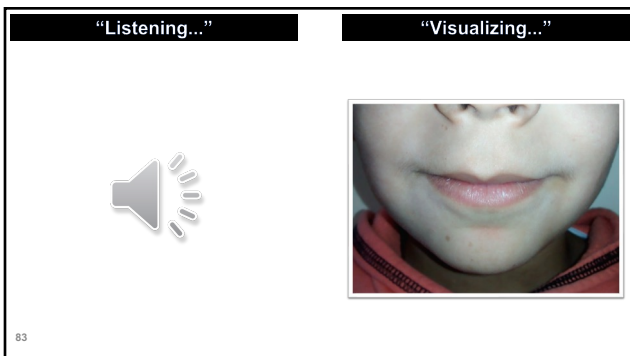
---

---

---

---

---



---

---

---

---

---

---

---

---



---

---

---

---

---

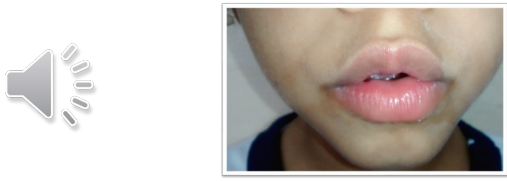
---

---

---

84

**"Listening..."**      **"Visualizing..."**



85

---

---

---

---

---


---

---

---

85

**"Visualizing..."**      **"Visualizing and Listening ..."**



86

---

---

---

---

---


---

---

---

86

**"Training your eye..."**



87

---

---

---

---

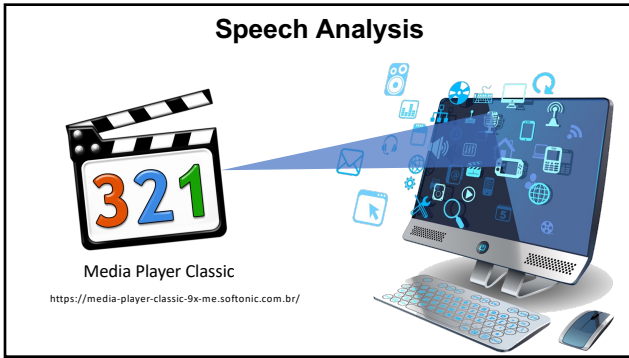
---

---

---

---

87



88

---

---

---

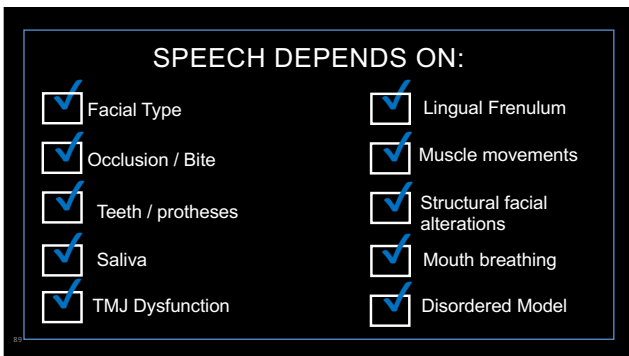
---

---

---

---

---



89

---

---

---

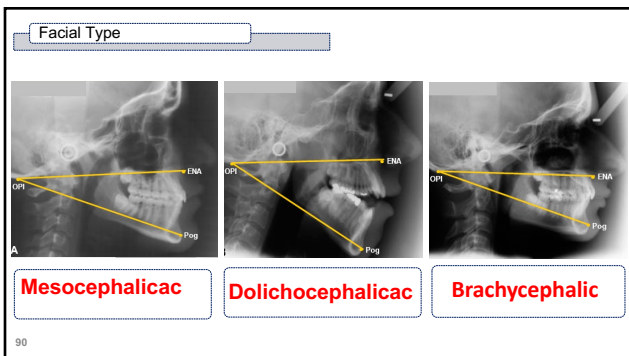
---

---

---

---

---



90

---

---

---

---

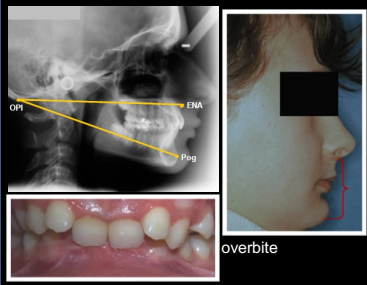
---

---

---

---

**Facial Type– Short Face**



- Powerful musculature
- Strong masseters
- Thin upper lip
- Wider tongue
- Forward or lateral mandibular movements
- Speaks like “whistling”
- Lateral lisp

overbite

91

---

---

---

---

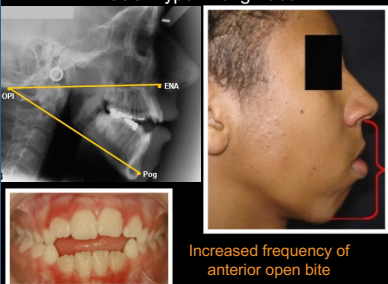
---

---

---

---

**Facial Type– Long Face**



- Lip incompetence (curled lower lip)
- Hypertrophy of mentalis
- Forward or lower resting tongue position
- Low pressure of [p] [b] [m]
- Forward position of [t] [d] [l] [n] and alveolar fricatives [s] [z]

Increased frequency of anterior open bite

92

---

---

---

---


---

---

---

---

**Malocclusion– Classe II**



Convex face – changes the tongue position in the oral cavity – [s] e [z] distortion / lateral lisp

Dental overbites emerge from interference with dental development, such as excessive thumb-sucking, extra teeth/crowding, or loss of molars

93

---

---

---

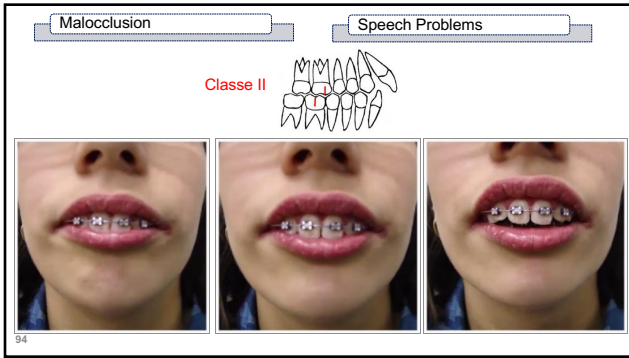
---

---

---

---

---



---

---

---

---

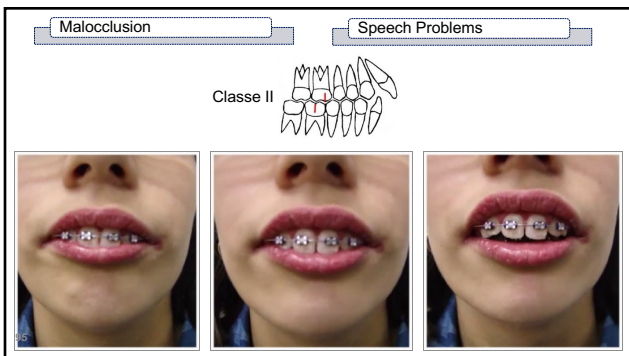
---

---

---

---

94



---

---

---

---

---

---

---

---

95



---

---

---

---

---

---


---

---

96



Malocclusion- Classe III



Concave facial profile and steep mandibular plane angle attributable, in part, to an obtuse gonial angle  
 Bilabials [p] [b] [m] and labiodentals [f] [v]

97

---

---

---

---

---


---

---

---

Malocclusion      Speech Problems

Classe III



98

---

---

---

---

---

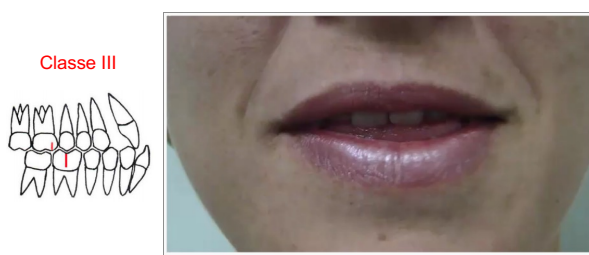
---

---

---

Malocclusion      Speech Problems

Classe III



99

---

---

---

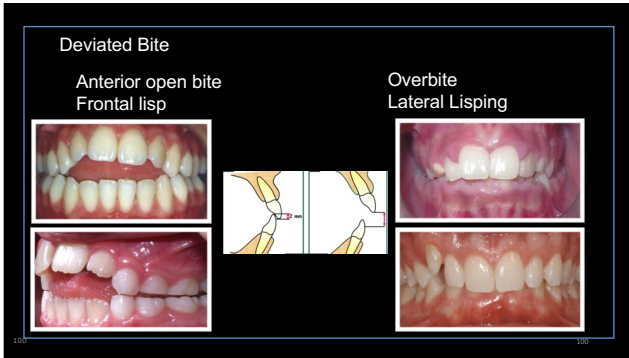
---

---

---

---

---



100

---

---

---

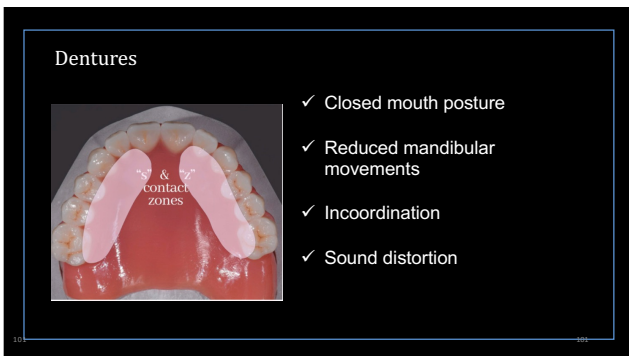
---

---

---

---

---



101

---

---

---

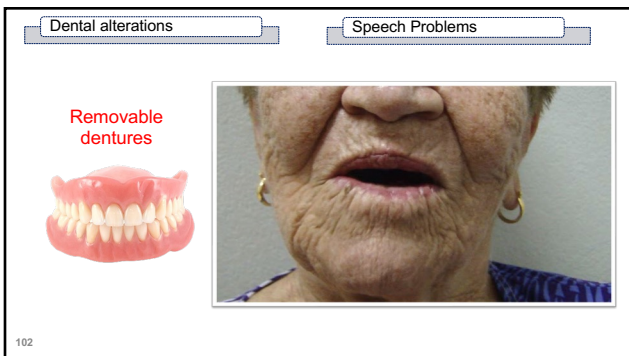
---

---

---

---

---



102

---

---

---

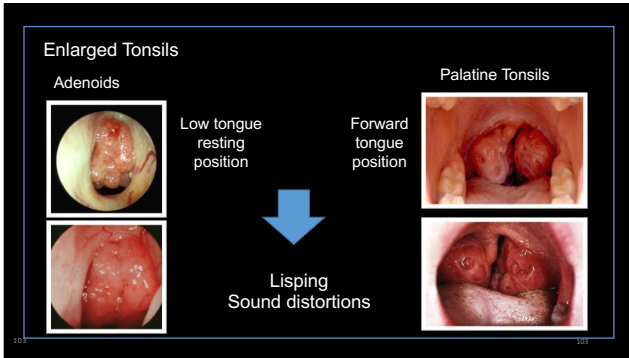
---

---

---

---

---



103

---

---

---

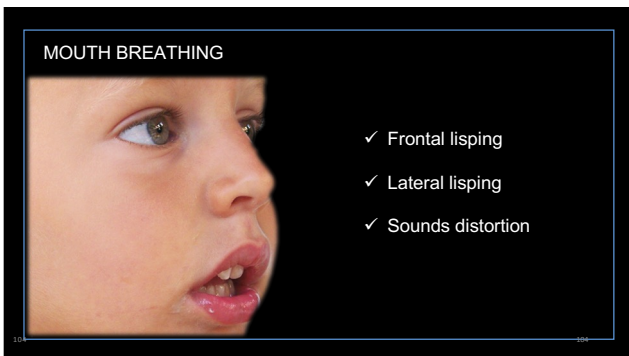
---

---

---

---

---



104

---

---

---

---

---

---

---

---

- This treatment aims to “normalize” function
- The most common example is atypical quiet breathing due to the position of the tongue in the oral cavity
- This disorder leads to a narrowing of the airways, which causes an abnormal tongue position.
- This malposition of the tongue can cause growth and tooth eruption disorders. MFT = the function changes, as well as the occlusion and the profile

\* Lons IM, Zohud O, Miffel J, Paddenberg E, Krohn S, Kirschneck C, Proff P, Watzlad N, Itagi PA. Anterior Open Bite Malocclusion: From Clinical Treatment Strategies towards the Dissection of the Genetic Bases of the Disease Using Human and Collaborative Cross Mice Cohorts. J Pers Med. 2023 Nov 17;13(11):1617

105

---

---

---

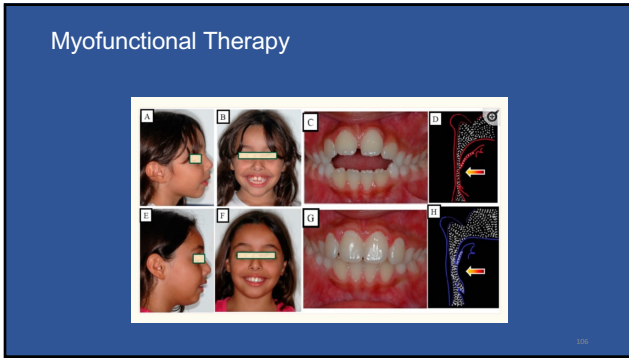
---

---

---

---

---



---

---

---

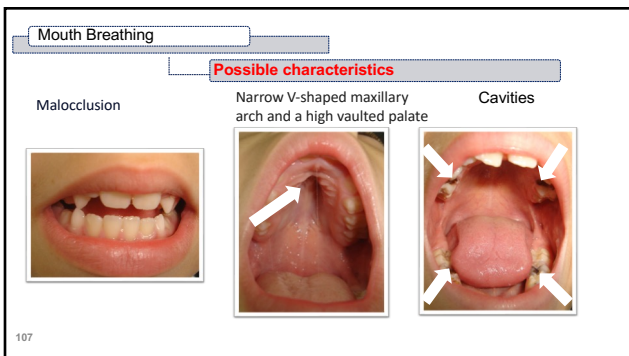
---

---

---

---

---



---

---

---

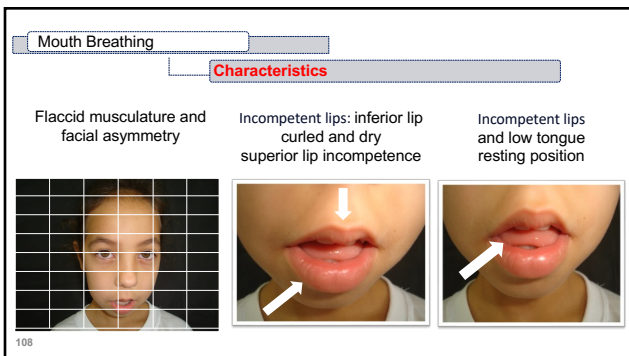
---

---

---

---

---



---

---

---

---

---

---

---

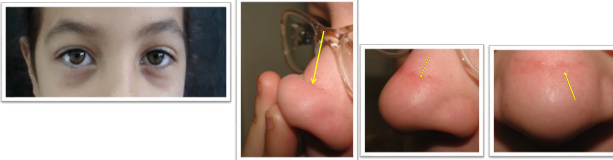
---

108

Mouth Breathing

Characteristics

Dark circles under the eyes    Allergy Signs / Itchy nose



109

---

---

---

---

---

---

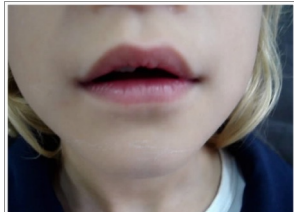
---

---

109

Mouth Breathing

Hyponasal Voice



110

---

---

---

---

---

---


---

---

110

Mouth Breathing

Hoarse Voice



111

---

---

---

---

---

---

---

---

111

nature > scientific reports > articles > article

Article | [Open access](#) | Published: 15 February 2024

**Mouth breathing reduces oral function in adolescence**

Yukako Masutomi, Takaharu Goto & Tetsuo Ichikawa

**Tongue pressure alone** was identified as a significant independent variable, with an odds ratio of 1.063 (95% confidence interval, 1.006–1.123;  $p < 0.05$ ) Results indicate a **relationship between mouth breathing** and the **lip-closing force, tongue pressure, and masticatory efficiency**, as well as the significance of tongue pressure on mouth breathing in adolescents.

The findings highlight the importance of clarifying the pathophysiology of mouth breathing and its underlying causes.

---

---

---

---

---

---

---

---

112

**TMJ Dysfunction**

- ✓ Reduced mandibular range of motion (difficulty opening and closing the mouth)
- ✓ Increased perioral muscle activity
- ✓ Mandibular lateralization to produce /s/, /z/
- ✓ Difficulty chewing or pain while chewing
- ✓ Reduced speech rate
- ✓ Voice disorders

---

---

---

---

---

---

---

---

113

**TMJ Dysfunction**

---

---

---

---

---

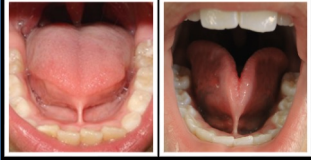
---

---

---

114

Lingual Frenulum



- ✓ Reducing mouth opening
- ✓ Mandibular deviations
- ✓ Sound distortions [s], [z], [l] e [r]
- ✓ Increased lateral tongue movements

115

---

---

---

---

---

---

---

---

Ankyloglossia: tongue movements resulting in compensations or developing adaptations to produce speech



116

---

---

---

---


---

---

---

---

Lips resting posture



117

---

---

---

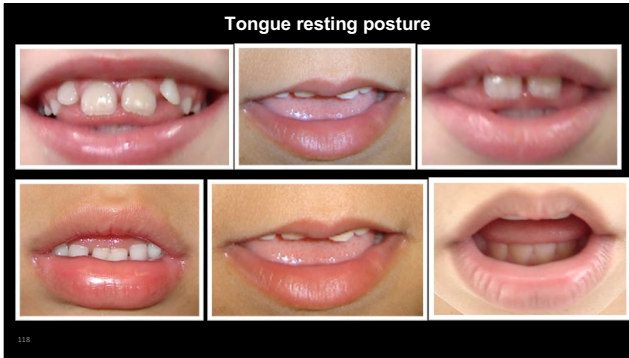
---

---

---

---

---



---

---

---

---

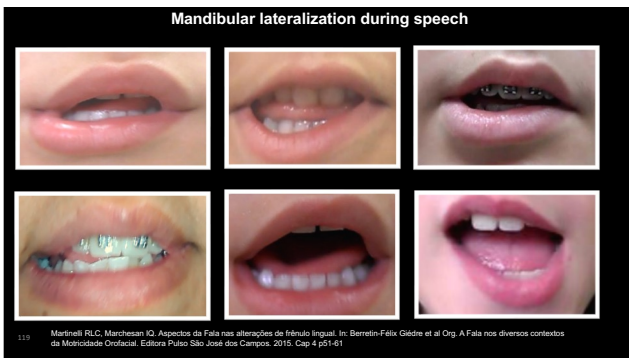
---

---

---

---

118



---

---

---

---

---

---

---

---

119



---

---

---

---

---

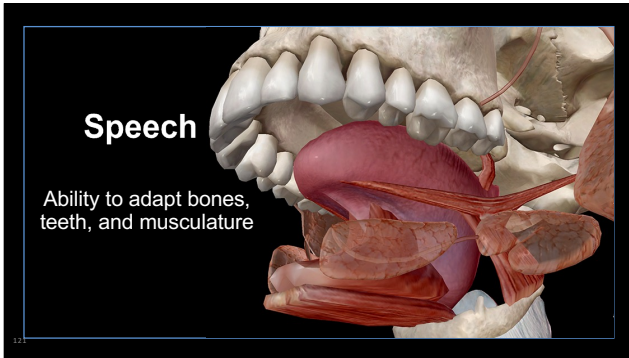
---

---

---

120





121

---

---

---

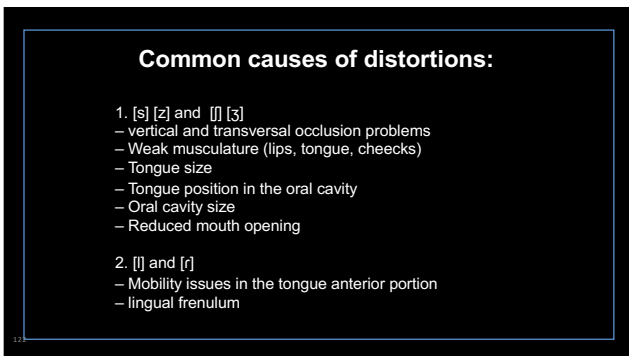
---

---

---

---

---



122

---

---

---

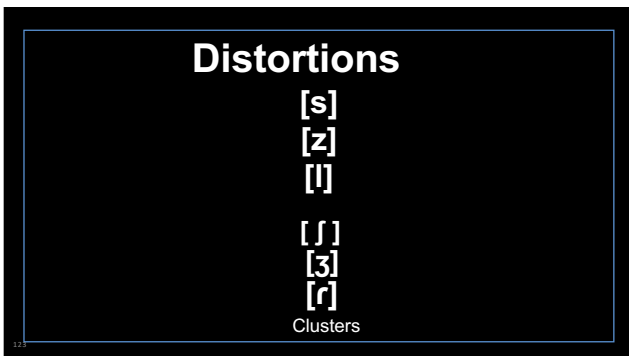
---

---

---

---

---



123

---

---

---

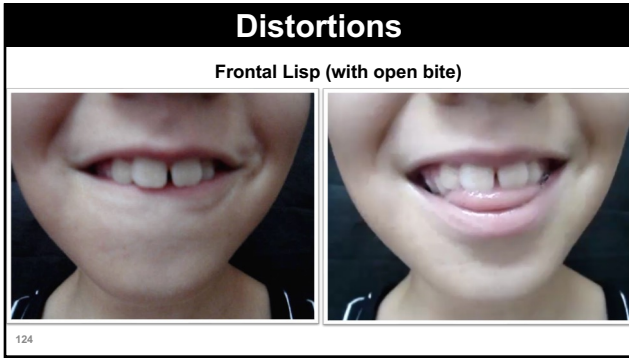
---

---

---

---

---



124

---

---

---

---

---

---

---

---



125

---

---

---

---

---

---

---

---



126

---

---

---

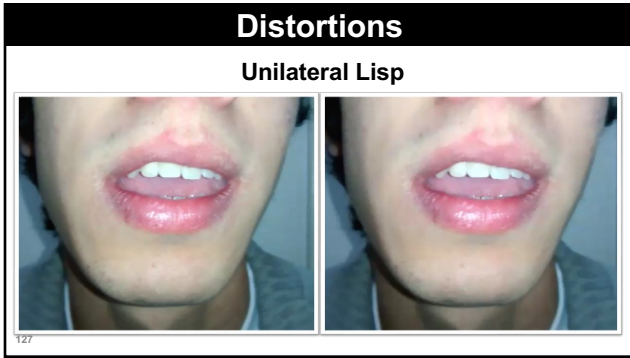
---

---

---

---

---



127

---

---

---

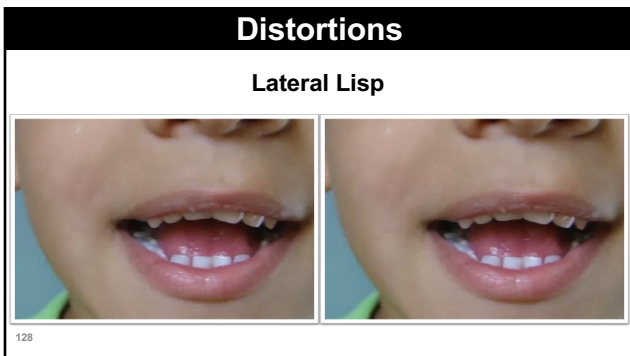
---

---

---

---

---



128

---

---

---

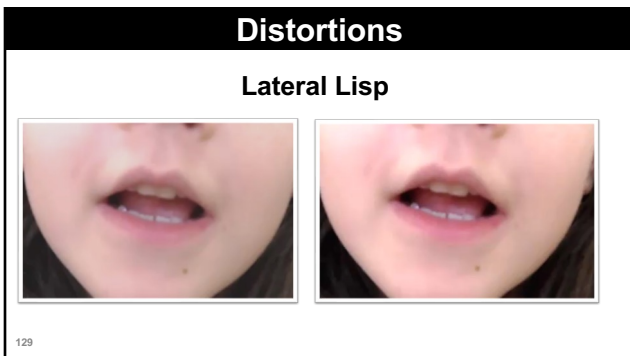
---

---

---

---

---



129

---

---

---

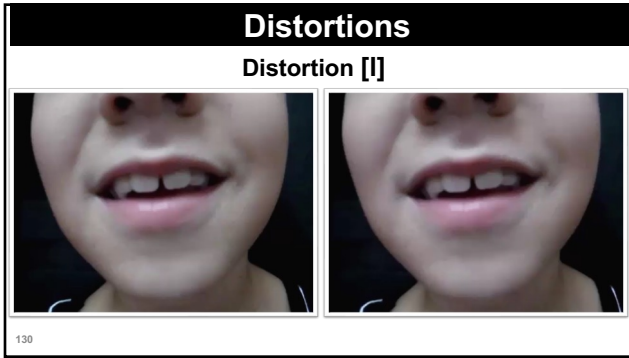
---

---

---

---

---



130

---

---

---

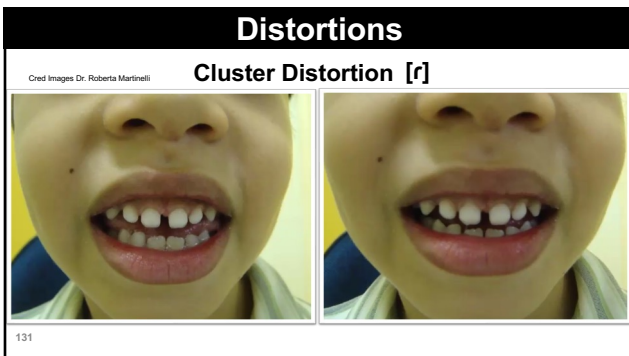
---

---

---

---

---



131

---

---

---

---

---

---

---

---



132

---

---

---

---

---

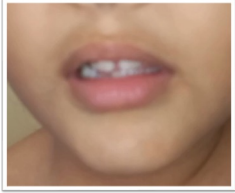
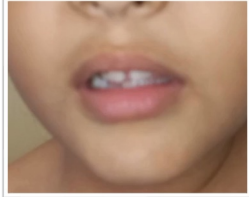
---

---

---

**Distortions**

**Cluster Distortion [r]**

133

133

---

---

---

---

---

---

---

---

**Traditional Motor-Based Therapy**

- Exercises (limited and only when necessary)
- Awareness, perception, and motivation
- Therapy tasks using actual speech
- Systematic practice

**Family: practice and positive feedback**

134

134

---

---

---

---

---

---

---

---

**STRATEGIES TO BE USED IN INTERVENTION**

- Teach the correct production of the sound and help the client understand how they are producing the sound;
- Help the client observe their own speech;
- Help the client observe others speaking;
- Compare their speech with the speech of others;
- Reinforce the new sound's tongue and articulator placement;
- Provide visual and auditory feedback;
- Practice the sound in different levels (syllable, word, spontaneous speech)

135

135

---

---

---

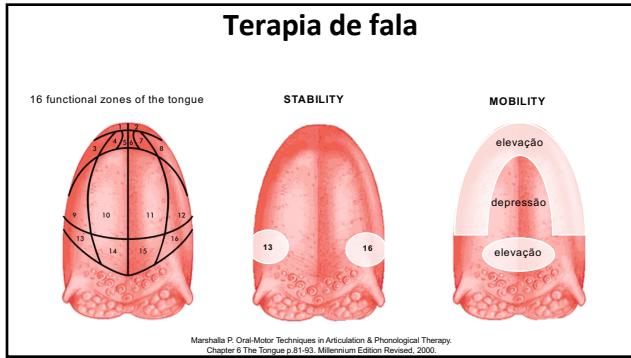
---

---

---

---

---



136

---

---

---

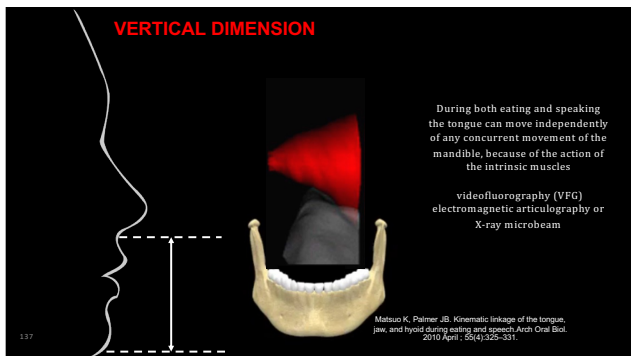
---

---

---

---

---



137

---

---

---

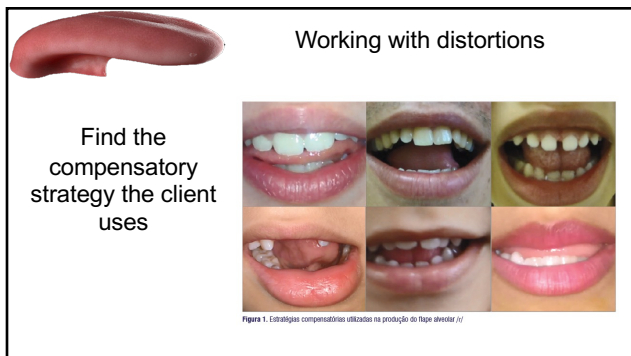
---

---

---

---

---



138

---

---

---

---

---


---

---

---

**Treatment Strategies**

The client observes themselves and describes how to produce the correct sound



139

---

---

---

---

---

---

---

---

**Treatment Strategies**

Observe other people talking



140

---

---

---

---

---

---

---

---

**Treatment Strategies**



141

---

---

---

---

---

---

---

---



142

---

---

---

---

---

---

---

---



143

---

---

---

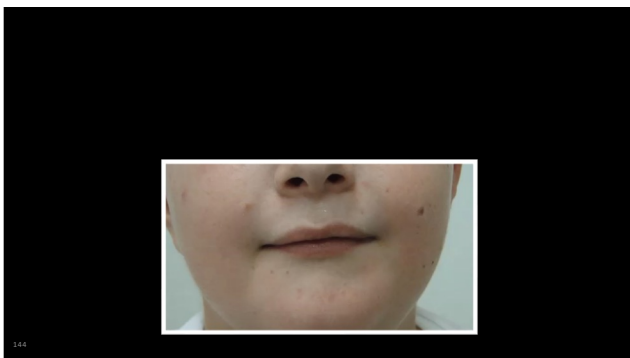
---

---

---

---

---



144

---

---

---

---

---

---

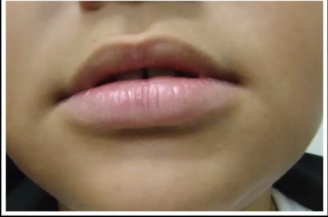
---

---



### Treatment Strategies

Negative practice: producing the incorrect & correct sound;  
Explore different ways to work with the same sound



145

---

---

---

---

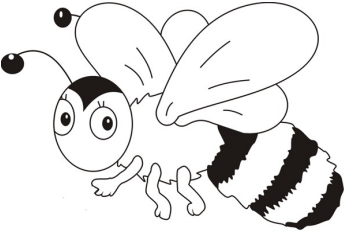
---

---

---

---

Practice [z] Voiced alveolar Fricative



146

---

---

---

---

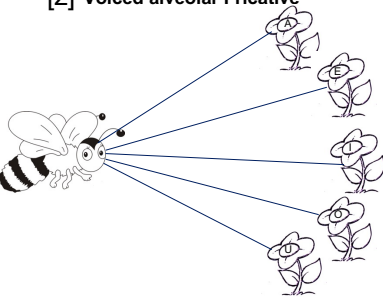
---

---

---

---

Practice [z] Voiced alveolar Fricative



147

---

---

---

---

---

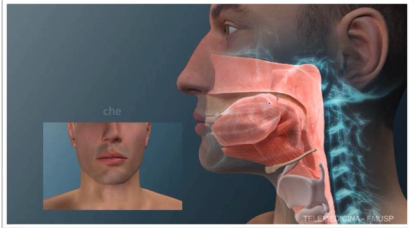
---

---

---

[ʃ] Voiceless Fricative

Teach the correct sound production



148

148

---

---

---

---


---

---

---

---

Practice [ʃ] Voiceless Palatal Fricative



149

149

---

---

---

---

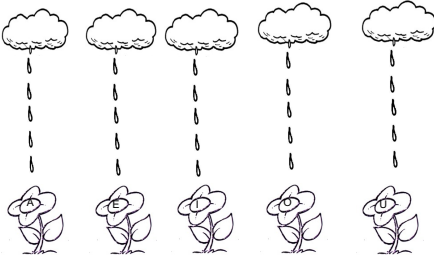
---

---

---

---

Practice [ʃ] Voiceless Fricative



150

150

---

---

---

---

---

---

---

---

[3] Fricativa pós-alveolar vozeada



151

151

---

---

---

---

---

---

---

---



152

152

---

---

---

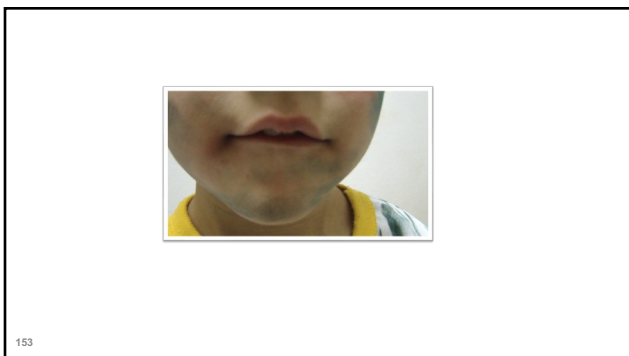
---

---

---

---

---



153

153

---

---

---

---

---

---

---

---



154

---

---

---

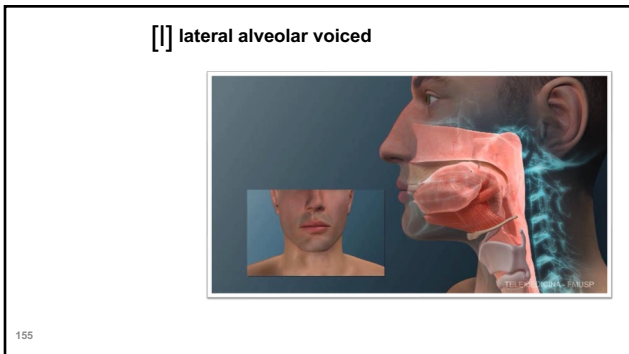
---

---

---

---

---



155

---

---

---

---

---

---

---

---



156

---

---

---

---

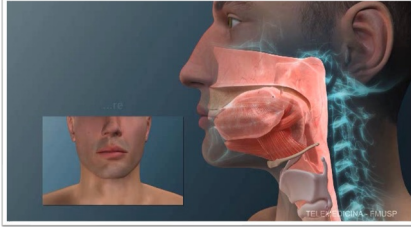
---

---

---

---

[r] Alveolar



157

157

---

---

---

---

---

---

---

---



158

158

---

---

---

---

---

---

---

---



159

159

---

---

---

---

---

---

---

---

**Other strategies**

**Visual Feedback**

Katz W., Campbell T., Wang J., Farrar E., Eubanks J., Balasubramanian A., Prabhakaran B., and Renninger R., "Opti-Speech: A real-time, 3D visual feedback system for speech learning," in *JSCA Proceedings of Interspeech*, Singapore (2014), pp. 1174-1178.

Katz WF, Mehta S. Visual Feedback of tongue movement for novel speech sound learning. *Front Hum Neurosci*. 2015 Nov 19;9:1012-1010.

Illustration of the *Opti-Speech* system, with the subject wearing sensors and head-orientation glasses

160

---

---

---

---

---

---

---

---

---

---

○

Electromagnetic articulometer-based visual-feedback approach using an articulatory target presented in real-time to facilitate L2 pronunciation learning.

Real-time visual feedback of articulatory position using ultrasound imaging

Electromagnetic articulometry (EMA)

161

---

---

---

---

---

---

---

---

---

---

**Generalization**

Generalization means that the task has been learned and has become automatic. It's now been incorporated into the client's daily routine and life, and the client no longer needs to be consciously aware to employ the learned strategies and techniques.

162

162

---

---

---

---

---

---

---

---


---

---

### Treatment Results

#### Generalization

- To learn the new motor pattern, the client must repeat the motor act many times.
- The client needs to have maximal motivation, and as a result, the newly learned pattern will be highly utilized, eventually becoming automatic.



163

---

---

---

---

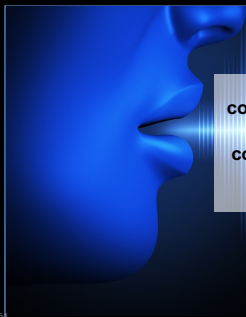
---

---

---

---

163



**Speech production is extremely complex. Because of this, it is essential to make a good assessment and consequently plan therapy that always considers the real possibilities of change.**

164

---

---

---

---

---

---


---

---

164

The treatment plan in myofunctional therapy relies on good assessment.

Distortions are individual. Because of this, the professional must have good knowledge of how sounds are produced. Having this enables you to know the distortions that the client does in an attempt to produce a sound, as well as enabling you to propose good treatment strategies to treat the problem.



165

---

---

---

---

---

---

---

---

165



166

---

---

---

---

---

---

---