

Part 2: Cleft Palate Speech Dr. Triona Sweeney

- Early speech & language
- Velopharyngeal Dysfunction (VPD)
- Resonance and airflow problems
- Articulation
- Voice
- Hearing

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Cleft Palate Incidence of speech problems

- 50% children develop speech normally
- 68% require speech and language therapy (Hardin Jones 2005)
- 50% have speech problems at 5 years of age (Britton et al. 2014)
- 20% of children have persistent speech problems into the school years (Sell et al., 2015)
- 5 – 40% may require secondary speech surgery
- 'cleft speech' - hypernasality, nasal airflow errors, articulation errors known as cleft speech characteristics

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Early development

- Mothers can be less responsive to the infant's cues and less actively engaged with them Murray et al., 2018
- Infants with an unoperated palate have difficulty making oral sounds due to a lack of intraoral air pressure.
- Use more nasal consonants, glides and glottal stops Hardin-Jones et al., 2003; Scherer et al., 2008
- Later onset of babbling, producing fewer 'canonical' syllables and with oral consonants Chapman et al., 2001; Hardin-Jones et al., 2003
- Smaller consonant inventories in early word productions, with less complex syllable and word structures Chapman and Willadsen, 2011

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Speech and Language Development

- Risk for speech and language difficulties Chapman, 2011; Scherer et al., 2008.
 - mean length of utterance Scherer et al., 2013
 - amount of vocabulary Frey et al., 2018
 - Syntax/grammar Young et al., 2010
- 27% of younger children had language delay/disorder Deatherage et al., 2021
- Consonant inventory and their accuracy, which can persist into the school aged years Lancaster et al., 2019

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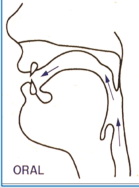
Developmental Speech problems

- Phonological delay/disorder may co-occur with articulation problems
- Phonological consequence of cleft type articulation problems
 - lack of ability to signal phonological contrasts Harding Bell & Howard 2011

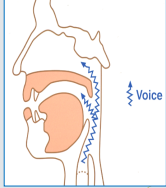
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Velopharyngeal Function



ORAL



Voice

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Velopharyngeal Dysfunction

- *velopharyngeal insufficiency* - lack of sufficient tissue to effect velopharyngeal closure
- *velopharyngeal incompetency* - lack of neuromuscular competency in opening and closing the velopharyngeal sphincter
- *velopharyngeal mislearning* - maladaptive articulation which is learnt and is not due to structural or neurological aetiologies

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Causes of VPD

- Structural –
 - Cleft palate
 - Submucous Cleft Palate
 - Palato-pharyngeal disproportion – can present post adenoidectomy
 - Irregular adenoids
 - Enlarged tonsils
 - Choanal atresia
- Neurological
 - Dysarthria or Dyspraxia
 - neuromuscular diseases
 - congenital syndromes
 - upper and lower motor neuron lesions
 - childhood apraxia of speech
- Velopharyngeal mislearning
 - Hearing loss

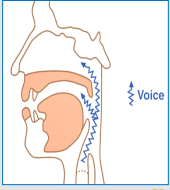
Persson & Sjogreen 2011

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Nasality/Nasal resonance

- perceived nasal resonance during production of speech
- evident on nasal consonants and adjacent vowels
- resulting from the coupling of the oral and nasal resonating cavities



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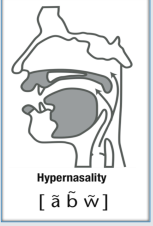
Sweeney 2011

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Hypernasality

- excessive nasal resonance perceived during speech production
- results from increased nasal resonance within the nasal cavity coupled with oral resonating cavities
- incomplete /problem with timing of the velopharyngeal closure



Sell et al 2009

Bob is a baby boy
Mõm ìn ã mãmy mõy

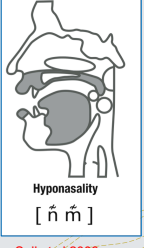
Sweeney 2011

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Hyponasality

- reduction or absence of expected nasal resonance associated with nasal consonants and adjacent vowels
- reduction or absence of the resonance within the nasal cavity
- blockage in nasopharynx



Sell et al 2009

mum came home
m̃um cãme hõme

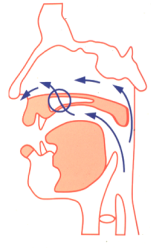
Sweeney 2011

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Nasal Emission

- audible escape of air from the nasal cavity
- accompanying production of oral pressure consonants
- airflow is constricted within the nasal cavity, with a frictional but no turbulent/ snorting quality



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I saw Sam sitting on a bus
I šaw šam šitting on a buš

Sweeney 2011

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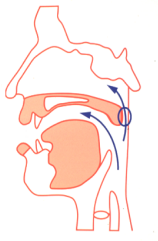
- a 'snorting'/turbulent noise **accompanying** a sound
- inadequate closure of the superior border of the velum and the posterior pharyngeal wall
- friction produced when an airstream passes through a small velopharyngeal gap.
- Velar trill

Nasal Turbulence
~ ~ ~
p t s

Kind permission D. Sell

I saw Sam sitting on a bus
I \tilde{s} aw \tilde{s} am \tilde{s} itting on a bu \tilde{s}

Sweeney 2011



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Terminology Issues

- Considerable variation internationally in terms used to describe sounds and how errors are classified
 - nasal emission
 - nasal turbulence
 - nasal fricatives
 - articulation errors

Sweeney 2011, Howard et al 2019, Oren et al 2020,

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Passive and Active

Harding and Grunwell 1998

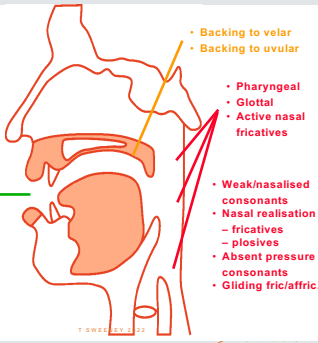
PASSIVE – Structurally Related
Accept inability to produce high pressure sounds
Trost-Cardamone 1990

Obligatory articulation is normal but the abnormal structure results in distortion of the speech sound
Golding-Kushner 1995

ACTIVE – Mislearning
Adaptive Trost-Cardamone 1990
Compensatory articulation is altered in response to abnormal structure
Golding-Kushner 1995

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Cleft Speech Characteristics (CSCs)



- Backing to velar
- Backing to uvular
- Pharyngeal
- Glottal
- Active nasal fricatives
- Weak/nasalised consonants
- Nasal realisation – fricatives – plosives
- Absent pressure consonants
- Gliding fric/affric.
- Dentalisation
- Lateral
- Palatal
- Double articulation


Sell et al., 1999

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Anterior CSC

- **Dentalization**
Tim is putting a hat on
 \tilde{t} im is put \tilde{t} ing a ha \tilde{t} on
- **Lateralization/lateral**
I saw Sam sitting on a bus
I \tilde{f} aw \tilde{f} am \tilde{f} itting on a bu \tilde{t}
- **Palatalization/palatal**
I saw Sam sitting on a bus
I \tilde{c} aw \tilde{c} am \tilde{c} itting on a bu \tilde{c}

Anterior Oral CTCs
Sell et al 2009




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Posterior CSC

- **Double articulation**
The puppy is playing
The \tilde{p} kup \tilde{p} y is \tilde{p} kplaying
- **Backing**
Tim is putting a hat on
kim is puking a hak on
qim is pu \tilde{q} ing a ha \tilde{q} on


Posterior Oral CTCs
Sell et al 2009



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Non Oral CSC

- **Pharyngeal**
I saw Sam sitting on a bus
I haw ham hitting on a buh
- **Glottal**
Tim is putting a hat on
ʔim is puʔing a haʔ on
- **Active nasal fricative**
I saw Sam sitting on a bus
I ŋaw ŋam ŋitting on a buŋ
I ŋaw ŋam ŋitting on a buŋ




Non-Oral CTCs
Sell et al 2009

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Passive CSC

- **Weak / nasalized consonants**
The puppy is playing
The pu py is playing
- **Nasal realization of consonants**
Bob is a baby boy I saw Sam sitting on a bus
Mom in a mamy moy I (s)ŋaw (s)ŋam (s)ŋitting on a bu(s)ŋ
- **Absent pressure consonants**
Bob is a baby boy
o i a ay oy
- **Gliding of fricatives/affricatives**
Sean is washing a dish
jean i wajing a dij

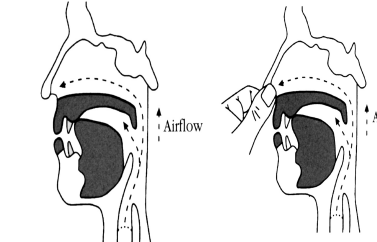


Passive CTCs
Sell et al 2009

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Active Nasal Fricative \tilde{n} $\tilde{\eta}$

- frictional or snorting sound produced by air passing through the nasal cavity
- complete stricture in the oral cavity - no audible oral release
- **replaces a consonant**

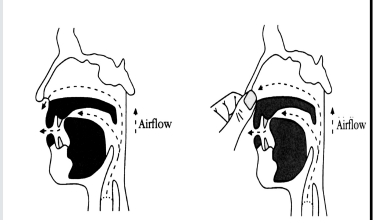


(a) T. SWEENEY 2022 (b) Sell & Grunwell 2001

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Passive Nasal Fricative (s)ŋ

- incomplete stricture in the oral cavity - no audible oral release
- **replaces a consonant**



(a) T. SWEENEY 2022 (b) Sell & Grunwell 2001

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Unusual cleft characteristics

- Ingressive plosives/fricatives have been noted in children who have history of inability to produce intra oral pressure Howard et al 2019
bus bus↓
- Clicks – way of producing plosive sound with VPI using ingressive velaric airstream Gibbons et al 2008, Howard et al 2019
Tim is putting
ʔim is puʔing

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Voice Characteristics

- Controversy regarding incidence of voice disorders in cleft population
 - similar to normal population Hamming et al 2009, Robinson & Otteson 2011,
 - incidence ranges from 17% to 41% Cavalli 2011

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Voice Characteristics

- Causes – wide range and multifactorial
 - Associated with syndromes with laryngeal pathology **Cavalli 2011**
 - Muscle tension - due to increased laryngeal adduction associated with VPI, influenced of use of glottal stops **Aydinli et al 2016**
- Dysphonia – hoarseness, breathiness, strain **Cavalli 2011**

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Hearing Loss in children with cleft palate

- High incidence of hearing loss mostly due to otitis media effusion (fluid in middle ear)
- Conductive hearing loss – usually mild, can be transient, and in minority of cases can persist
 - flatter angle of Eustachian tube
 - poor Eustachian tube function
- Sensorineural hearing loss
 - usually associated with syndrome

Regular hearing assessments

Purdy et al 2019
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Impact of Hearing Loss

- Language delay
- Listening skills
- Education
- Speech perception
- Speech production
- Associated with velopharyngeal mislearning

Purdy et al. (2019) in Case Studies in Cleft Palate Speech (ed) Anne Harding-Bell

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Thank you

Questions?

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