

# Theoretical Phonology: Suprasegmental Phonology

## Consonants: Voice & Place of Articulation

Charalambos Themistocleous

Department of English Studies  
University of Cyprus

Autumn, 2014

# Outline

- 1 Speech Sounds
- 2 Airstream Mechanisms & Airflow Direction
- 3 Phonation
- 4 Place of Articulation
  - Articulators
  - Bilabial
  - Labiodental
  - Dental
  - Alveolar
  - Post-alveolar
  - Palatal
  - Velar
  - Uvular
  - Pharyngeal
  - Glottal

# Sound Classification

## ① initiation

- ① airstream mechanism
- ② airflow direction

## ② phonation

## ③ articulation

- ① place of articulation
- ② degree of stricture
- ③ aspect of articulation

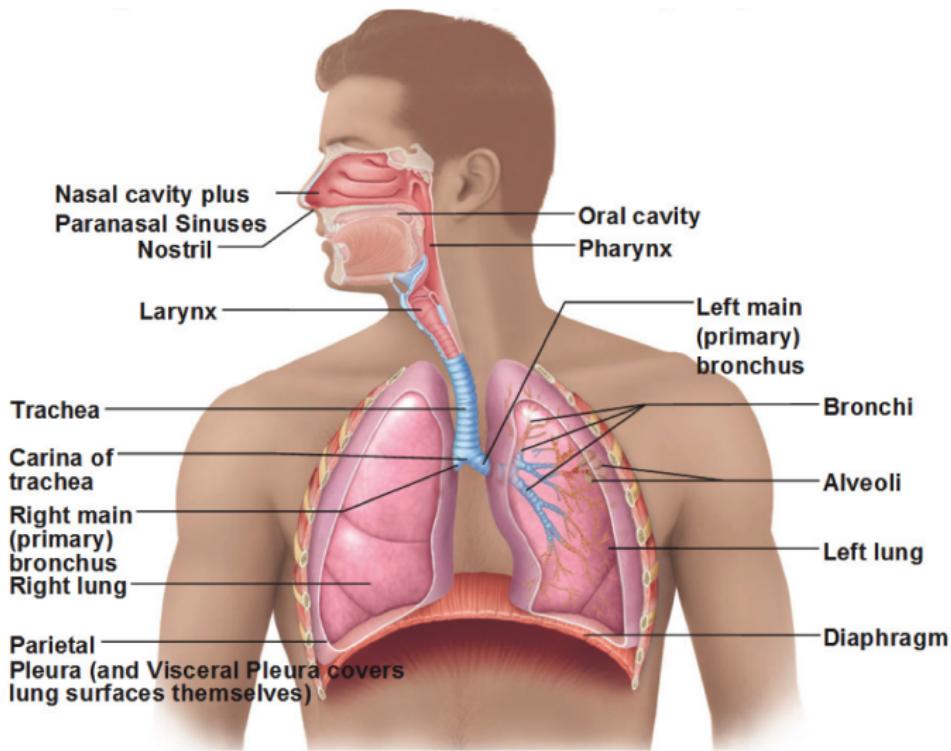
## ④ co-ordination

# Airstream Mechanisms

## Source of Energy

- Pulmonic: the source of their energy is the lungs.
- Glottalic: source of energy the glottis and the
- Velaric: the source of energy the tongue.

# Airstream Mechanisms



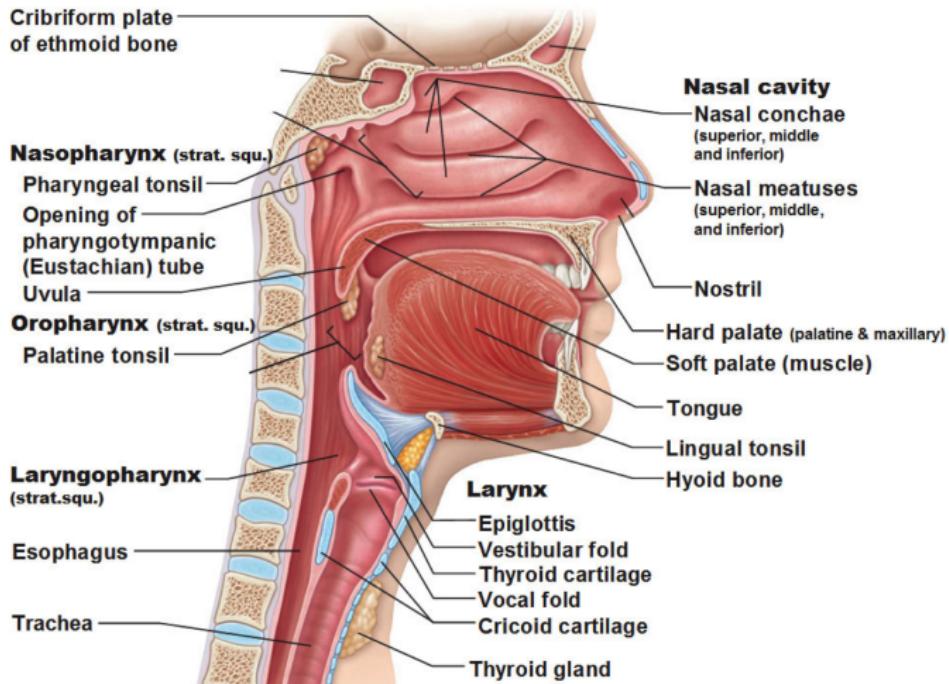
# Airflow Direction

- Egressive Airflow. The air goes out of the body.
- Ingressive Airflow. The air goes inward to the body.

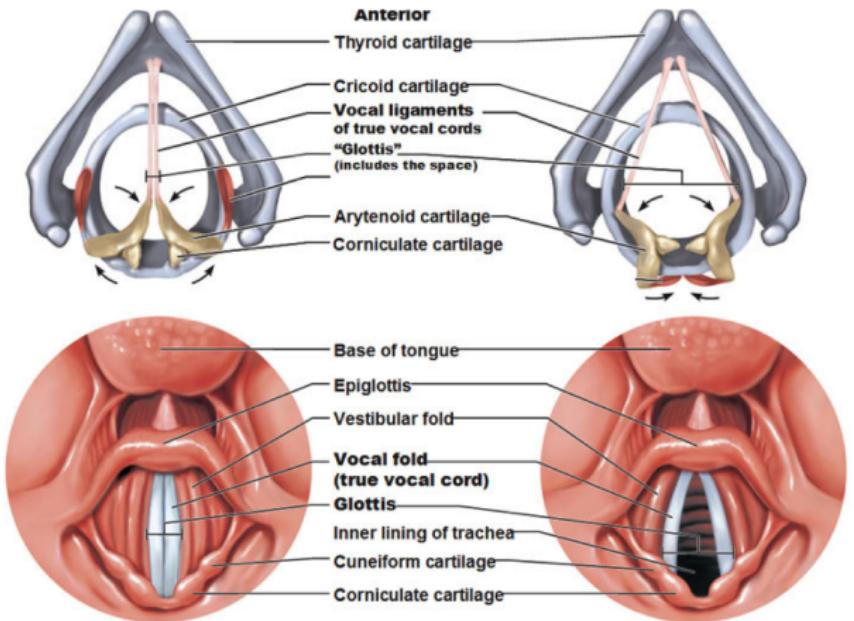
# Airstream/Airflow

- Ejectives. Sounds that are made on glottalic egressive airstream.
- Implosives. Sounds that are made on a glottalic ingressive airstream.
- Clicks. Sounds that are made with a velaric ingressive airstream.

# Voice Box



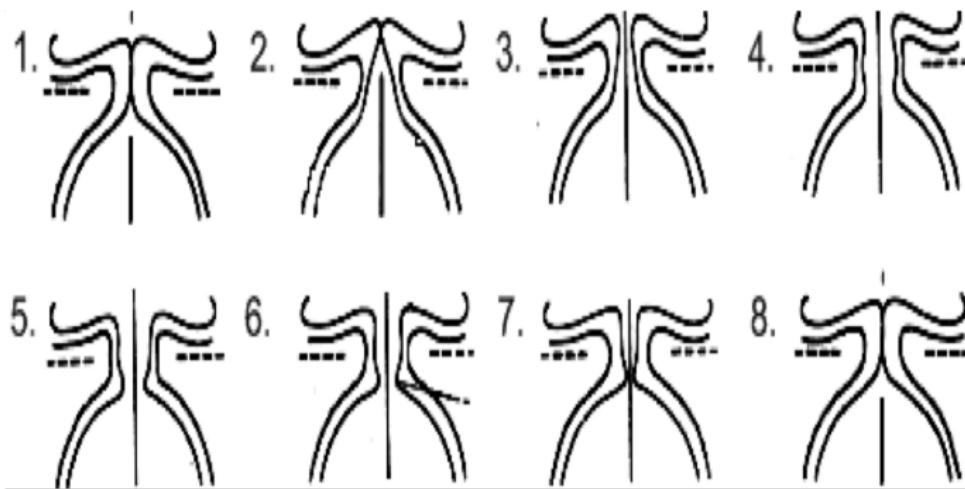
# Vocal Folds



(a) Vocal folds in closed position; closed glottis

(b) Vocal folds in open position; open glottis

# Phonation Cycle



# Voiceless and Voiced Consonants

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b		t d		t̪ d̪	c ɟ	k g	q G			?
Nasal	m	n̪		n		ɳ	j̪ n̪	ɳ	N		
Trill	B			r					R		
Tap or Flap		v̪		f		t̪					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ɟ	x y	χ ʁ	ħ ʕ	h f̪
Lateral fricative				ɬ ɭ							
Approximant		v̪		ɹ		ɻ	j̪	w̪			
Lateral approximant				l̪		ɺ	ɻ̪	ɿ			

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

# Voiced and Voiceless Consonants

## Task

To get awareness of voicing, cover your ears with your hands and pronounce [fvfvfv szszsz] multiple times. What do you feel?

# Voicing in languages

- Some languages such as the Dyribal, an Australian language, do not distinguish between voiced and unvoiced sounds [t] and [d] in the word /tibən/ or /dibən/.
- Other languages like English and Greek have context-sensitive voicing (that functions similarly to the Dyribal language).

# Articulation

- Oral Articulation: the air flows exclusively through the mouth.
- Nasal Articulation: the air flows through the nasal cavity.<sup>1</sup>

---

<sup>1</sup>The soft palate functions as a valve: when it is raised the air flows exclusively through the mouth, when it is lowered the air can escape through the nasal cavity.

# Outline

- 1 Speech Sounds
- 2 Airstream Mechanisms & Airflow Direction
- 3 Phonation
- 4 Place of Articulation
  - Articulators
  - Bilabial
  - Labiodental
  - Dental
  - Alveolar
  - Post-alveolar
  - Palatal
  - Velar
  - Uvular
  - Pharyngeal
  - Glottal

# Articulators

## Active Articulators:

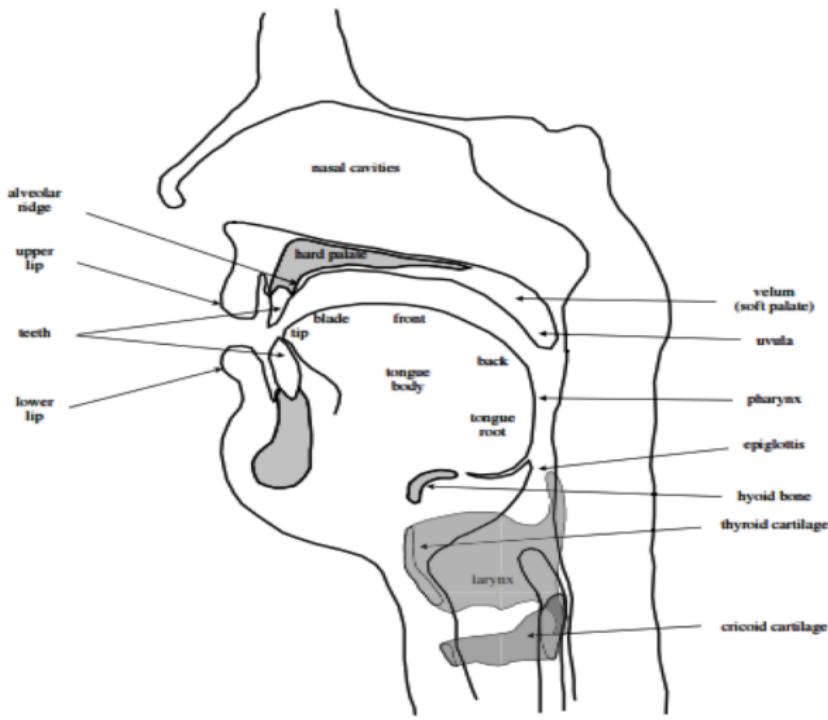
The articulator that moves; it is usually the lower lip or some part of the tongue.

## Passive Articulators:

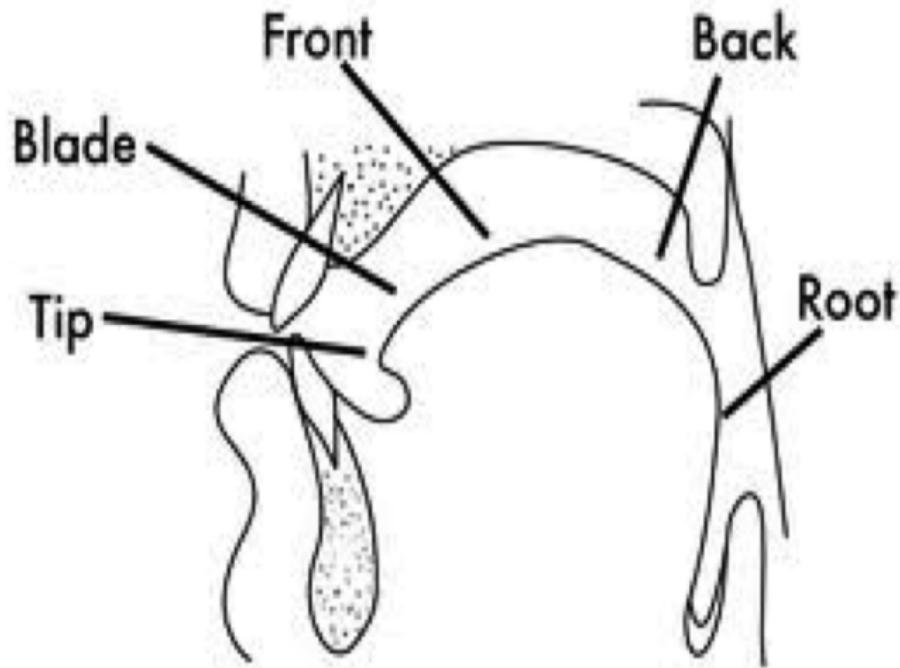
The articulator that makes little or no movement during a speech gesture. Passive articulators include the upper lip, the upper teeth, the various parts of the upper surface of the oral cavity, and the back wall of the pharynx.

**Note:** In bilabial sounds, since both articulators—passive and active—move, the distinction between active and passive articulators is neutralised.

# Place of Articulation



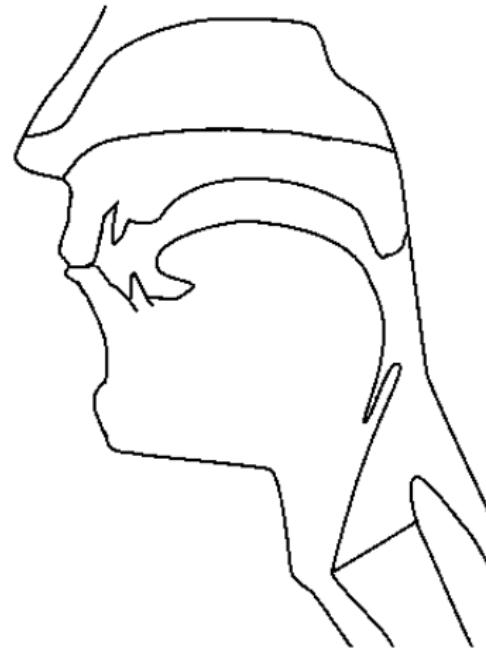
# Tongue



# Outline

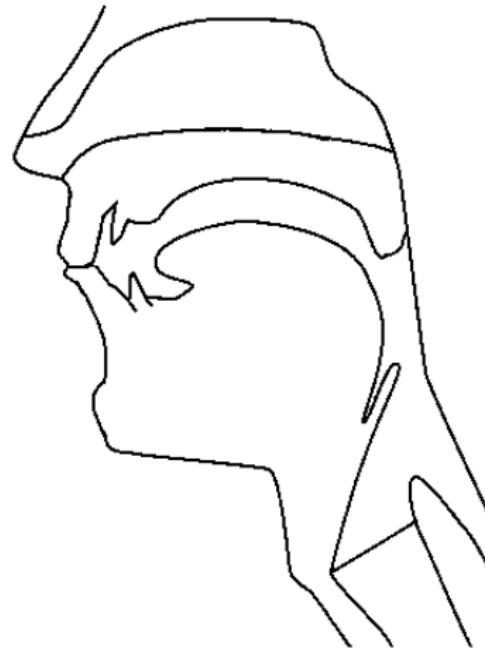
- 1 Speech Sounds
- 2 Airstream Mechanisms & Airflow Direction
- 3 Phonation
- 4 Place of Articulation
  - Articulators
  - **Bilabial**
  - Labiodental
  - Dental
  - Alveolar
  - Post-alveolar
  - Palatal
  - Velar
  - Uvular
  - Pharyngeal
  - Glottal

# Bilabial [p]



created by using Daniel Hall's Interactive Application.

# Bilabial [p]

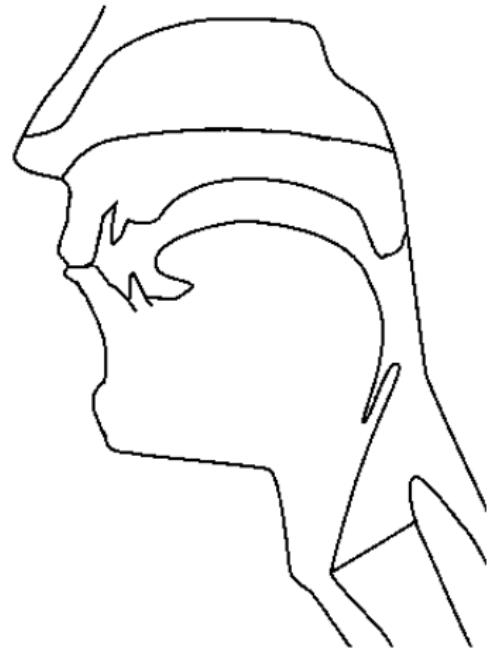


## Observation 1

Lips: Closed. The articulators are the two lips. English bilabial sounds include [p], [b], and [m].

created by using Daniel Hall's Interactive Application.

# Bilabial [p]



## Observation 1

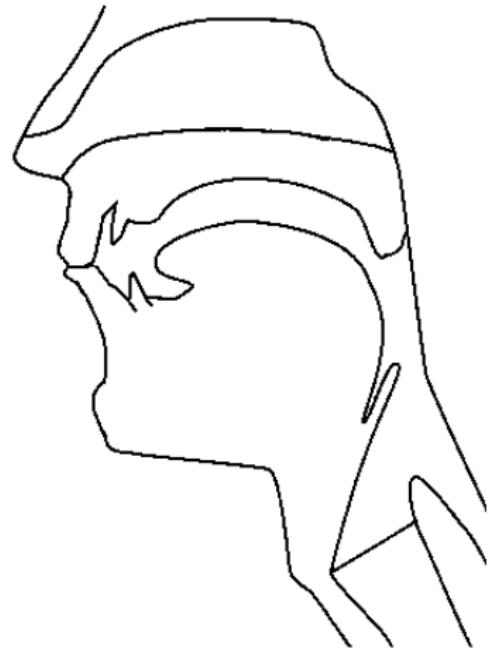
Lips: Closed. The articulators are the two lips. English bilabial sounds include [p], [b], and [m].

## Observation 2

Oral Consonant: the air does not escape into the nasal cavity. The soft palate is raised touching the pharynx wall forming a velic closure.

created by using Daniel Hall's Interactive Application.

# Bilabial [p]



created by using Daniel Hall's Interactive Application.

## Observation 1

Lips: Closed. The articulators are the two lips. English bilabial sounds include [p], [b], and [m].

## Observation 2

Oral Consonant: the air does not escape into the nasal cavity. The soft palate is raised touching the pharynx wall forming a velic closure.

## Observation 3

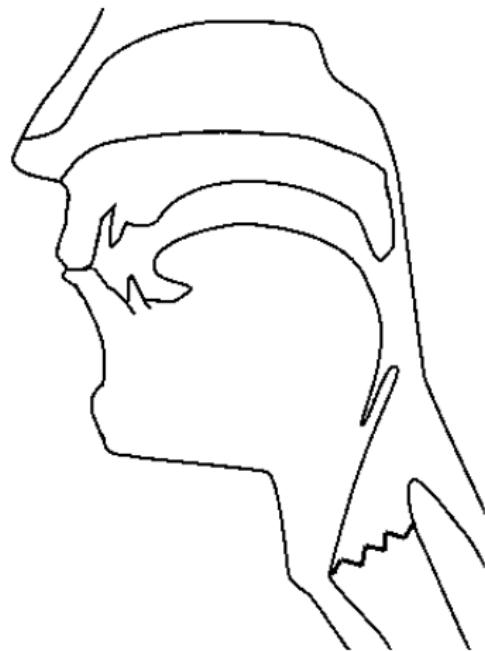
Phonation: Voiceless (vocal folds do not vibrate).

# Bilabial [m]



created by using Daniel Hall's Interactive Application.

# Bilabial [m]

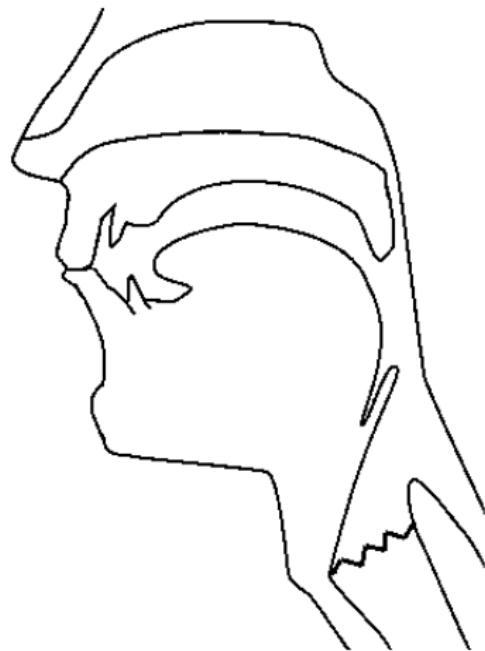


## Observation 1

Lips: Closed. The articulators are the two lips. English bilabial sounds include [p], [b], and [m].

created by using Daniel Hall's Interactive Application.

# Bilabial [m]



## Observation 1

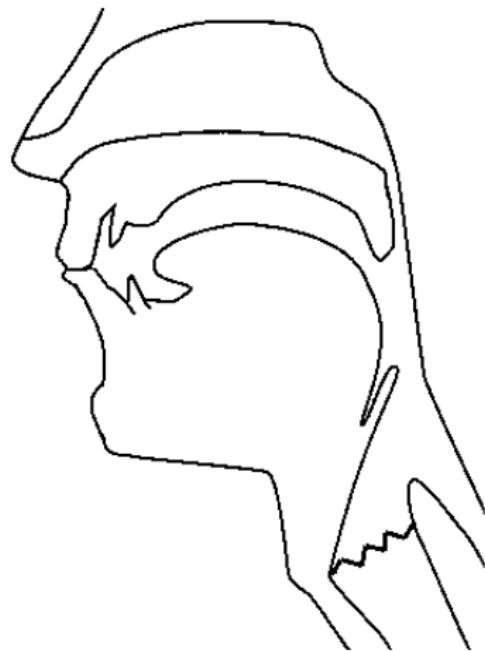
Lips: Closed. The articulators are the two lips. English bilabial sounds include [p], [b], and [m].

## Observation 2

Nasal Consonant: The soft palate is lowered and does not touch the pharynx wall. The air escapes into the nasal cavity.

created by using Daniel Hall's Interactive Application.

# Bilabial [m]



created by using Daniel Hall's Interactive Application.

## Observation 1

Lips: Closed. The articulators are the two lips. English bilabial sounds include [p], [b], and [m].

## Observation 2

Nasal Consonant: The soft palate is lowered and does not touch the pharynx wall. The air escapes into the nasal cavity.

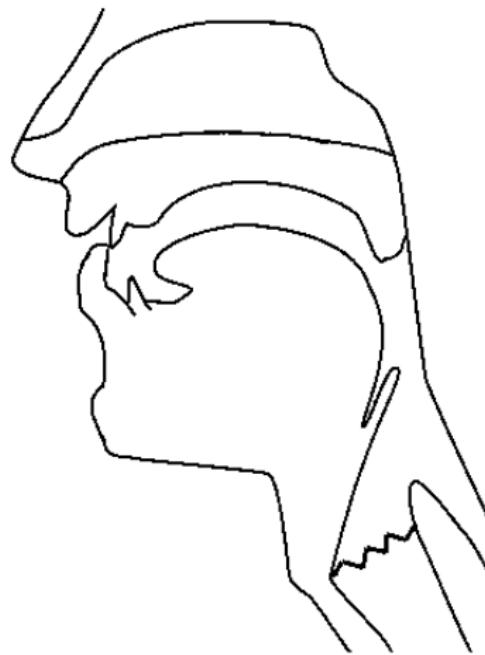
## Observation 3

Voiced - vocal folds vibrate

# Outline

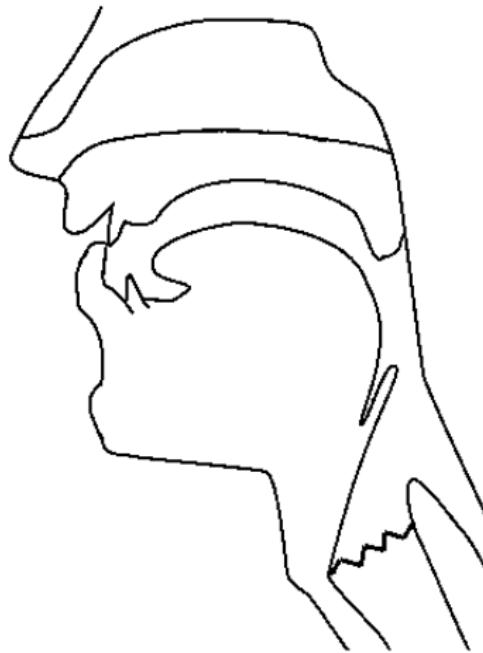
- 1 Speech Sounds
- 2 Airstream Mechanisms & Airflow Direction
- 3 Phonation
- 4 Place of Articulation
  - Articulators
  - Bilabial
  - **Labiodental**
  - Dental
  - Alveolar
  - Post-alveolar
  - Palatal
  - Velar
  - Uvular
  - Pharyngeal
  - Glottal

# Labiodental [v]



created by using Daniel Hall's Interactive Application.

# Labiodental [v]



## Observation 1

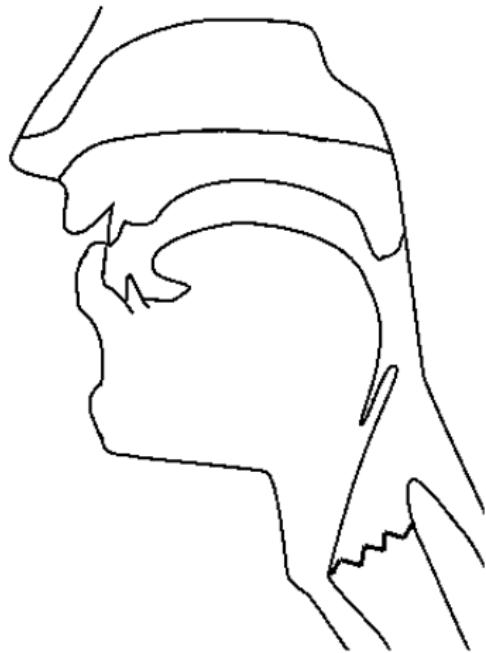
**Active Articulator:** the lower lip.

**Passive Articulator:** the upper teeth.

English labio-dental sounds include [f] and [v].

created by using Daniel Hall's Interactive Application.

# Labiodental [v]



## Observation 1

**Active Articulator:** the lower lip.

**Passive Articulator:** the upper teeth.

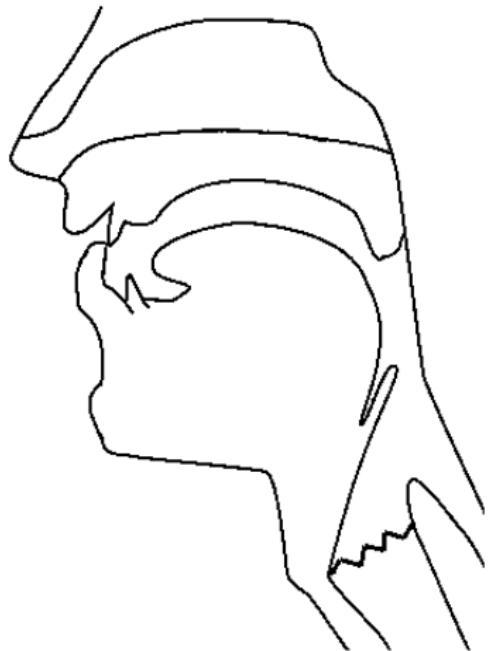
English labio-dental sounds include [f] and [v].

## Observation 2

Oral Consonant: the air does not escape into the nasal cavity. The soft palate is raised touching the pharynx wall forming a velic closure.

created by using Daniel Hall's Interactive Application.

# Labiodental [v]



## Observation 1

**Active Articulator:** the lower lip.

**Passive Articulator:** the upper teeth.

English labio-dental sounds include [f] and [v].

## Observation 2

Oral Consonant: the air does not escape into the nasal cavity. The soft palate is raised touching the pharynx wall forming a velic closure.

## Voicing:

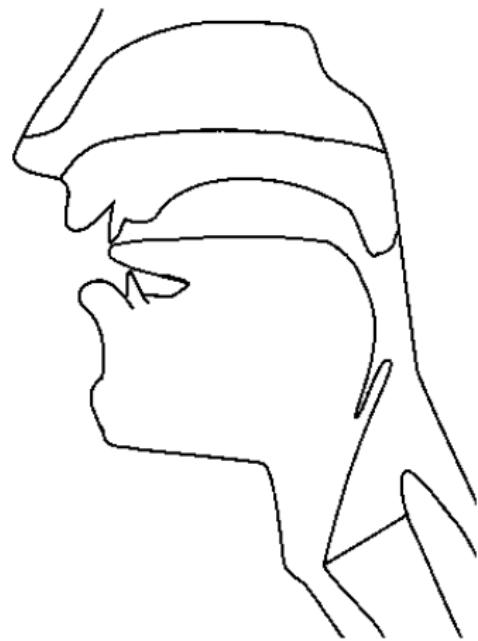
Voiced - Vocal Folds Vibrate

created by using Daniel Hall's Interactive Application.

# Outline

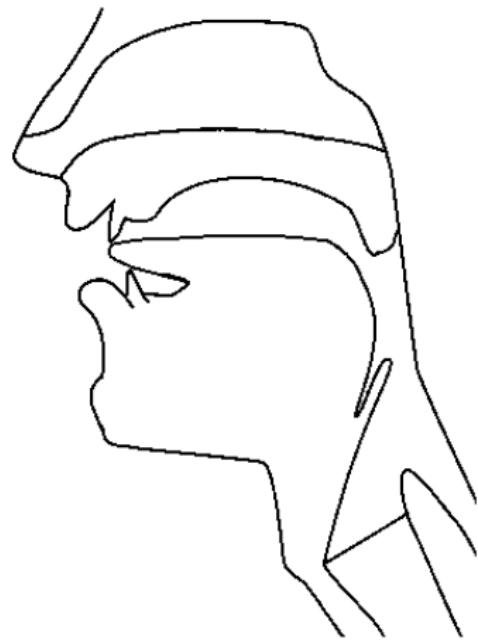
- 1 Speech Sounds
- 2 Airstream Mechanisms & Airflow Direction
- 3 Phonation
- 4 Place of Articulation
  - Articulators
  - Bilabial
  - Labiodental
  - **Dental**
  - Alveolar
  - Post-alveolar
  - Palatal
  - Velar
  - Uvular
  - Pharyngeal
  - Glottal

# Dental [θ]



created by using Daniel Hall's Interactive Application.

# Dental [θ]



## Observation 1

**Passive articulators:** upper teeth.

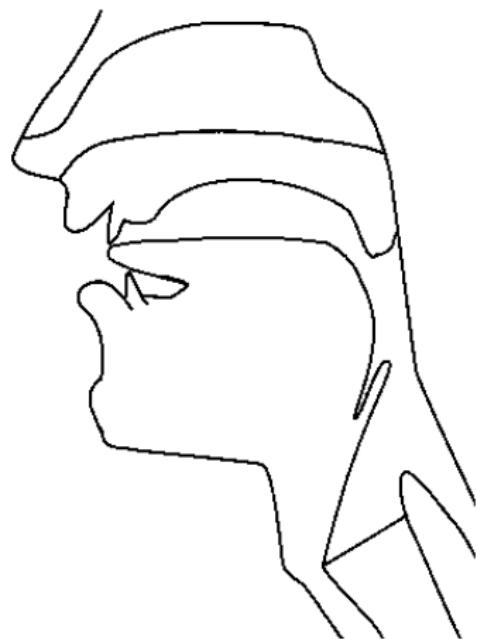
**Active articulators:** the tongue tip or (usually) the tongue blade.  
English includes the [θ] and [ð] dental sounds.

created by using Daniel Hall's Interactive Application.

Charalambos Themistocleous (UCY)

Theoretical Phonology (ENG 255)

# Dental [θ]



## Observation 1

**Passive articulators:** upper teeth.

**Active articulators:** the tongue tip or (usually) the tongue blade.

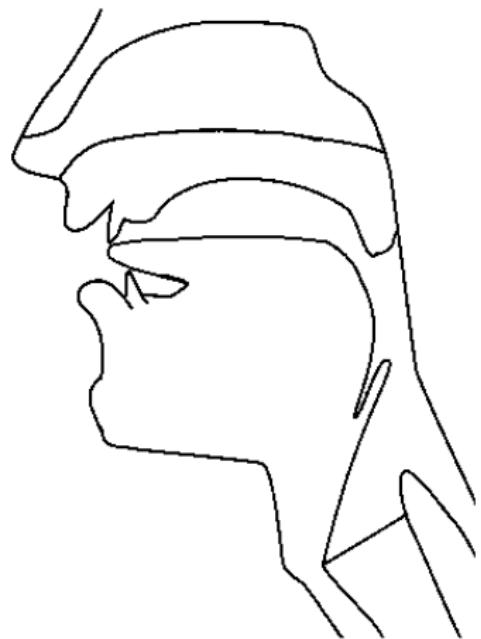
English includes the [θ] and [ð] dental sounds.

## Observation 2

The air does not escape to the nasal cavity: the soft palate is raised touching the pharynx wall forming a velic closure.

created by using Daniel Hall's Interactive Application.

# Dental [θ]



## Observation 1

**Passive articulators:** upper teeth.

**Active articulators:** the tongue tip or (usually) the tongue blade.

English includes the [θ] and [ð] dental sounds.

## Observation 2

The air does not escape to the nasal cavity: the soft palate is raised touching the pharynx wall forming a velic closure.

## Voicing:

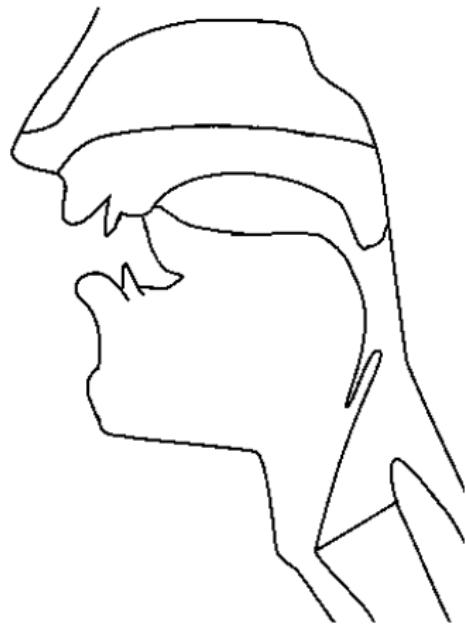
Voiceless - Vocal Folds do not vibrate

created by using Daniel Hall's Interactive Application.

# Outline

- 1 Speech Sounds
- 2 Airstream Mechanisms & Airflow Direction
- 3 Phonation
- 4 Place of Articulation
  - Articulators
  - Bilabial
  - Labiodental
  - Dental
  - Alveolar
  - Post-alveolar
  - Palatal
  - Velar
  - Uvular
  - Pharyngeal
  - Glottal

# Alveolar [t]

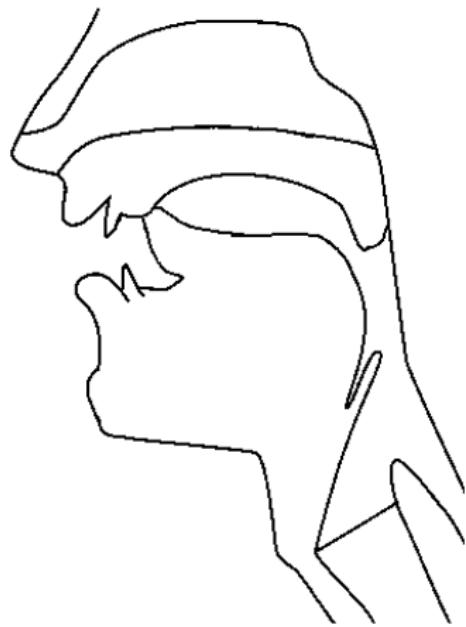


created by using Daniel Hall's Interactive Application.

Charalambos Themistocleous (UCY)

Theoretical Phonology (ENG 255)

# Alveolar [t]



## Observation 1

**Passive articulator:** alveolar ridge.

**Active articulator:** the tongue blade or the tongue tip.

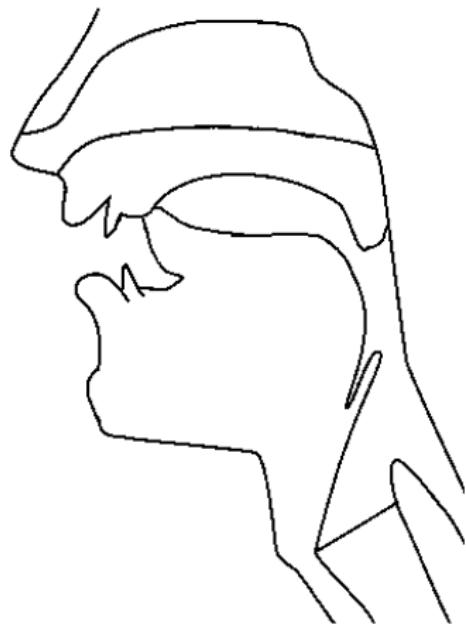
English alveolar sounds include [t], [d], [n], [s], [z], [l].

created by using Daniel Hall's Interactive Application.

Charalambos Themistocleous (UCY)

Theoretical Phonology (ENG 255)

# Alveolar [t]



## Observation 1

**Passive articulator:** alveolar ridge.

**Active articulator:** the tongue blade or the tongue tip.

English alveolar sounds include [t], [d], [n], [s], [z], [l].

## Observation 2

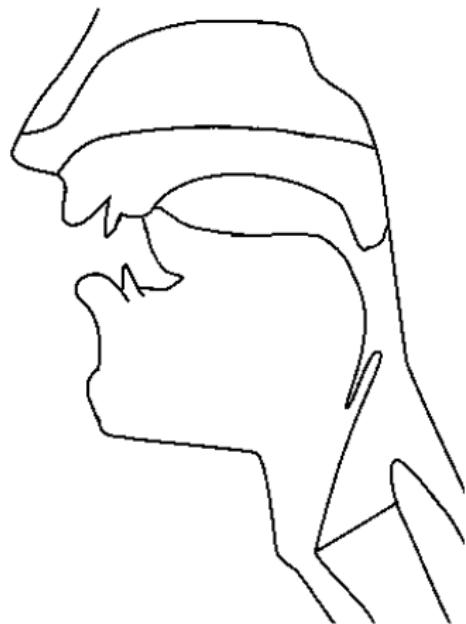
The air does not escape to the nasal cavity: the soft palate is raised touching the pharynx wall forming a velic closure.

created by using Daniel Hall's Interactive Application.

Charalambos Themistocleous (UCY)

Theoretical Phonology (ENG 255)

# Alveolar [t]



created by using Daniel Hall's Interactive Application.

## Observation 1

**Passive articulator:** alveolar ridge.

**Active articulator:** the tongue blade or the tongue tip.

English alveolar sounds include [t], [d], [n], [s], [z], [l].

## Observation 2

The air does not escape to the nasal cavity: the soft palate is raised touching the pharynx wall forming a velic closure.

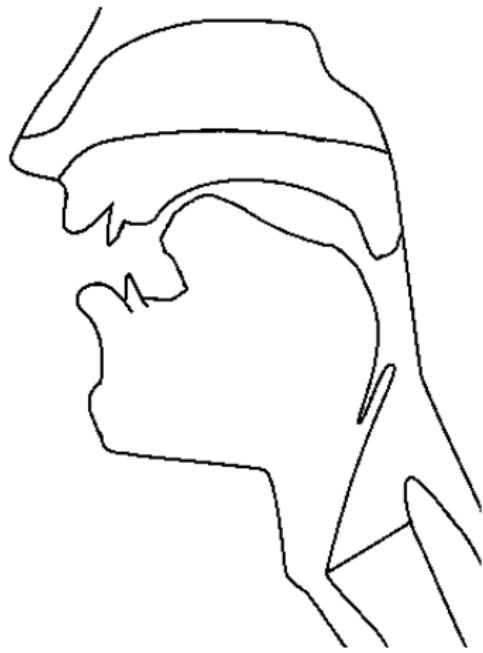
## Voicing:

Voiceless - Vocal Folds do not

# Outline

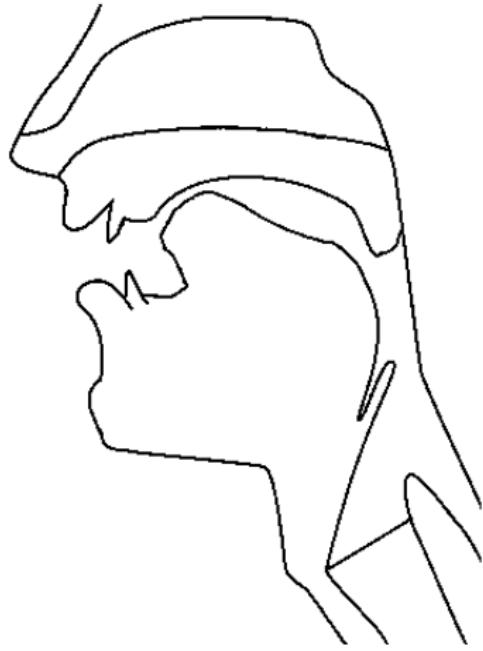
- 1 Speech Sounds
- 2 Airstream Mechanisms & Airflow Direction
- 3 Phonation
- 4 Place of Articulation
  - Articulators
  - Bilabial
  - Labiodental
  - Dental
  - Alveolar
  - Post-alveolar
  - Palatal
  - Velar
  - Uvular
  - Pharyngeal
  - Glottal

# Post-alveolar [ʃ] shy



created by using Daniel Hall's Interactive Application.

# Post-alveolar [ʃ] shy



## Observation 1

**Passive Articulator:** the area just behind the alveolar ridge as.

**Active articulator:** the tongue tip or (usually) the tongue blade.

English Post-alveolars are [ʃ] and [ʒ].

created by using Daniel Hall's Interactive Application.

# Post-alveolar [ʃ] shy



## Observation 1

**Passive Articulator:** the area just behind the alveolar ridge as.

**Active articulator:** the tongue tip or (usually) the tongue blade.

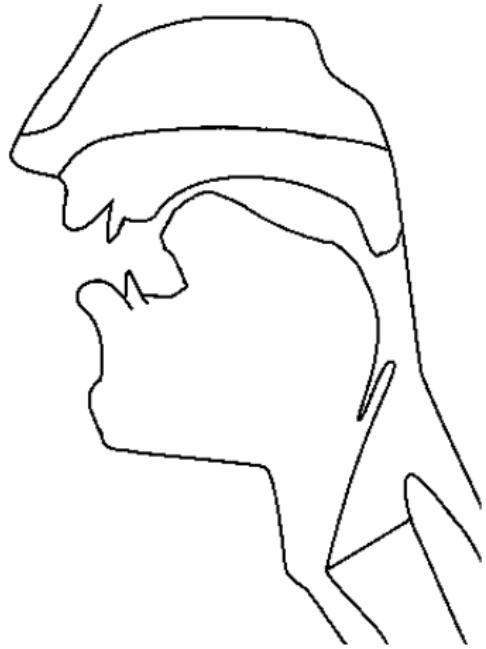
English Post-alveolars are [ʃ] and [ʒ].

## Observation 2

The air does not escape to the nasal cavity: the soft palate touches the pharynx wall.

created by using Daniel Hall's Interactive Application.

# Post-alveolar [ʃ] shy



created by using Daniel Hall's Interactive Application.

## Observation 1

**Passive Articulator:** the area just behind the alveolar ridge as.

**Active articulator:** the tongue tip or (usually) the tongue blade.

English Post-alveolars are [ʃ] and [ʒ].

## Observation 2

The air does not escape to the nasal cavity: the soft palate touches the pharynx wall.

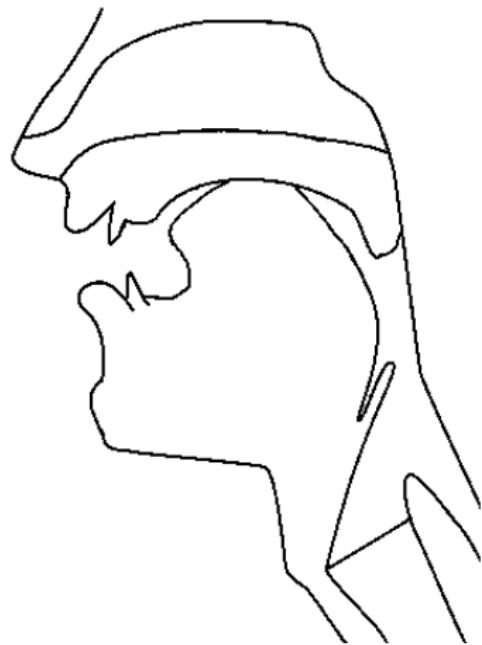
## Observation 3

Voiceless - Vocal Folds do not Vibrate

# Outline

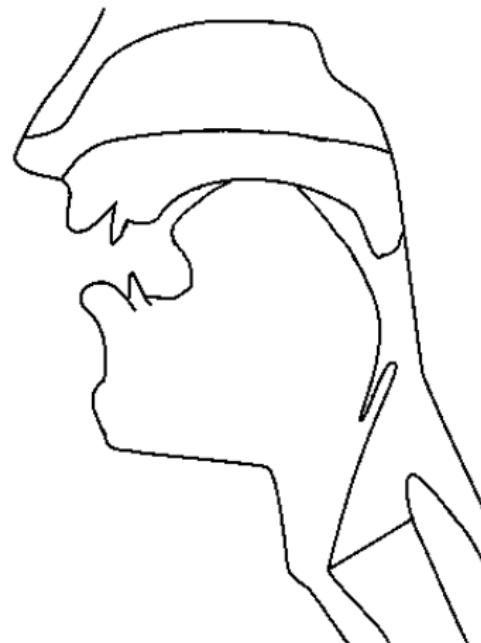
- 1 Speech Sounds
- 2 Airstream Mechanisms & Airflow Direction
- 3 Phonation
- 4 Place of Articulation
  - Articulators
  - Bilabial
  - Labiodental
  - Dental
  - Alveolar
  - Post-alveolar
  - Palatal
  - Velar
  - Uvular
  - Pharyngeal
  - Glottal

# Palatal [c]



created by using Daniel Hall's Interactive Application.

# Palatal [c]



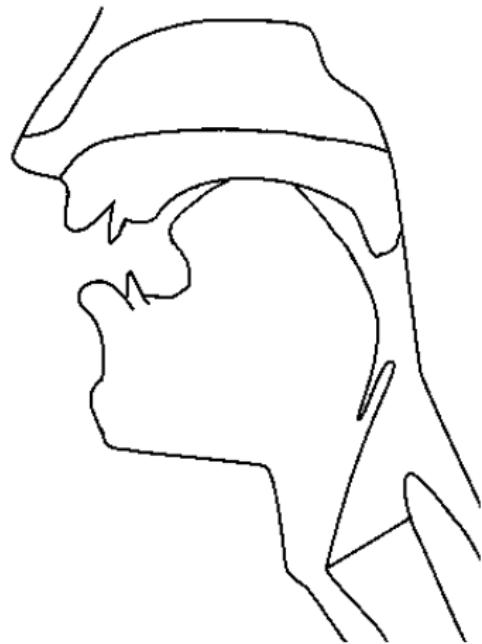
## Observation 1

**Active articulators:** the middle or back part of the tongue.

**Passive articulator:** the hard palate.  
The English glide [j] is a palatal.

created by using Daniel Hall's Interactive Application.

# Palatal [c]



## Observation 1

**Active articulators:** the middle or back part of the tongue.

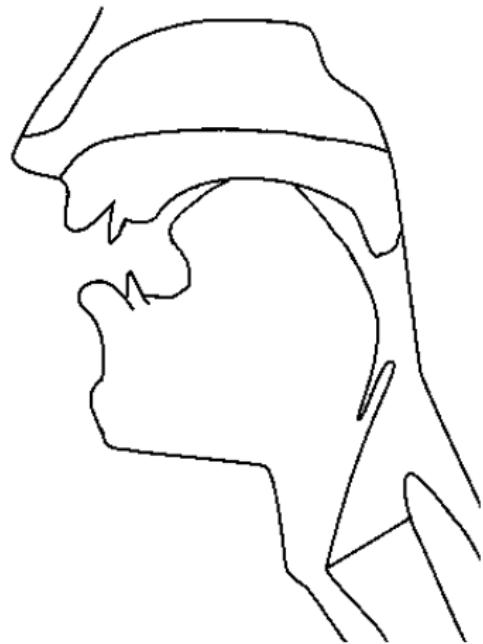
**Passive articulator:** the hard palate.  
The English glide [j] is a palatal.

## Observation 2

The air does not escape to the nasal cavity: the soft palate is raised touching the pharynx wall forming a velic closure.

created by using Daniel Hall's Interactive Application.

# Palatal [c]



created by using Daniel Hall's Interactive Application.

## Observation 1

**Active articulators:** the middle or back part of the tongue.

**Passive articulator:** the hard palate.  
The English glide [j] is a palatal.

## Observation 2

The air does not escape to the nasal cavity: the soft palate is raised touching the pharynx wall forming a velic closure.

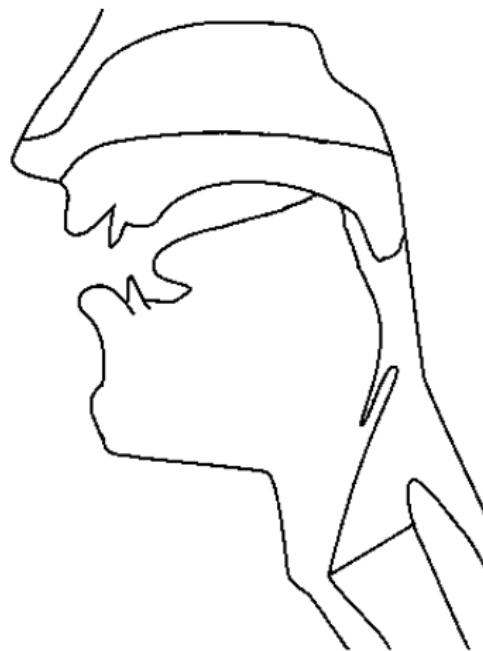
## Observation 3

Voiceless - Vocal Folds do not Vibrate

# Outline

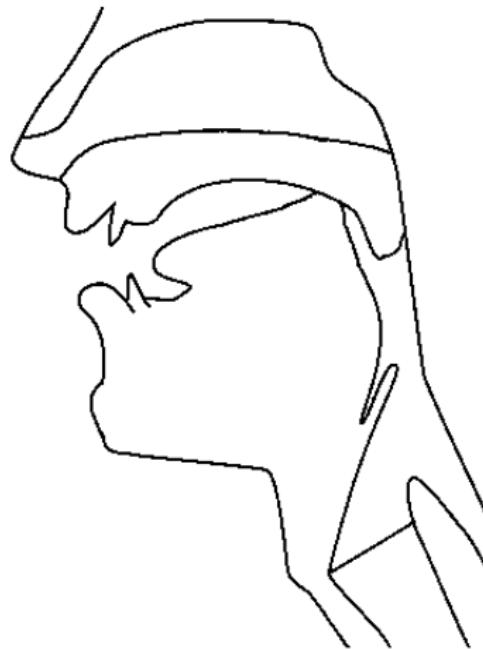
- 1 Speech Sounds
- 2 Airstream Mechanisms & Airflow Direction
- 3 Phonation
- 4 Place of Articulation
  - Articulators
  - Bilabial
  - Labiodental
  - Dental
  - Alveolar
  - Post-alveolar
  - Palatal
  - **Velar**
  - Uvular
  - Pharyngeal
  - Glottal

# Velar [k]



created by using Daniel Hall's Interactive Application.

# Velar [k]



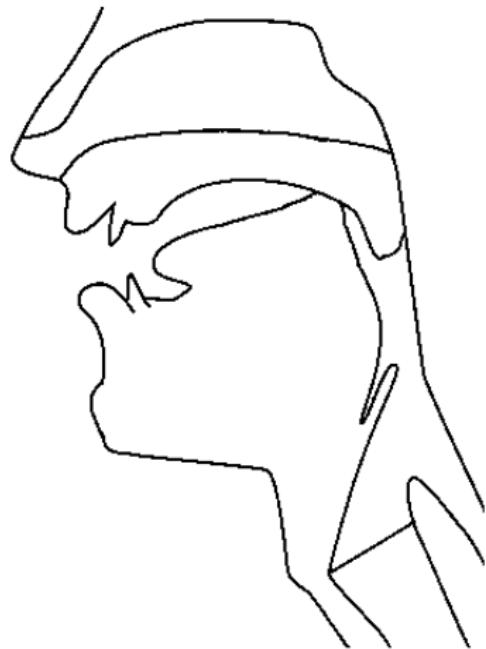
## Observation 1

**Active articulators:** the back of the tongue.

**Passive articulator:** the soft palate.  
English velars include [k], [g], [].

created by using Daniel Hall's Interactive Application.

# Velar [k]



## Observation 1

**Active articulators:** the back of the tongue.

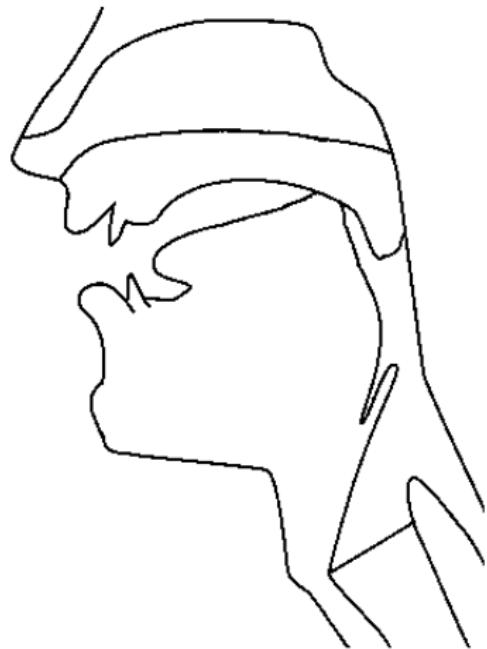
**Passive articulator:** the soft palate. English velars include [k], [g], [].

## Observation 2

The air does not escape to the nasal cavity: the soft palate is raised touching the pharynx wall forming a velic closure.

created by using Daniel Hall's Interactive Application.

# Velar [k]



created by using Daniel Hall's Interactive Application.

## Observation 1

**Active articulators:** the back of the tongue.

**Passive articulator:** the soft palate. English velars include [k], [g], [].

## Observation 2

The air does not escape to the nasal cavity: the soft palate is raised touching the pharynx wall forming a velic closure.

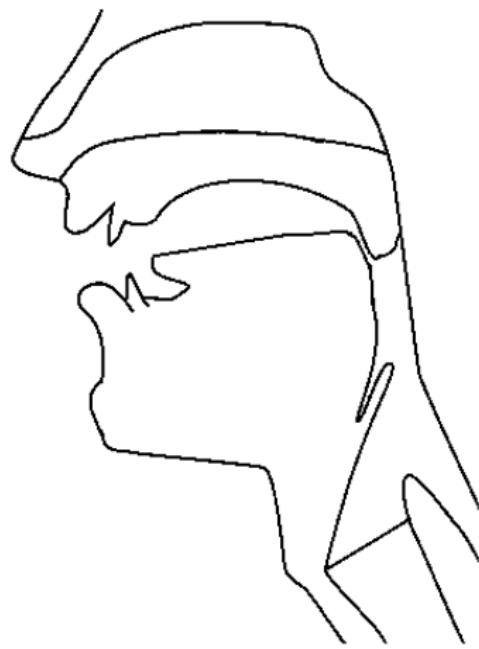
## Observation 3

Voiced - Vocal Folds Vibrate

# Outline

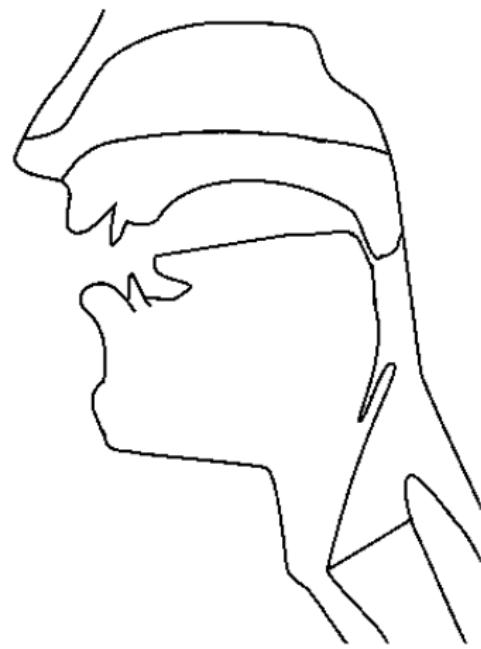
- 1 Speech Sounds
- 2 Airstream Mechanisms & Airflow Direction
- 3 Phonation
- 4 Place of Articulation
  - Articulators
  - Bilabial
  - Labiodental
  - Dental
  - Alveolar
  - Post-alveolar
  - Palatal
  - Velar
  - **Uvular**
  - Pharyngeal
  - Glottal

# Uvular [χ]



created by using Daniel Hall's Interactive Application.

# Uvular [χ]



## Observation 1

**Active articulators:** the back of the tongue (dorsum).

**Passive articulator:** the uvula.

created by using Daniel Hall's Interactive Application.

# Uvular [χ]



## Observation 1

**Active articulators:** the back of the tongue (dorsum).

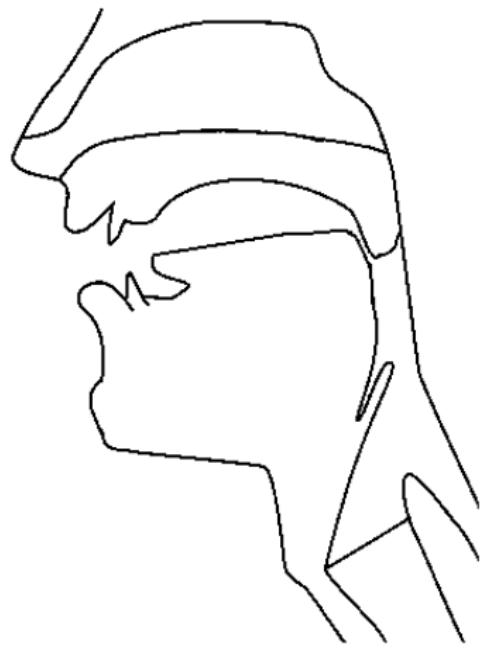
**Passive articulator:** the uvula.

## Observation 2

The air does not escape to the nasal cavity.

created by using Daniel Hall's Interactive Application.

# Uvular [χ]



## Observation 1

**Active articulators:** the back of the tongue (dorsum).

**Passive articulator:** the uvula.

## Observation 2

The air does not escape to the nasal cavity.

## Observation 3

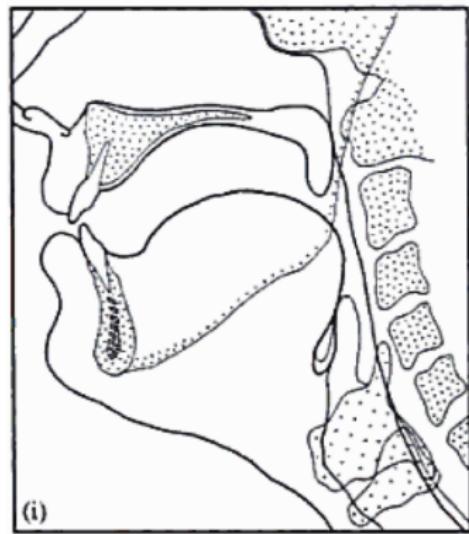
Voiced. Vocal folds vibrate

created by using Daniel Hall's Interactive Application.

# Outline

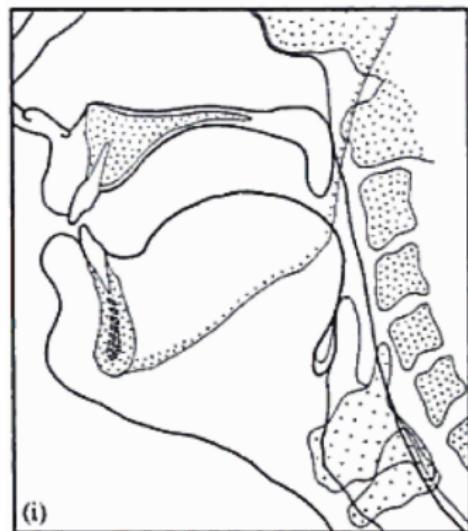
- 1 Speech Sounds
- 2 Airstream Mechanisms & Airflow Direction
- 3 Phonation
- 4 Place of Articulation
  - Articulators
  - Bilabial
  - Labiodental
  - Dental
  - Alveolar
  - Post-alveolar
  - Palatal
  - Velar
  - Uvular
  - Pharyngeal
  - Glottal

# Pharyngeal [ħ]



from Laver (1994)

# Pharyngeal [h]



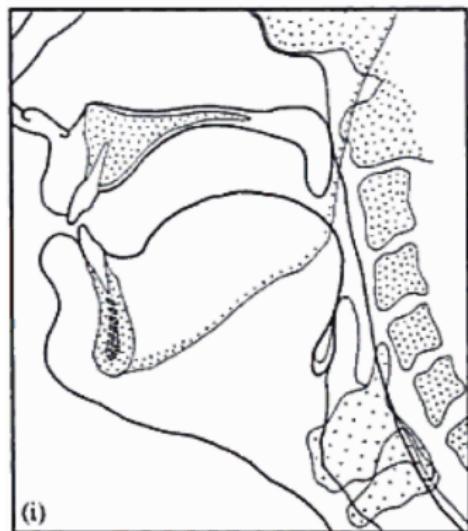
from Laver (1994)

## Observation 1

**Active articulators:** the root of the tongue.

**Passive articulator:** the pharynx.

# Pharyngeal [h]



from Laver (1994)

## Observation 1

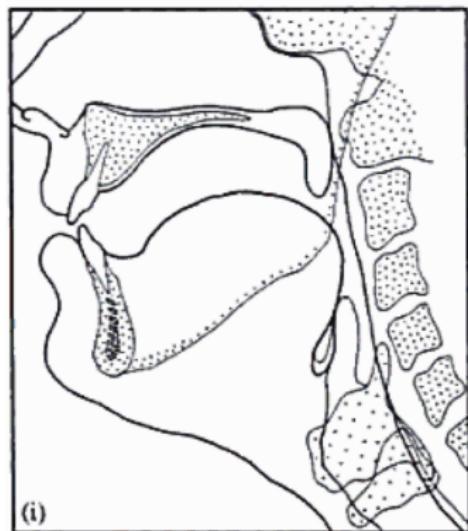
**Active articulators:** the root of the tongue.

**Passive articulator:** the pharynx.

## Observation 2

The air does not escape to the nasal cavity: the soft palate is raised touching the pharynx wall forming a velic closure.

# Pharyngeal [h]



from Laver (1994)

## Observation 1

**Active articulators:** the root of the tongue.

**Passive articulator:** the pharynx.

## Observation 2

The air does not escape to the nasal cavity: the soft palate is raised touching the pharynx wall forming a velic closure.

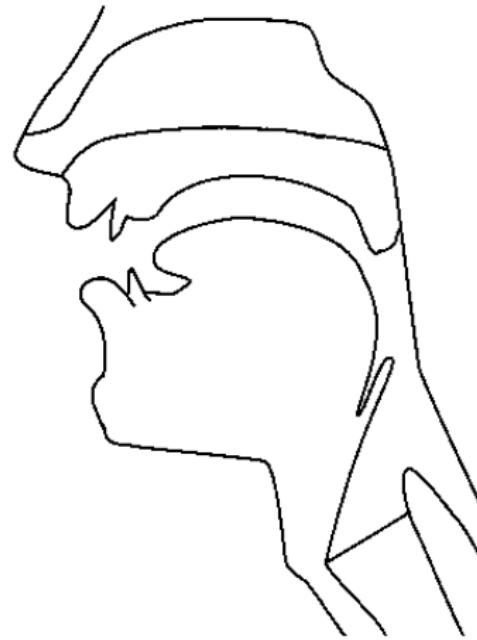
## Observation 3

Voiceless. Vocal folds do not vibrate

# Outline

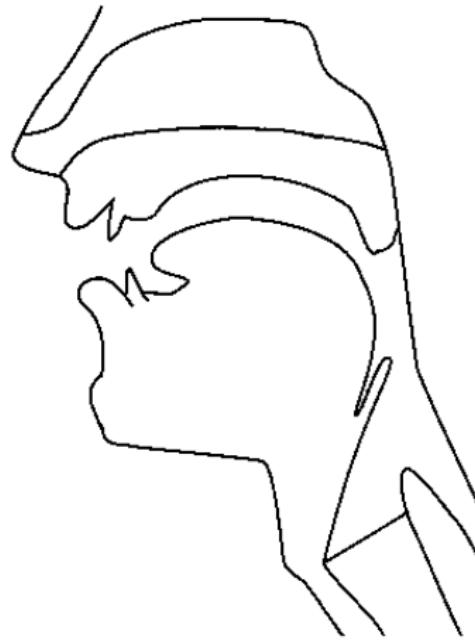
- 1 Speech Sounds
- 2 Airstream Mechanisms & Airflow Direction
- 3 Phonation
- 4 Place of Articulation
  - Articulators
  - Bilabial
  - Labiodental
  - Dental
  - Alveolar
  - Post-alveolar
  - Palatal
  - Velar
  - Uvular
  - Pharyngeal
  - Glottal

# Glottal [h]



created by using Daniel Hall's Interactive Application.

# Glottal [h]

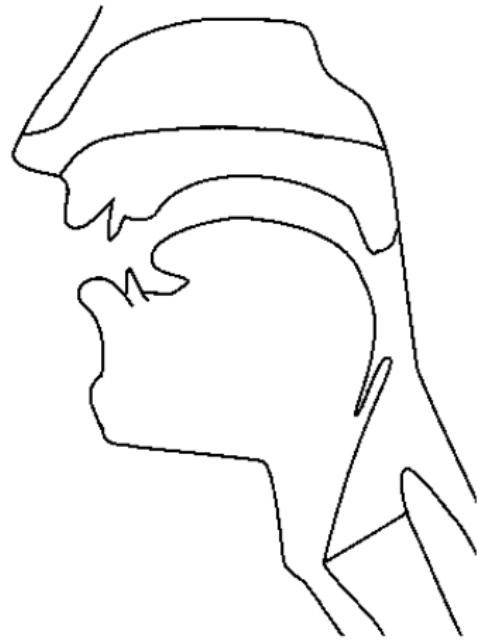


## Observation 1

Articulator: glottis (see discussion).

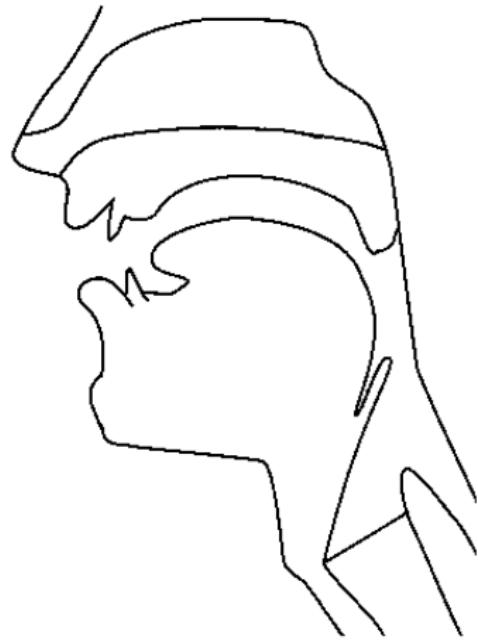
created by using Daniel Hall's Interactive Application.

# Glottal [h]



created by using Daniel Hall's Interactive Application.

# Glottal [h]



## Observation 1

Articulator: glottis (see discussion).

## Observation 2

The air does not escape to the nasal cavity: the soft palate is raised touching the pharynx wall forming a velic closure.

## Observation 3

Voiceless. Vocal folds do not vibrate

created by using Daniel Hall's Interactive Application.

# Transcribing Speech

To transcribe speech we employ the *International Phonetic Alphabet* (IPA). When we transcribe speech in IPA, we can become very specific by using *diacritics*.

- [t̪] = voiceless dental stop.
- [t̬] = voiceless alveolar stop.
- [t̫] = voiceless palato-alveolar (= post-alveolar) stop.

We will learn more about it next week.

# Summary

- Sound Classification: place-voice-manner.
- Airstream Mechanisms: pulmonic-glottalic-velaric.
- Airflow Direction: Egressive and Ingressive. We studied pulmonic egressive sounds.
- Outlook
  - In the following week we will study the manner of articulation.
  - Remember to do the assignments.

# For Further Reading I



A. Author.

*Handbook of Everything.*

Some Press, 1990.



S. Someone.

On this and that.

*Journal of This and That*, 2(1):50–100, 2000.