

LING 001

Introduction to Linguistics

Lecture 7

Articulatory Phonetics: Consonants

02/12/2019

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Announcements

- Exams will be returned in recitation **next** week
 - You can't take it with you, but you can take a picture.
- Your grade may be posted on canvas earlier
- Remember that your lowest exam will be dropped

Language as a DCS

- Language as an unbounded discrete combinatorial system
 - Discrete units (parts)
 - Rules for combining these parts

Sounds in language

- Two fields of linguistics devoted studying sound systems in language
 - Phonetics: the parts of the DCS
 - Phonology: the rules for combining these parts

Phonetics

- The study of the minimal units that make up language:
 - **Articulatory phonetics:** what are the sounds and how do we produce them?
 - **Acoustic phonetics:** what are the characteristics of the sounds produced?
 - **Auditory phonetics:** how do humans process and perceive these speech sounds?

Phonetic Transcription

- English spelling not designed to have a one-to-one mapping between sounds and symbols.
 - sea, see, scene
 - yet, type, happy
 - box, socks
- So we use the **International Phonetic Alphabet**

The International Phonetic Alphabet

- one symbol = one sound
 - sea, see, scene
 - /si/, /sin/
 - yet, type, happy
 - /jɛt/, /taɪp/, /'hapi/
 - box, socks
 - /baks/, /saks/
 - sign, got
 - /sain/, /gat/
 - enough, thorough, ghost
 - /ɪ'nʌf/, /'θʌrə/, /gəʊst/

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

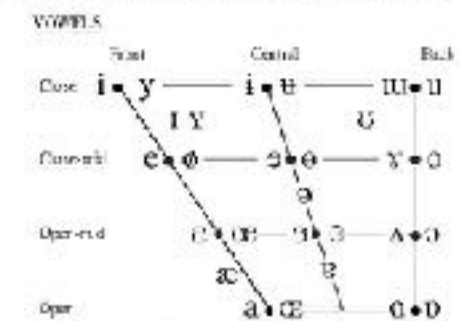
Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

Clicks	Vocal impressions	Object name
(.) Mute	Ḑ Mute	Ḑ Exotic
Dental	ḑ Dental/alveolar	p ^h Dental
Alveolar/velar	f Fricative	t ^h Dental/alveolar
+ Palatoalveolar	ḑ Velar	k ^h Velar
Alveolar/velar	ḑ Velar	s ^h Alveolar/velar

OTHER SYMBOLS

A	Voiced bilabial approximant	ʒ	Voiced postalveolar fricative
W	Voiced bilabial velar approximant	ʃ	Voiced alveolar fricative
U	Voiced bilabial-palatal approximant	ʒ	Voiced postalveolar fricative
H	Voiced velar bilabial fricative		
ʒ	Voiced alveolar fricative		
ʒ	Voiced postalveolar fricative		
ʒ	Voiced postalveolar fricative		

DISCREETICS Diagrams may be placed above a symbol with a descender, e.g. \hat{t} .

[illegible]

Where *ap* is *ash* appears in pairs, the one to the right representing a rounded vowel.

SUPPLEMENT 2

- Primary stress
- Secondary stress
- Long \bar{C}
- Half long \bar{C}^{H}
- Extra-short \bar{C}^{E}
- Minor (weak) group
- Major (strong) group
- Syllable break E, S, C, T
- Linking (absence of a break)

TONES AND VOICE ACENT
LEVEL. CONTINUED

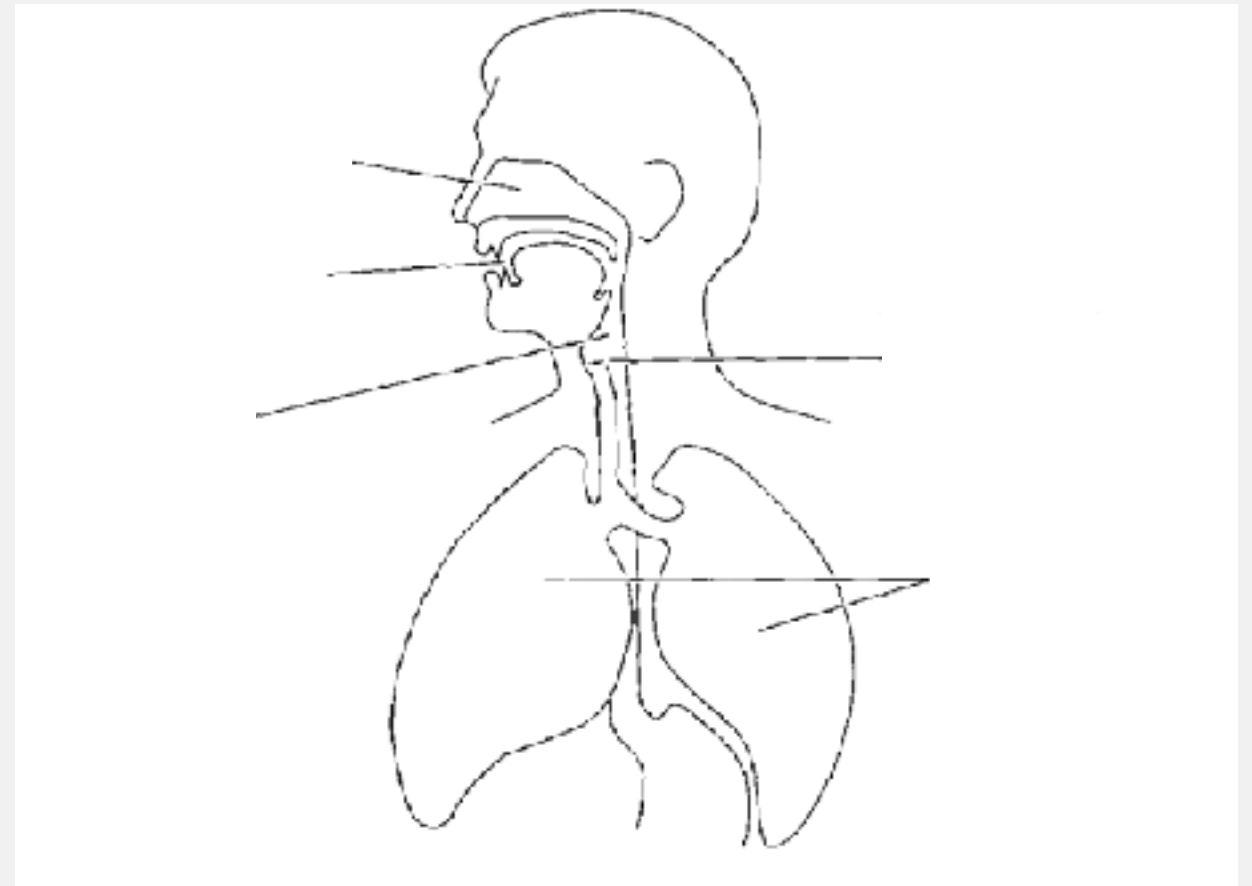
\mathbb{E}_k	↑	Force	\mathbb{E}_k	↑	Force
\mathbb{E}_k	↑	High	\mathbb{E}_k	↑	High
\mathbb{E}_k	↑	Mid	\mathbb{E}_k	↑	Mid
\mathbb{E}_k	↑	Low	\mathbb{E}_k	↑	Low
\mathbb{E}_k	↑	Low	\mathbb{E}_k	↑	Low
\mathbb{E}_k	↑	Downward	\mathbb{E}_k	↑	Downward
\mathbb{E}_k	↑	Unsure	\mathbb{E}_k	↑	Unsure

Articulatory Phonetics

- What are the sounds of language and how do we produce them with our anatomy?

Articulatory phonetics

- **Speech sounds** are shaped by various parts of the vocal tract:
 - **Lungs** supply airstream
 - **Vocal folds** (in the larynx) produce vibration
 - **Pharynx**: area above larynx and behind mouth
 - **Oral** and **nasal** passages for air to exit
 - **Tongue & Lips** move to articulate sounds
 - **Teeth** provide a passive articulator
- We can group sounds based on similarities in how they're formed.

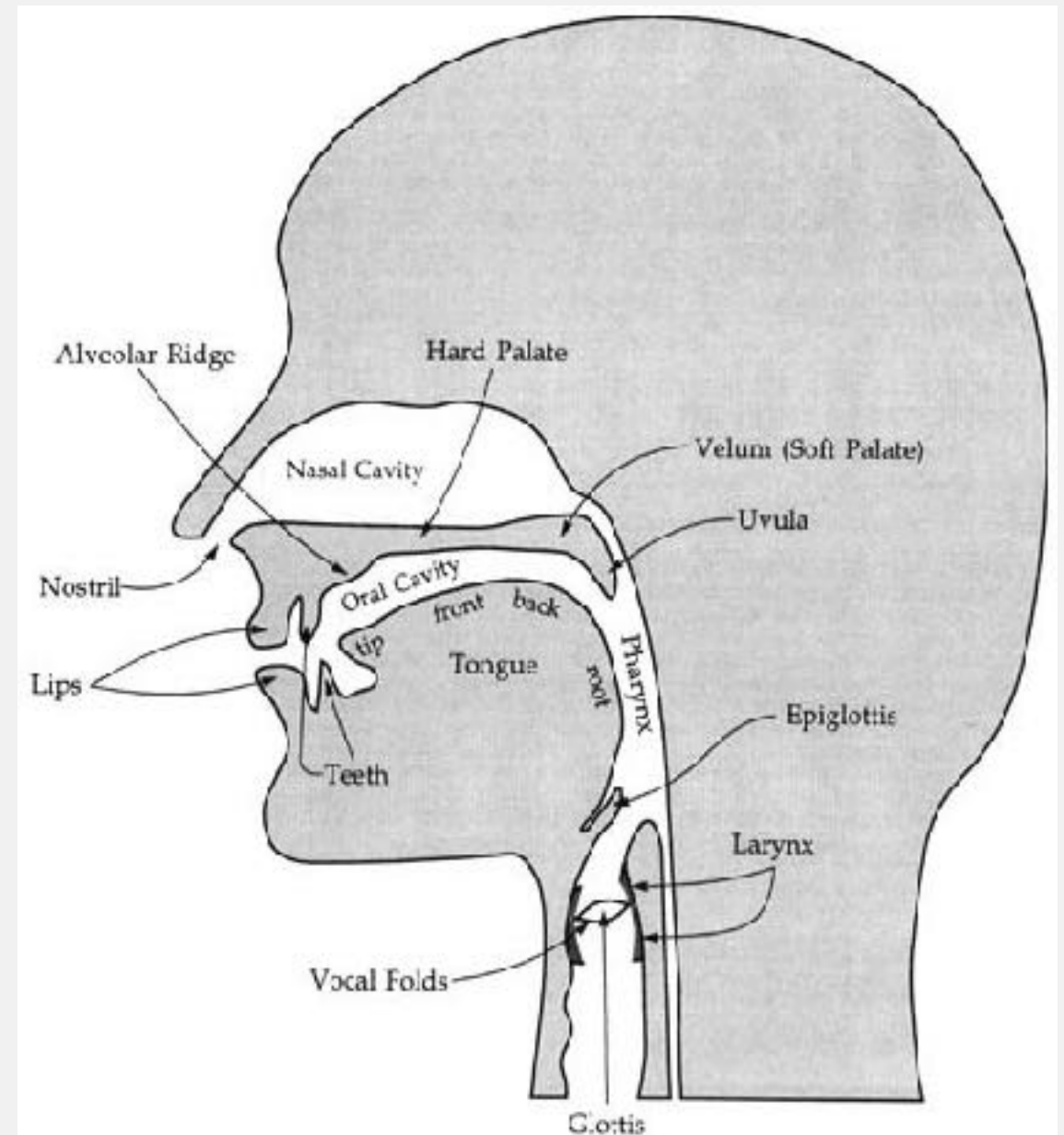


Segments

- **Consonants** involve **obstructing** the air-flow in one way or another (and to different degrees)
- **Vowels** result when the air-stream passes through the vocal tract with little obstruction
- The tongue and lips move to change the shape of the vocal tract, but not to obstruct airflow

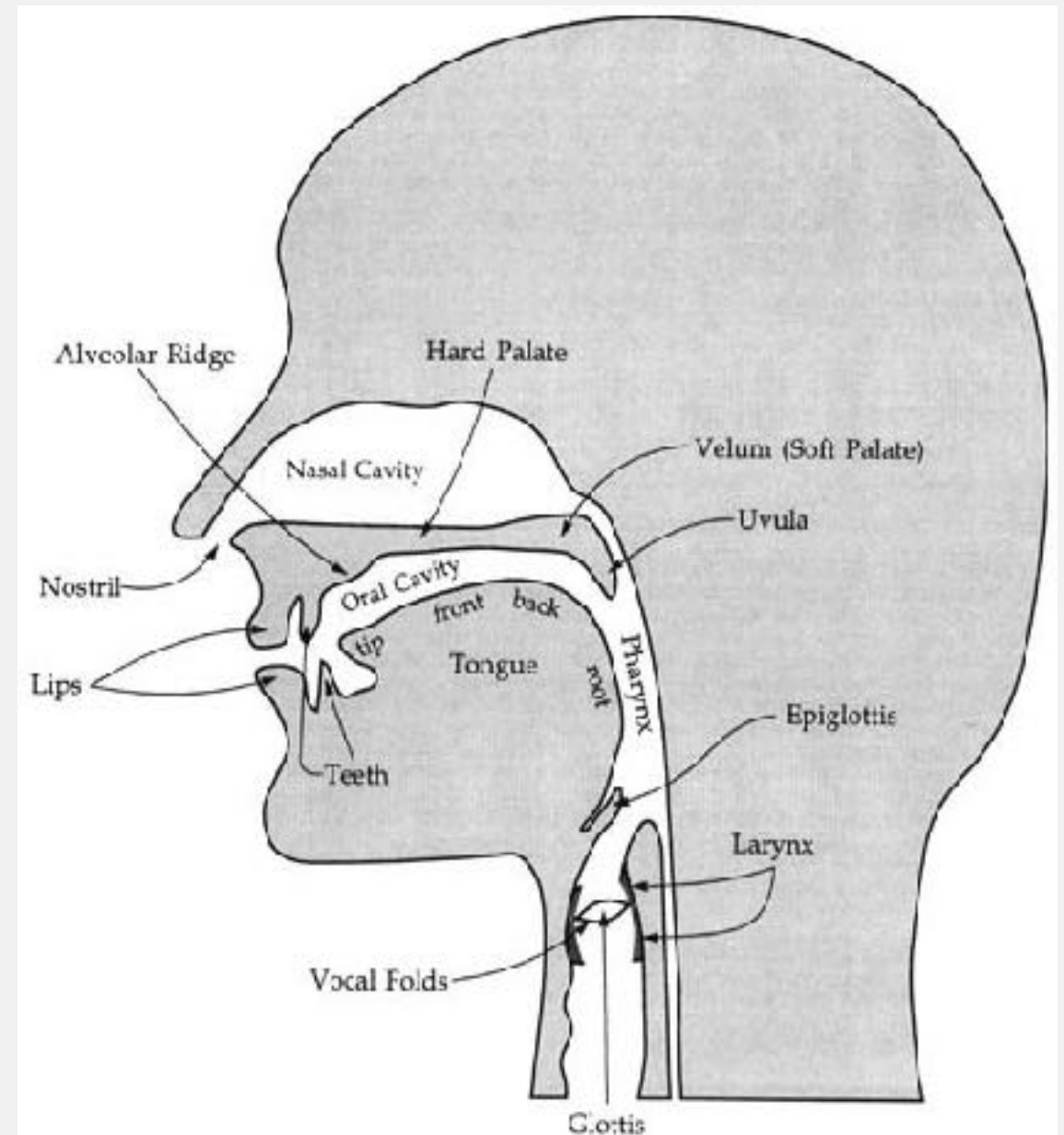
Classifying consonants

1. **Vocal Folds (“glottal state”)**: voiced or voiceless?
2. **Place (which articulators involved?)**: bilabial, labiodental, interdental, alveolar, postalveolar, palatal, velar, glottal...?
3. **Manner (what kind of constriction?)**: stop, fricative, affricate, approximant...?



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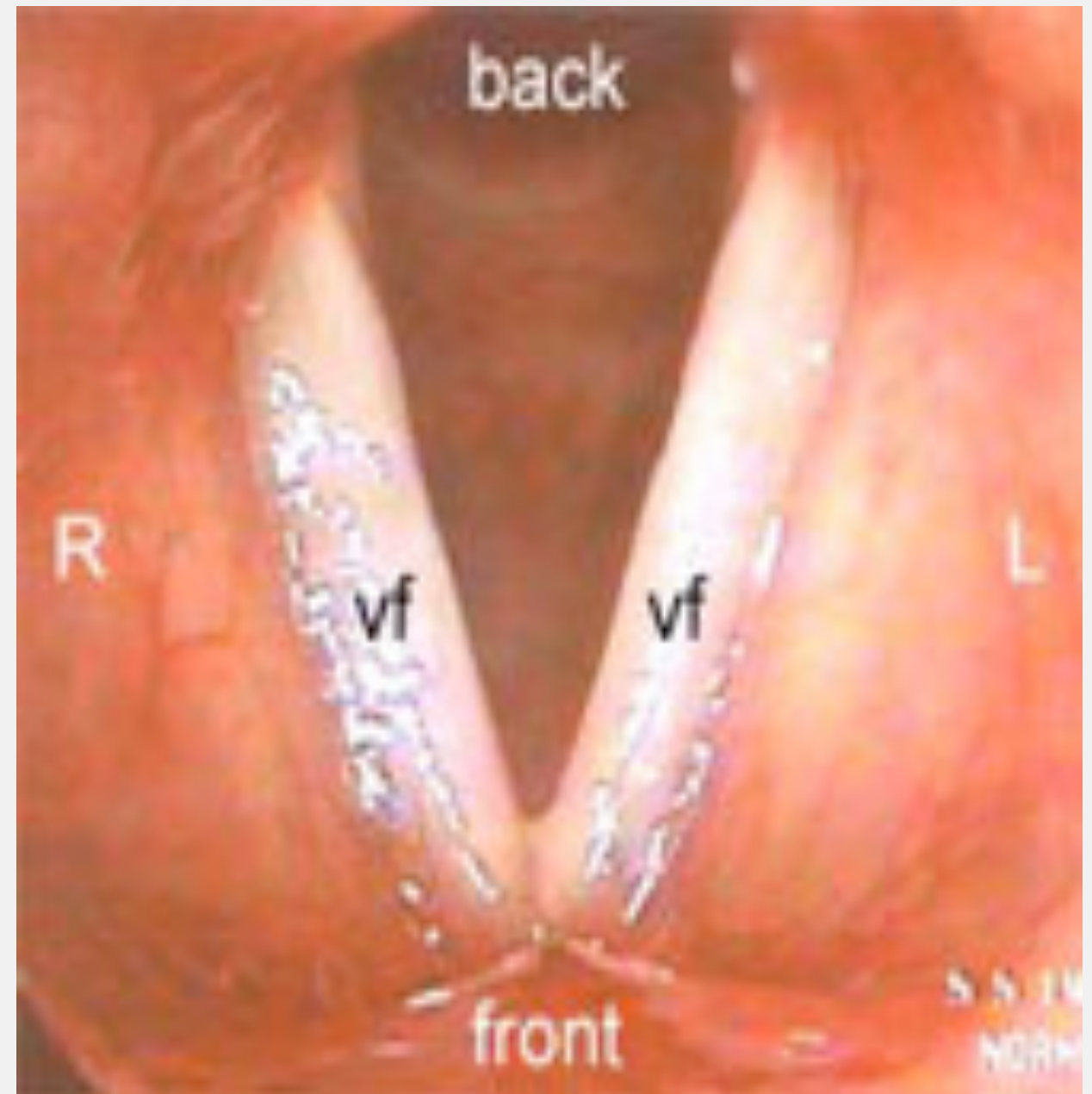


Vocal Folds in Action

Voiced



Voiceless



Voiceless vs. Voiced Sounds

Voiceless

[p] **pat**

[f] **fan**

[θ] **bath**

[t] **tip**

[s] **sip**

[ʃ] **lush**

[tʃ] **chin**

[k] **back**

Voiced

[b] **bat**

[v] **van**

[ð] **bathe**

[d] **dip**

[z] **zip**

[ʒ] **luge, pleasure**

[dʒ] **badge**

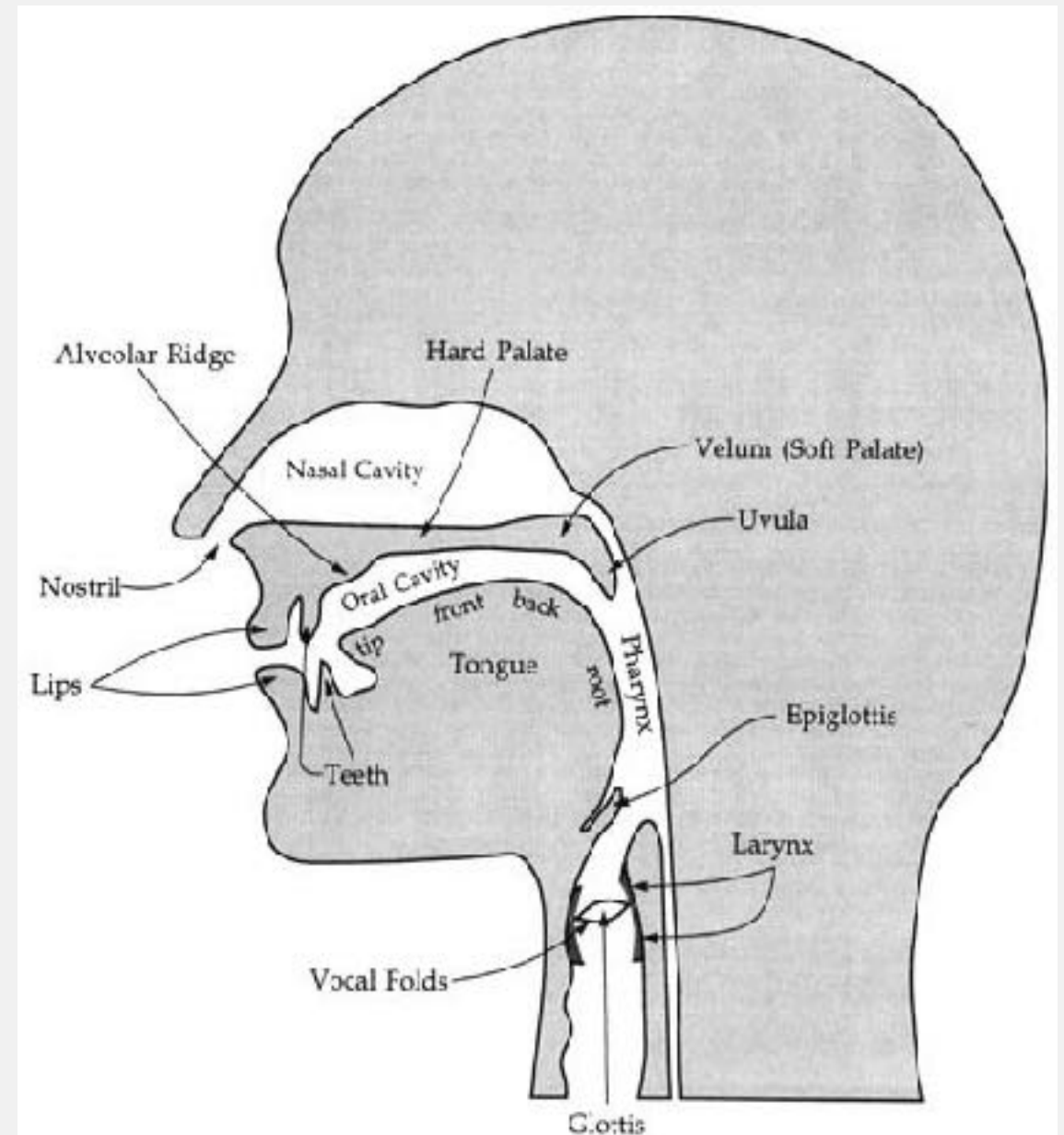
[g] **bag**

Place

- **Place:** **Where** does the obstruction in the vocal tract occur?
- The **mouth** can be **narrowed in many ways** by the **lips** and the **tongue**.

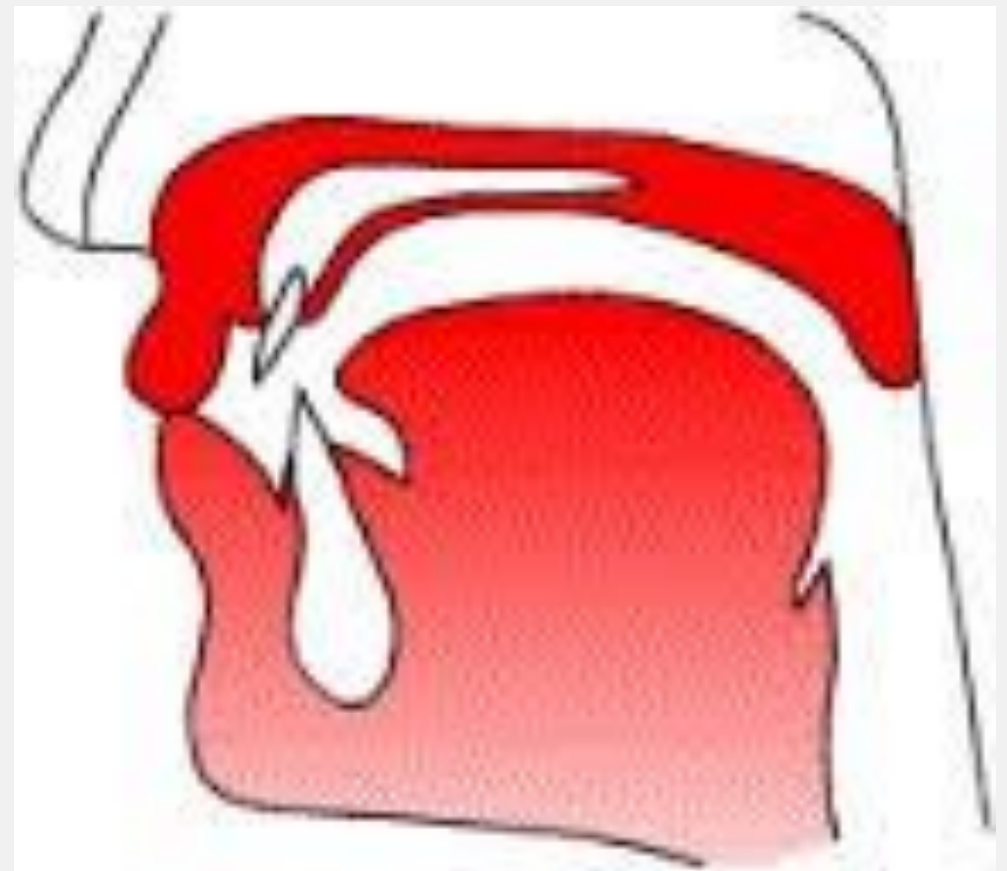
Four Questions for Consonants

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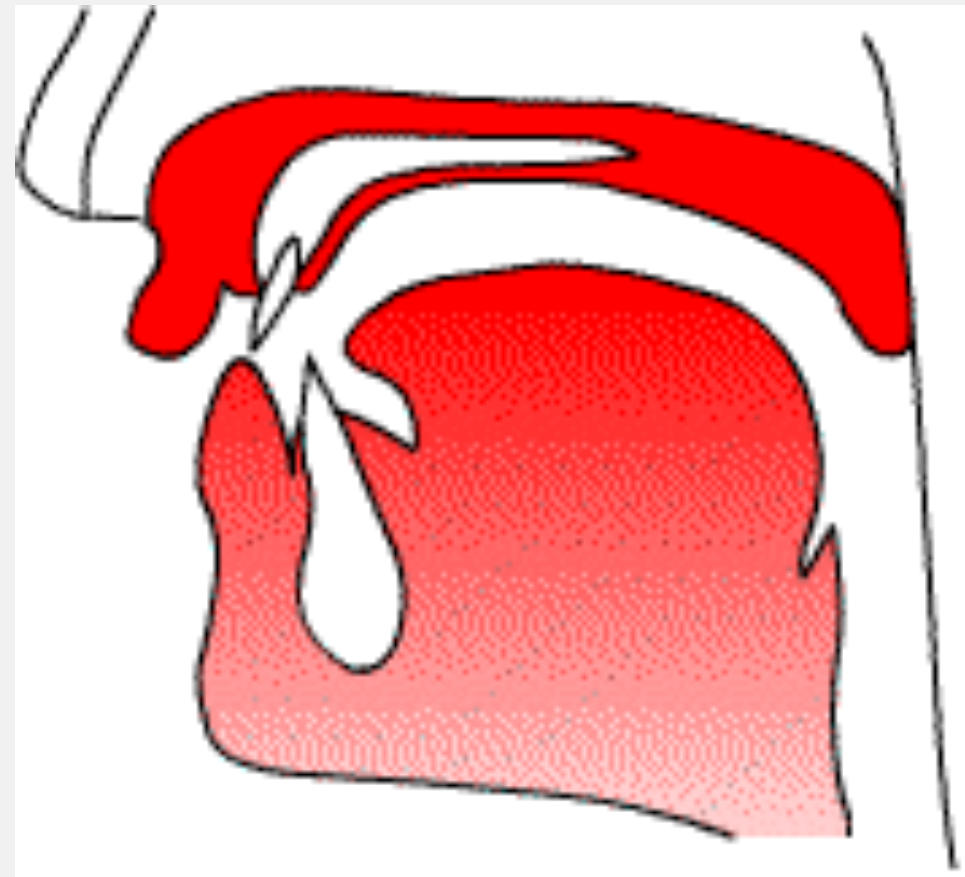
Place: Lips

- **Bilabial:** lips together
- [p] **p**at [b] **b**at
- [m] **m**at



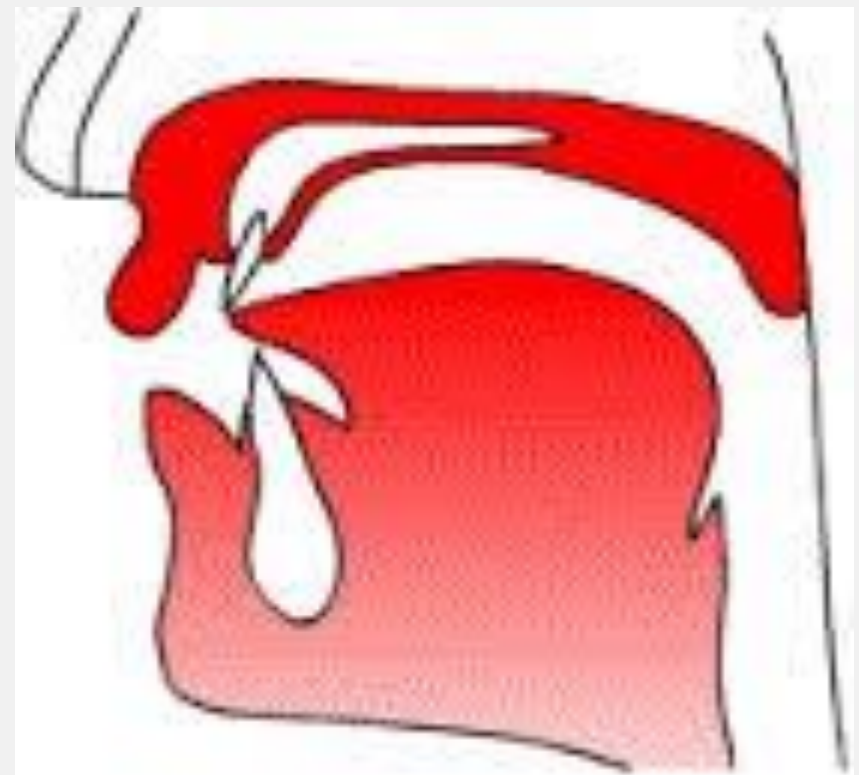
Place: Lips and teeth

- **Labiodental:**
Bottom lip and
upper teeth
- [f] **f**an [v] **v**an



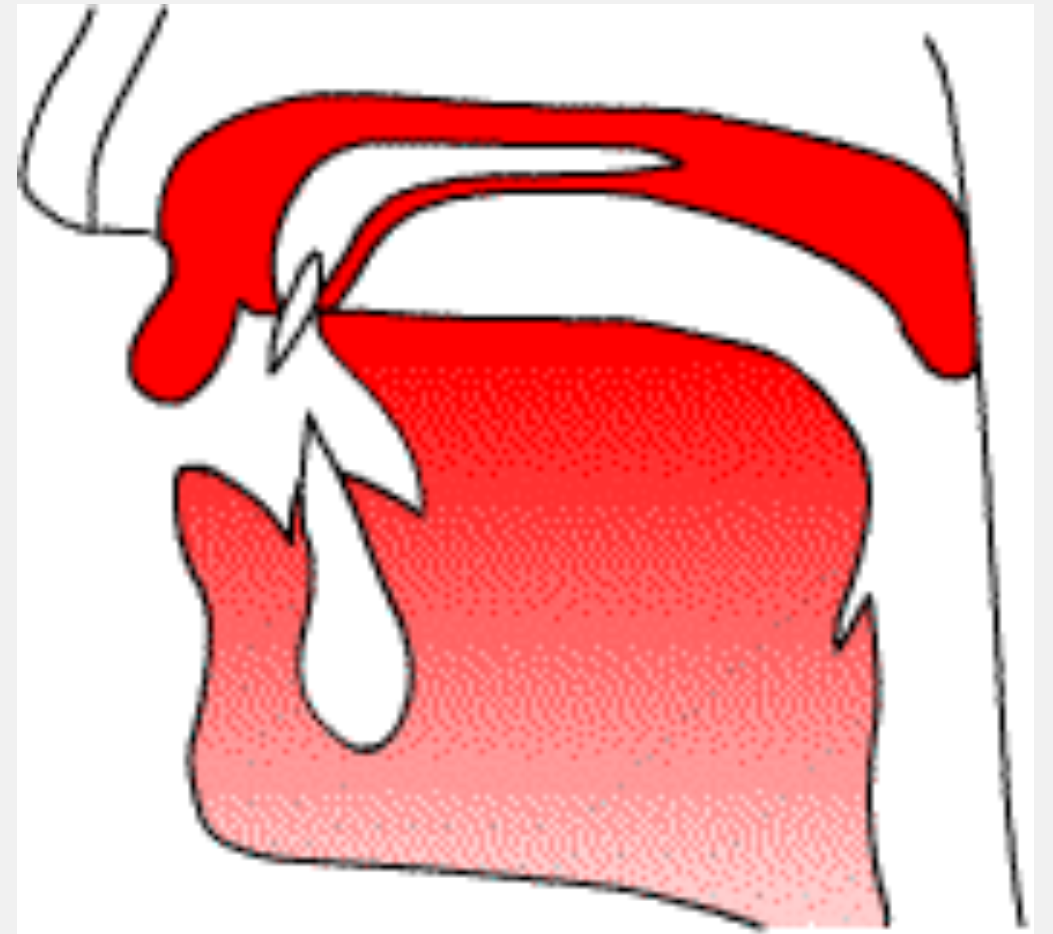
Place: Tongue tip between teeth

- **Interdental:**
tongue between teeth
- [θ] bath [ð] bathe



Place: Tongue tip and gum ridge

- **Alveolar:**
Tip of the tongue
and alveolar ridge
- [t] **t**in [d] **d**in
- [n] **n**ine
- [s] **s**ap [z] **z**ap
- [l] **l**ap [r] **r**ap



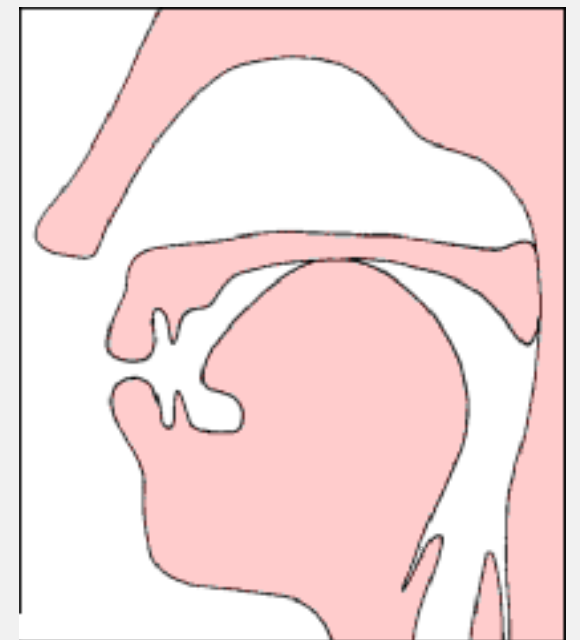
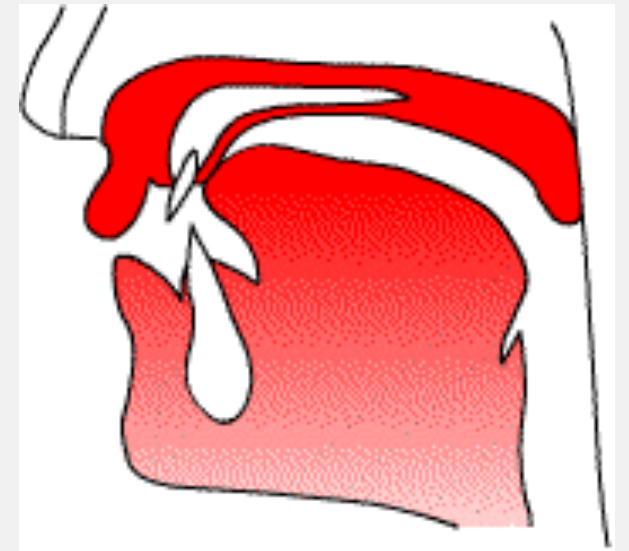
Place: Tongue tip behind the gum

- **Retroflex:** tip of tongue curled back
 - Occur in 20% of world's languages
 - Particularly common in South Asian and Australian/Western Pacific languages
 - /r/ in (e.g.) *rip* for some English speakers

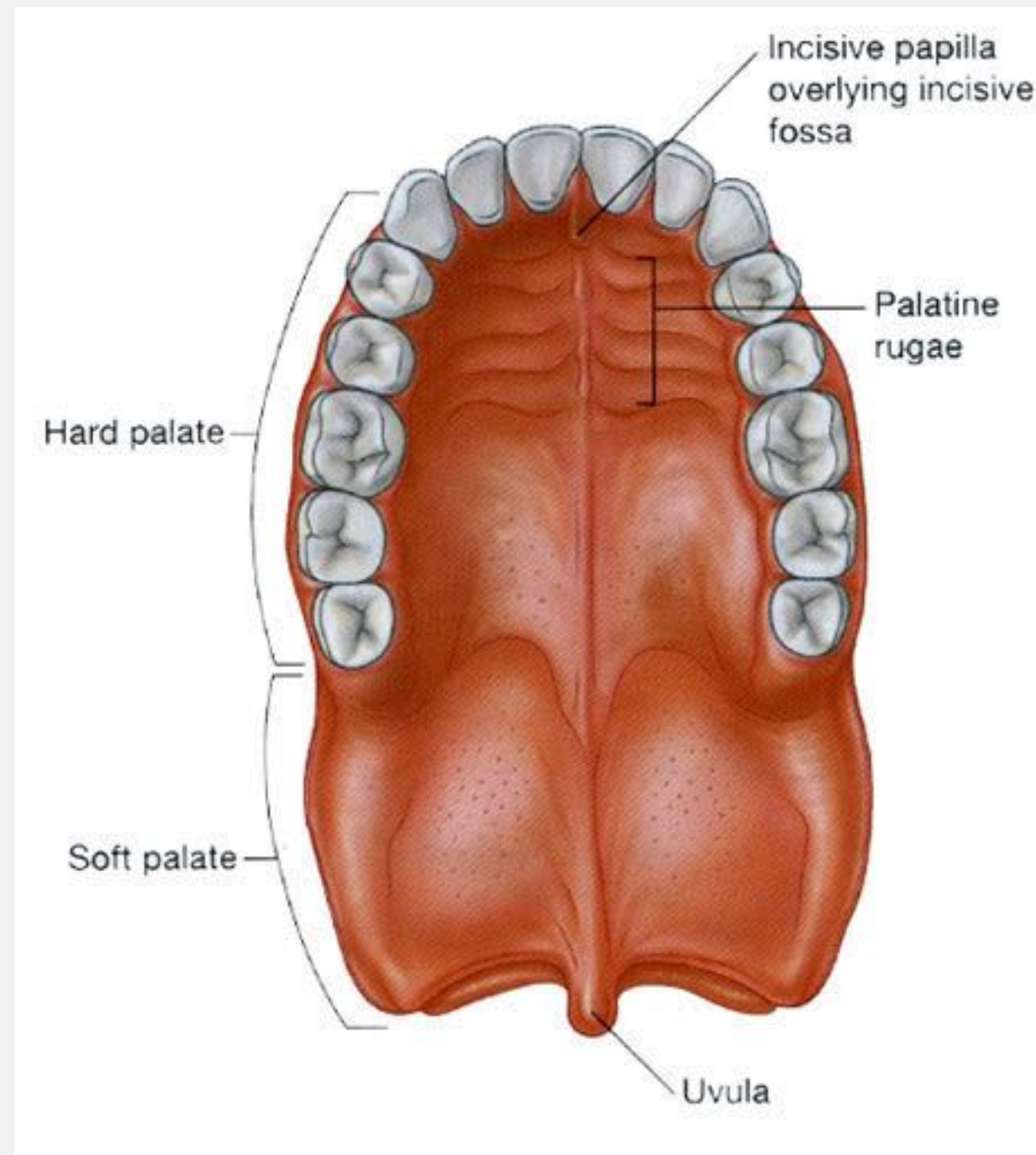


Place: Tongue Body behind the gum

- **Postalveolar:** tongue body and **back** of alveolar ridge
 - [ʃ] **shine** [ʒ] **treasure**
 - [tʃ] **chimes** [dʒ] **judge**
- **Palatal:** tongue body and hard palate
 - [j] **yes**

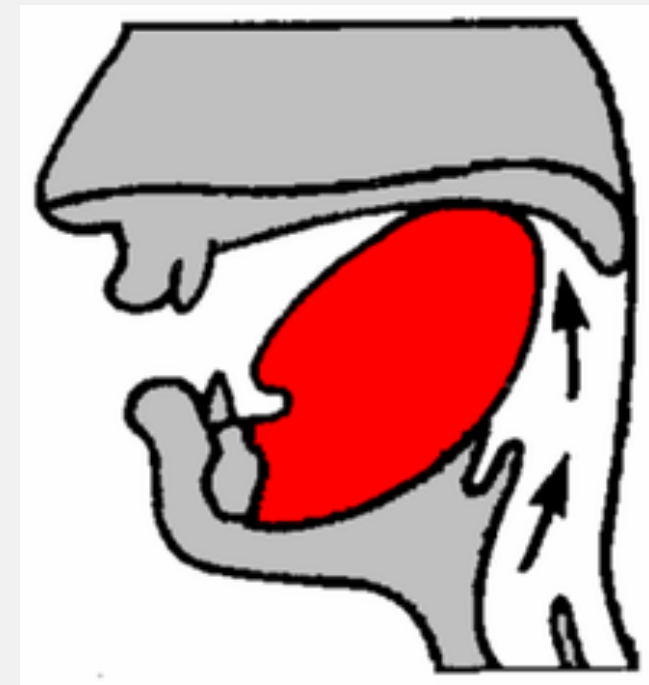


The palate(s)



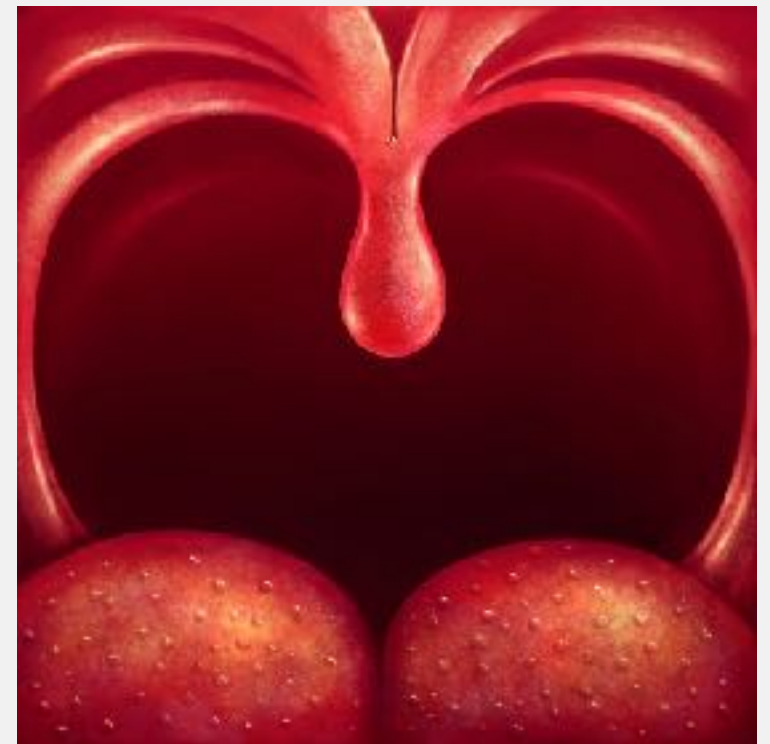
Place: Tongue Back and soft palate

- **Velar:** Back of the tongue and soft palate (the **velum**)
- [k] **back** [g] **bag**
- [ŋ] **bang**



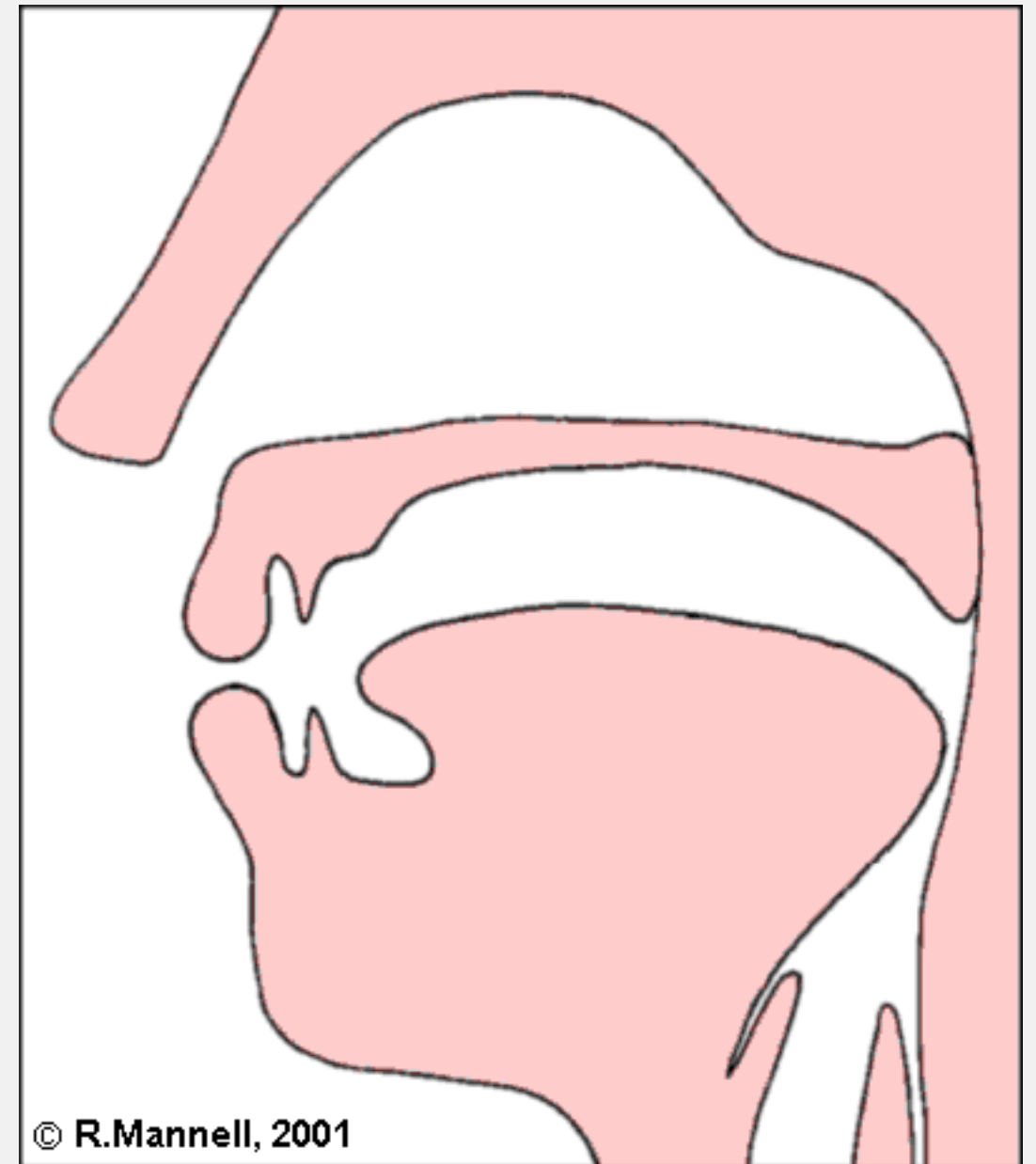
Place: Tongue back and uvula

- **Uvular:** Tongue back raised towards uvula
- uvular stops [q] and [G] occur in (e.g.) Arabic
- uvular trills and fricatives occur in (e.g.) German and French
- “je ne **regrette rien**...”



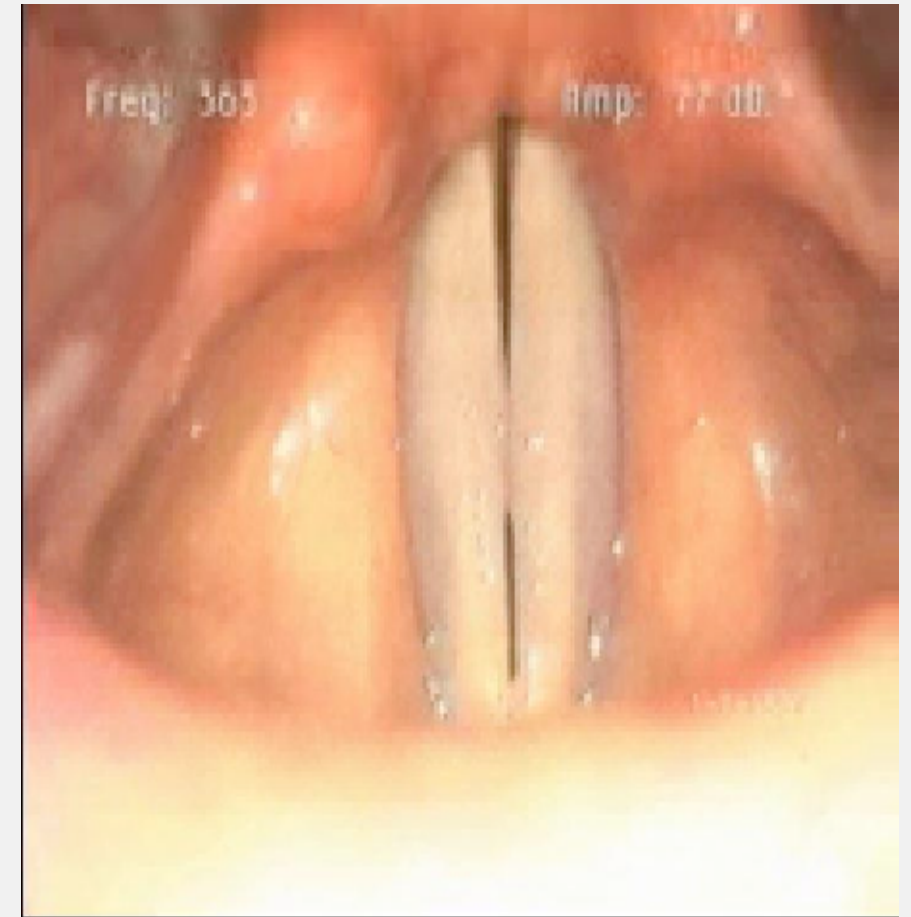
Place: Tongue back and pharynx

- **Pharyngeal**: back of tongue interacts with pharynx
- Pharyngeal sounds occur in (e.g.) Arabic and Danish
- (**Epiglottal** sounds pronounced in the lower pharynx, but the tongue isn't the important articulator.)



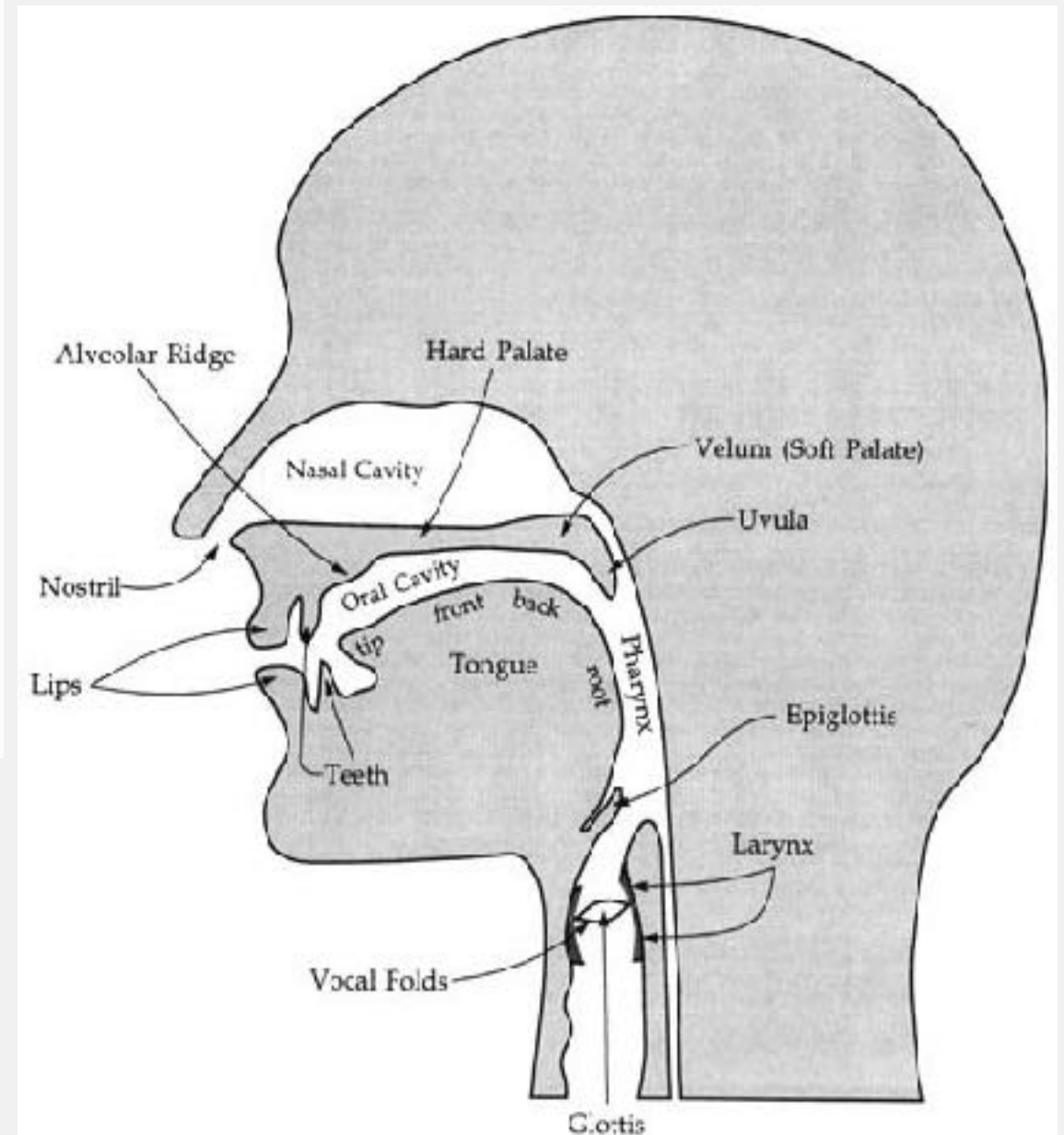
Place: Glottis

- **Glottal**: vocal folds together
 - [h] **hip**
 - [ʔ] **uh-oh!**
 - (Don't confuse ʔ, [ʔ] and [ɣ]!)



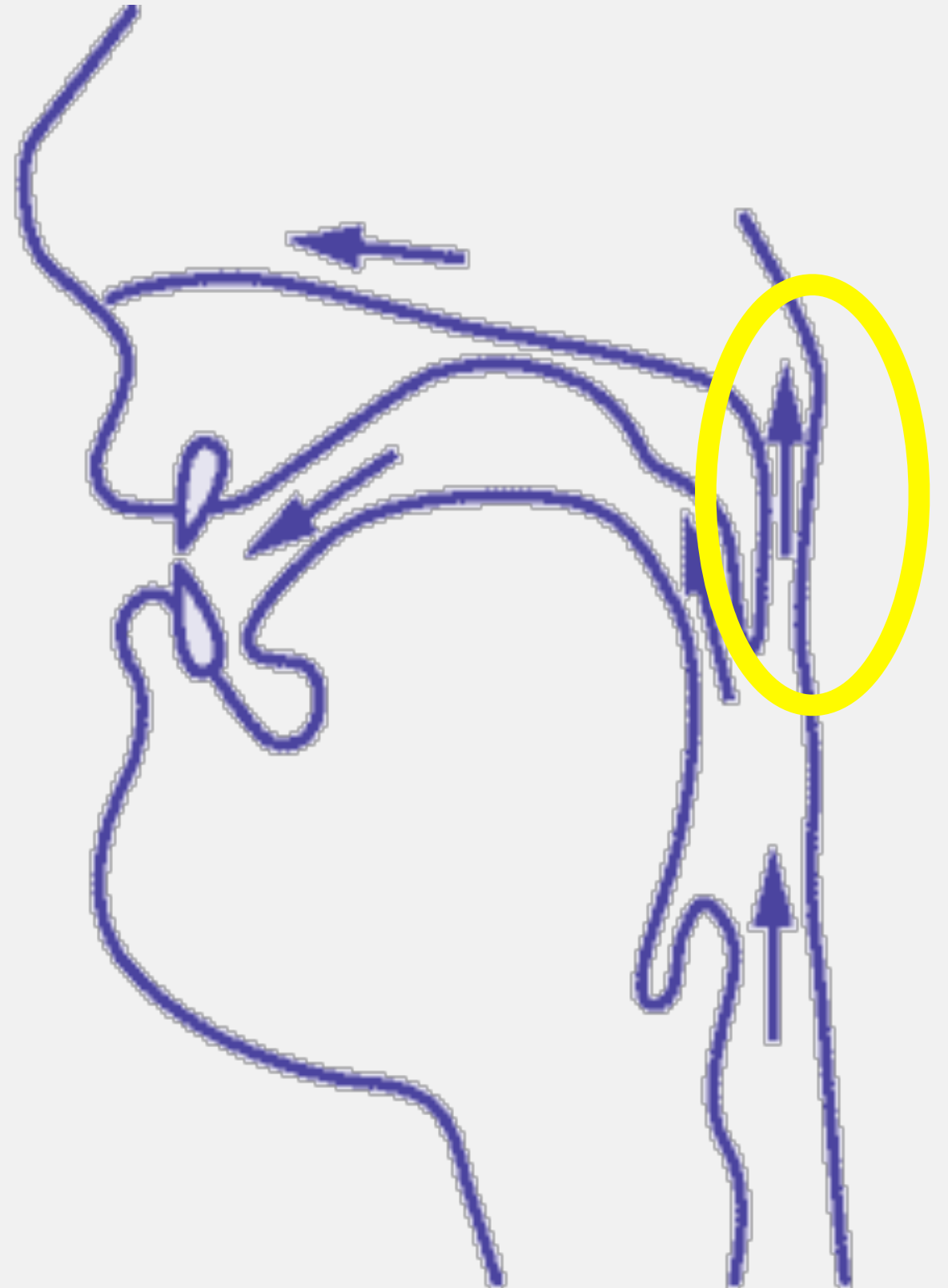
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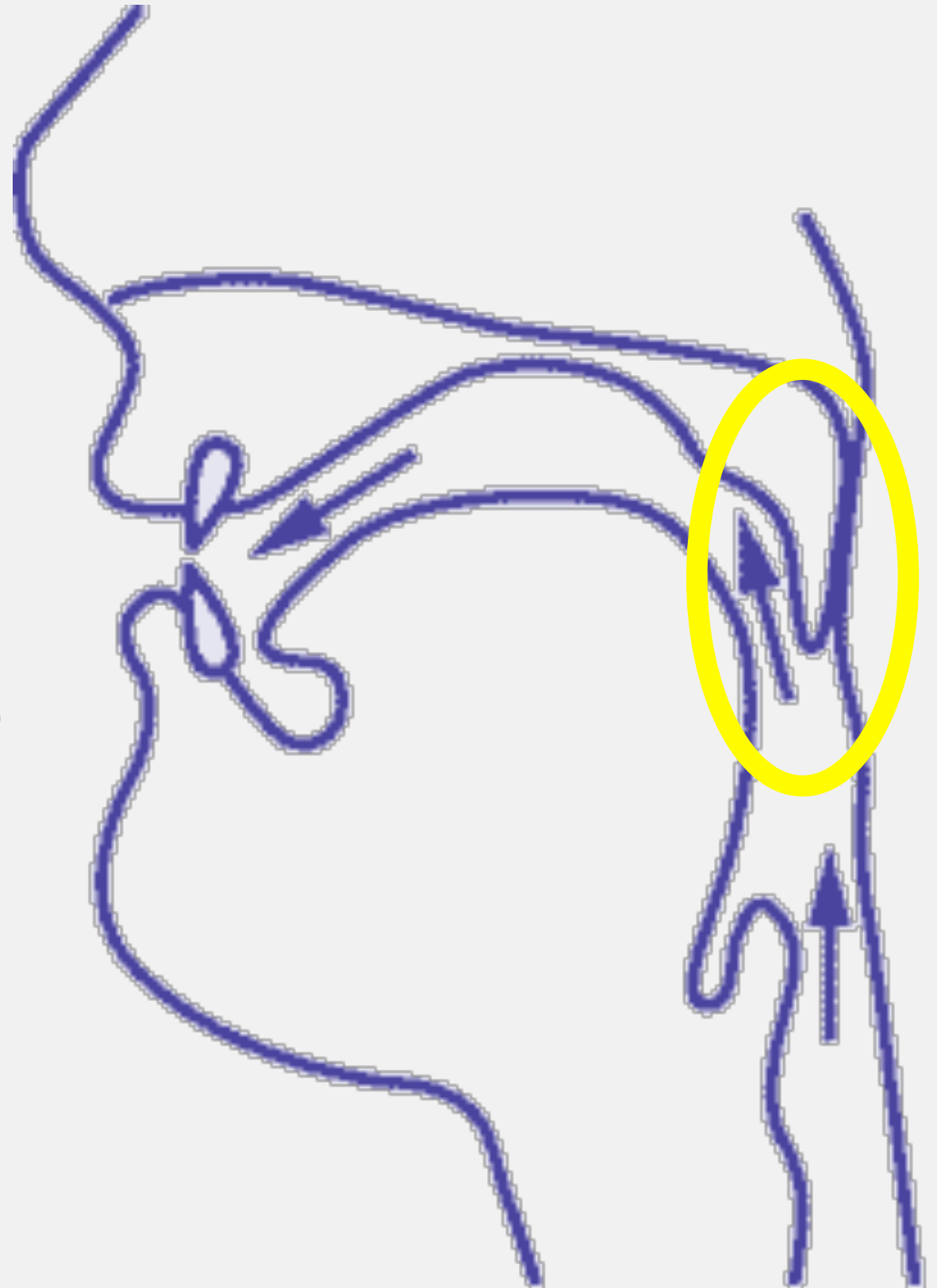
Mannar: Nasal

- **Nasal:**
Open velum;
air flows through
nasal cavity
- Example sounds
 - [m] pa**m**
 - [n] pa**n**
 - [ŋ] pi**ng**



Oral/Nasal

- **Oral:**
Velum closed
oral air-flow only
- Example sounds:
 - [b] da**b** (vs [m] da**m**)
 - [d] pa**d** (vs [n] pa**n**)
 - [g] pi**g** (vs [ŋ] pi**ng**)



Manner: Stops

- **Closure:**

How narrow is the mouth at the place of the sound?

- **Stop:** complete closure in mouth or glottis, creating a build up of pressure usually followed by a release

- [p] **p**at [b] **b**at
- [t] **t**ip [d] **d**ip
- [k] **back** [g] **bag**
- [m] **ram** [n] **ran** [ŋ] **rang**
- [ʔ] **uh**-oh!

NB: Nasal consonants are stops, because they involve oral closure. Oral stops are sometimes called **plosives**.

Manner: Flaps/taps

- **Flap** or **tap**: like a brief stop, with no build up of pressure
- **Compare:**
 - [t] in city (rather careful speech)
 - an alveolar stop
 - [ɾ] in city (casual American speech)
 - an alveolar flap
 - [ʔ] in city (rather casual British speech)
 - a glottal stop

Manner: trills

- **Trill:** A vibration of one articulator against another
- [r] (in, e.g., Spanish perro): an alveolar trill
 - (compare Spanish pero, typically pronounced with a flap [ɾ])
- [ʀ]: a uvular trill
 - occurs in French and German (but often pronounced as a fricative)

Manner: Fricative

- **Fricative:**
opening **too narrow** for the air to flow smoothly;
this creates turbulence
- [f] **f**an [v] **v**an
- [θ] bath**th** [ð] bat**th**e
- [s] **s**ap [z] **z**ap
- [ʃ] **sh**ine [ʒ] treas**ure**
- [h] **h**it

Manner: Affricate

- **Affricate:** a stop with a fricative release
- [tʃ] **watch**
- [dʒ] **judge**

Manner: Approximant

- **Approximant:** relatively slight closure
- **Liquid:**
 - [l] lip
 - [ɹ] rip
- **Glide:**
 - [j] yes
 - [w] **w**weather (labiovelar: tongue back towards velum with rounded lips)
 - The initial sound in **wh**ether is unvoiced ([ʍ]) for some speakers

Describing Consonants with Features

- **All consonants** can be described using **these 4 properties** (voicing, nasality, place, manner)
- **Examples:**
 - voiceless oral bilabial stop [p]
 - voiceless oral palatal affricate [tʃ]
 - voiced oral interdental fricative [ð]
 - voiced nasal velar stop [ŋ]

IPA Consonant chart

THE INTERNATIONAL PHONETIC ALPHABET (2005)											
CONSONANTS (PULMONIC)											
	Bilabial	Labio-dental	Dental	Alveolar	Post-alveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Epi-glottal
Nasal	m	ɱ	n		ɳ		ɲ	ŋ	ɴ		
Plosive	p b	ɸ β	t d		ʈ ɖ		c ɟ	k ɡ	q ɢ	ʕ	ʔ
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	ħ ʕ
Approximant		ʋ	ɹ		ɻ		j	ɰ			
Trill	ʙ		r						ʀ		ʀ
Tap, Flap		ɹ	ɾ		ɽ						
Lateral fricative			ɬ ɮ		ɮ		ɬ	ɮ			
Lateral approximant			l		ɭ		ʎ	ʟ			
Lateral flap			ɭ		ɮ						

Where symbols appear in pairs, the one to the right represents a modally voiced consonant, except for murmured ɦ. Shaded areas denote articulations judged to be impossible. Light grey letters are unofficial extensions of the IPA.

[Clickable IPA Chart with sounds](#)

IPA Consonant chart

THE INTERNATIONAL PHONETIC ALPHABET (2005)

CONSONANTS (PULMONIC)

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

Where symbols appear in pairs, the one to the right represents a modally voiced consonant, except for murmured ɦ. Shaded areas denote articulations judged to be impossible. Light grey letters are unofficial extensions of the IPA.

Manner

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