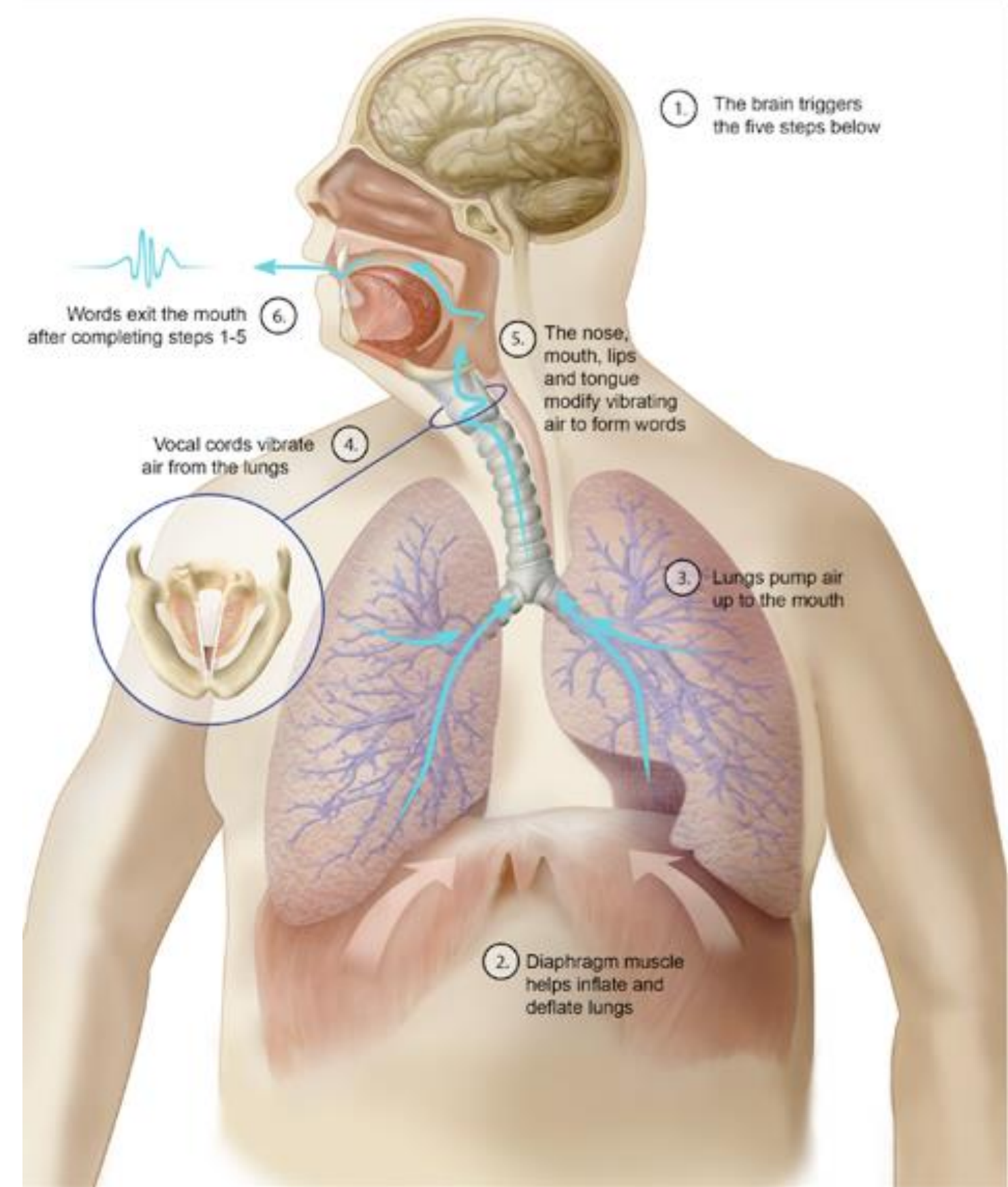# HS 133: Introduction to Phonetics

August 22, 2024

Airstream Mechanisms

Airstream Mechanisms

- Sounds are produced by pressure creation in the vocal tract

- Air flows from regions of high pressure to low pressure

- Flow of air can be inwards or outwards

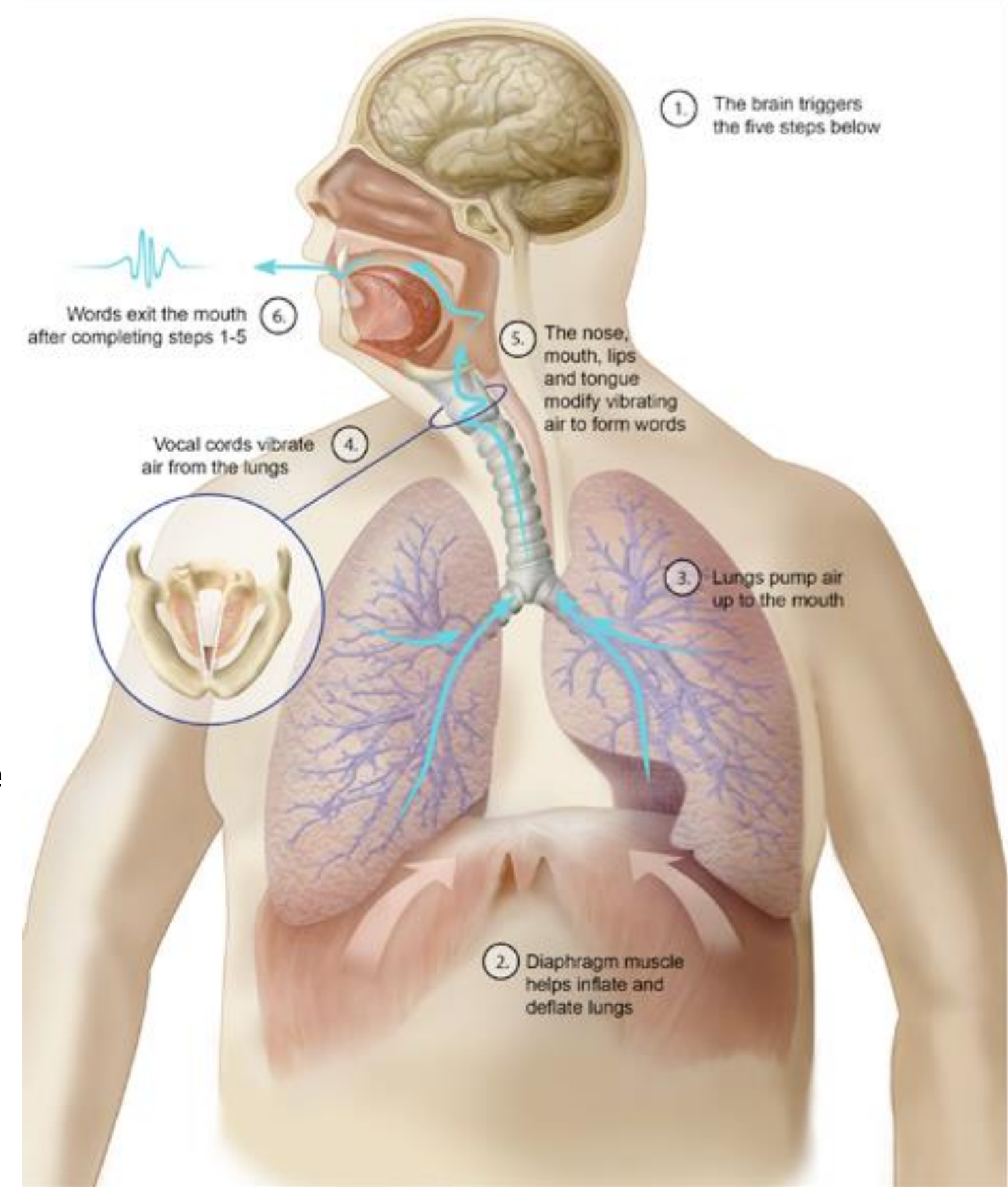- If it is inwards, ingressive

- If outwards, egressive

Airstream Mechanisms

- Lungs

- Oral cavity

- Tongue

1. The brain triggers the five steps below

6. Words exit the mouth after completing steps 1-5

5. The nose, mouth, lips and tongue modify vibrating air to form words

4. Vocal cords vibrate air from the lungs

3. Lungs pump air up to the mouth

2. Diaphragm muscle helps inflate and deflate lungs

Airstream Mechanisms
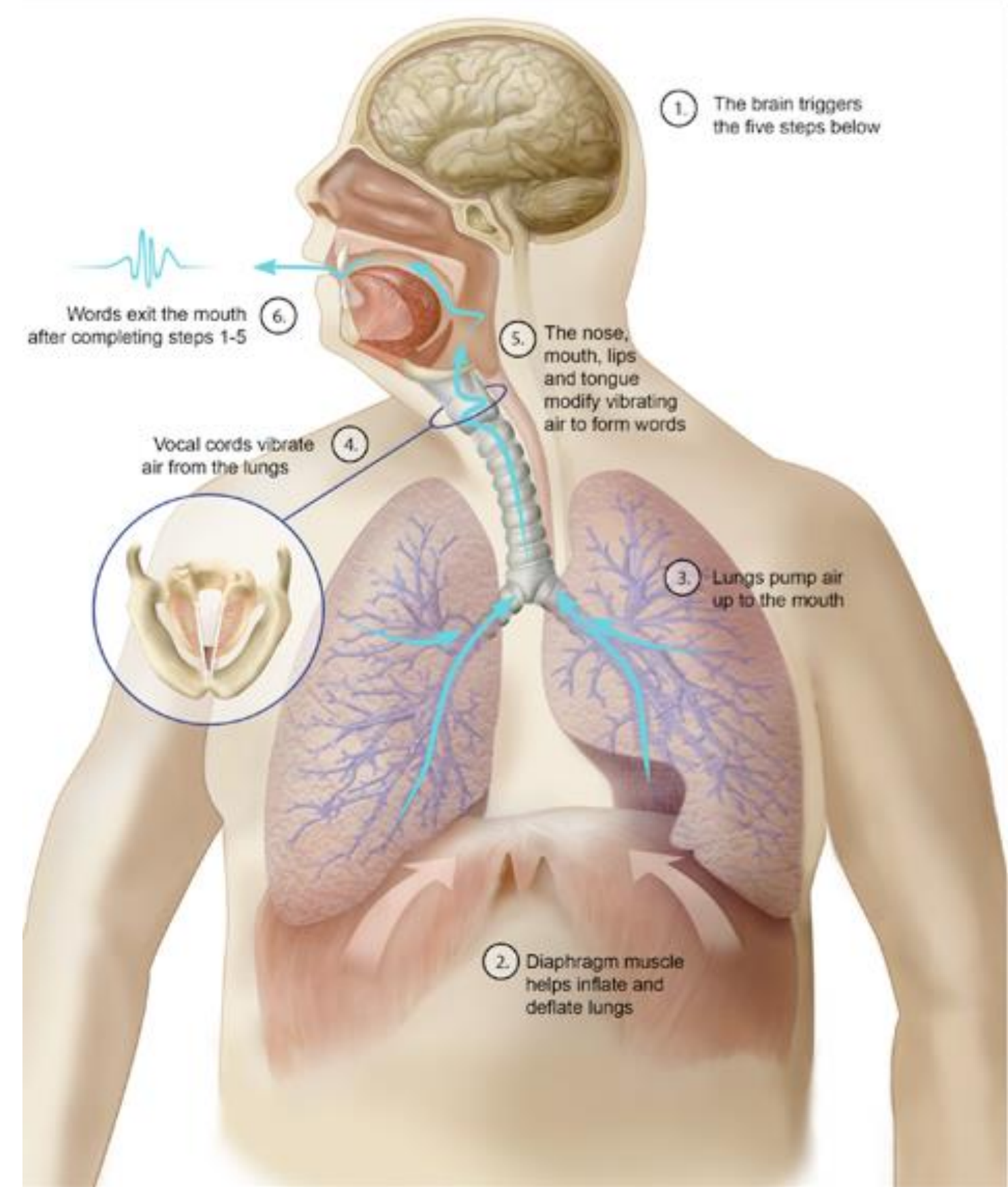
- Lungs : Pulmonic airstream

- Air expelled from the lungs

- High velocity

- Enough to sustain a phrase level utterance

1. The brain triggers the five steps below

Words exit the mouth 6. after completing steps 1-5

5. The nose, mouth, lips and tongue modify vibrating air to form words

Vocal cords vibrate 4. air from the lungs

3. Lungs pump air up to the mouth

2. Diaphragm muscle helps inflate and deflate lungs

Airstream Mechanisms

- Oral Cavity : Glottalic

- Air pressure between the glottis and lips

- Vocal folds are closed

- Amount of air is less

1. The brain triggers the five steps below

6. Words exit the mouth after completing steps 1-5

5. The nose, mouth, lips and tongue modify vibrating air to form words

Vocal cords vibrate air from the lungs 4.

3. Lungs pump air up to the mouth

2. Diaphragm muscle helps inflate and deflate lungs

Airstream Mechanisms

- Oral Cavity : Glottalic

- Can be ingressive or egressive

- If egressive: ejectives /p'/

- If ingressive: implosive /ɓ/

[aba]   [aɓa]
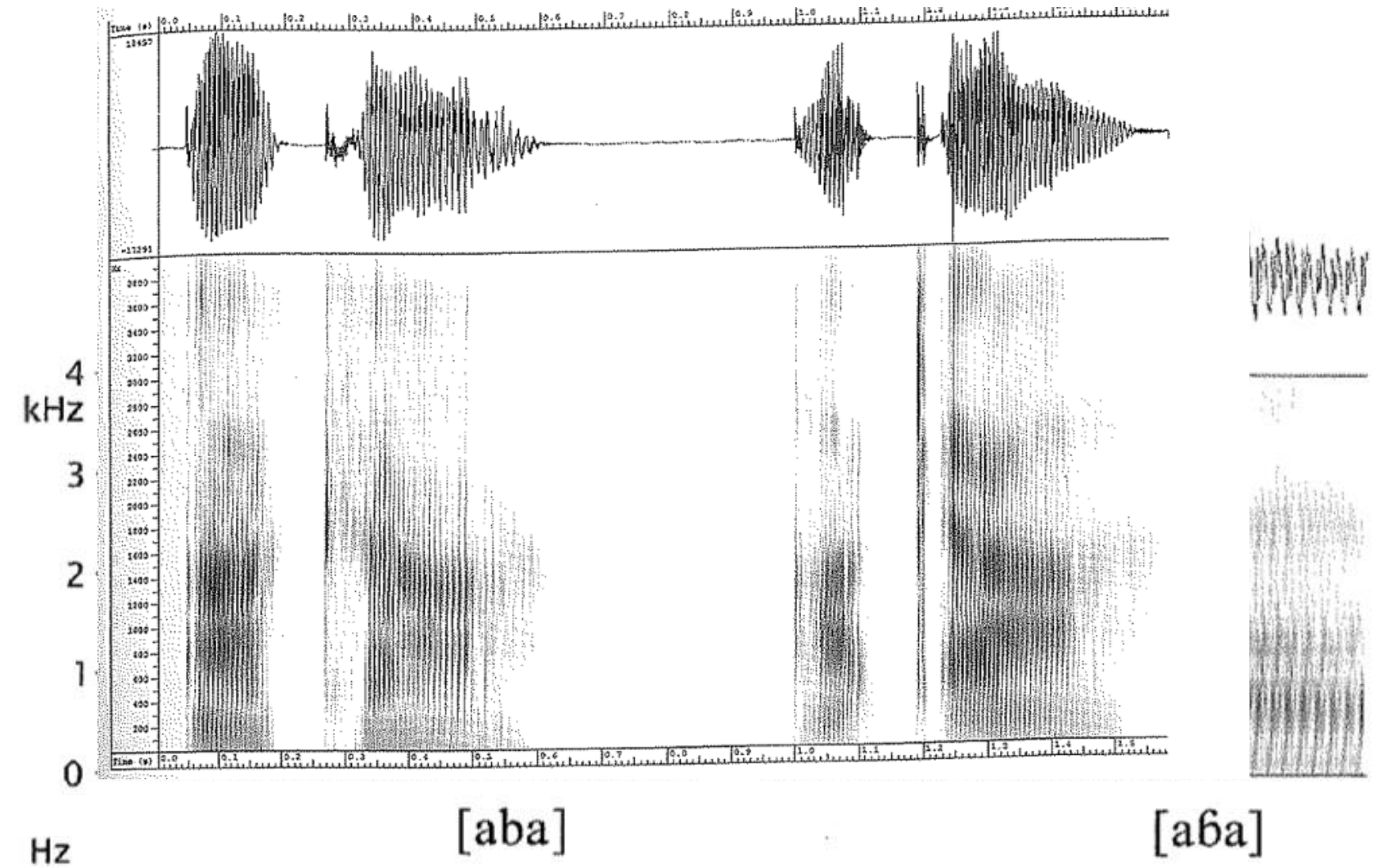
Airstream Mechanisms

- Tongue : Velaric

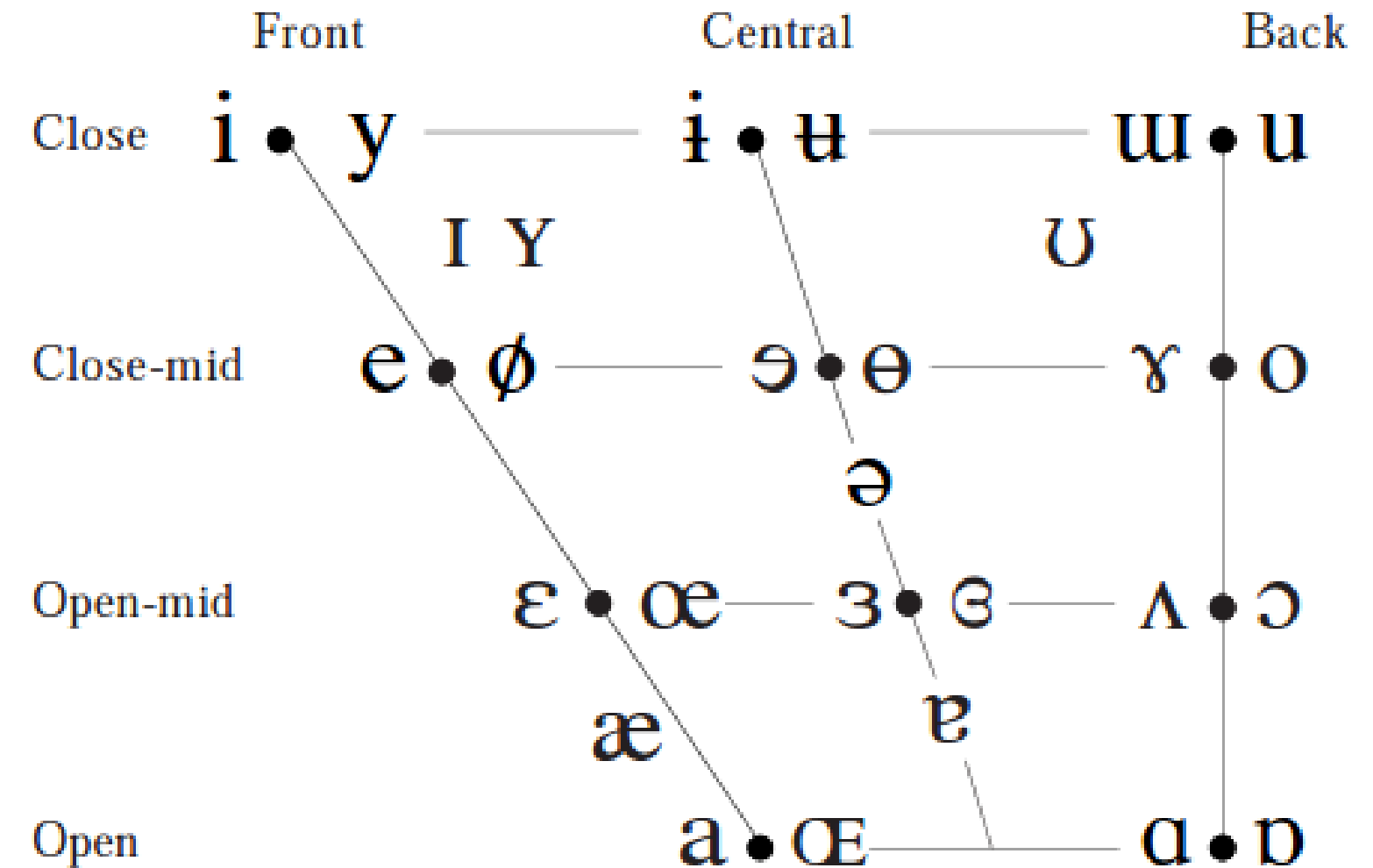- Air between tongue tip and back cavity

- Can be only ingressive

- Known as clicks

Articulatory Features of Vowels?

- How are vowels different?

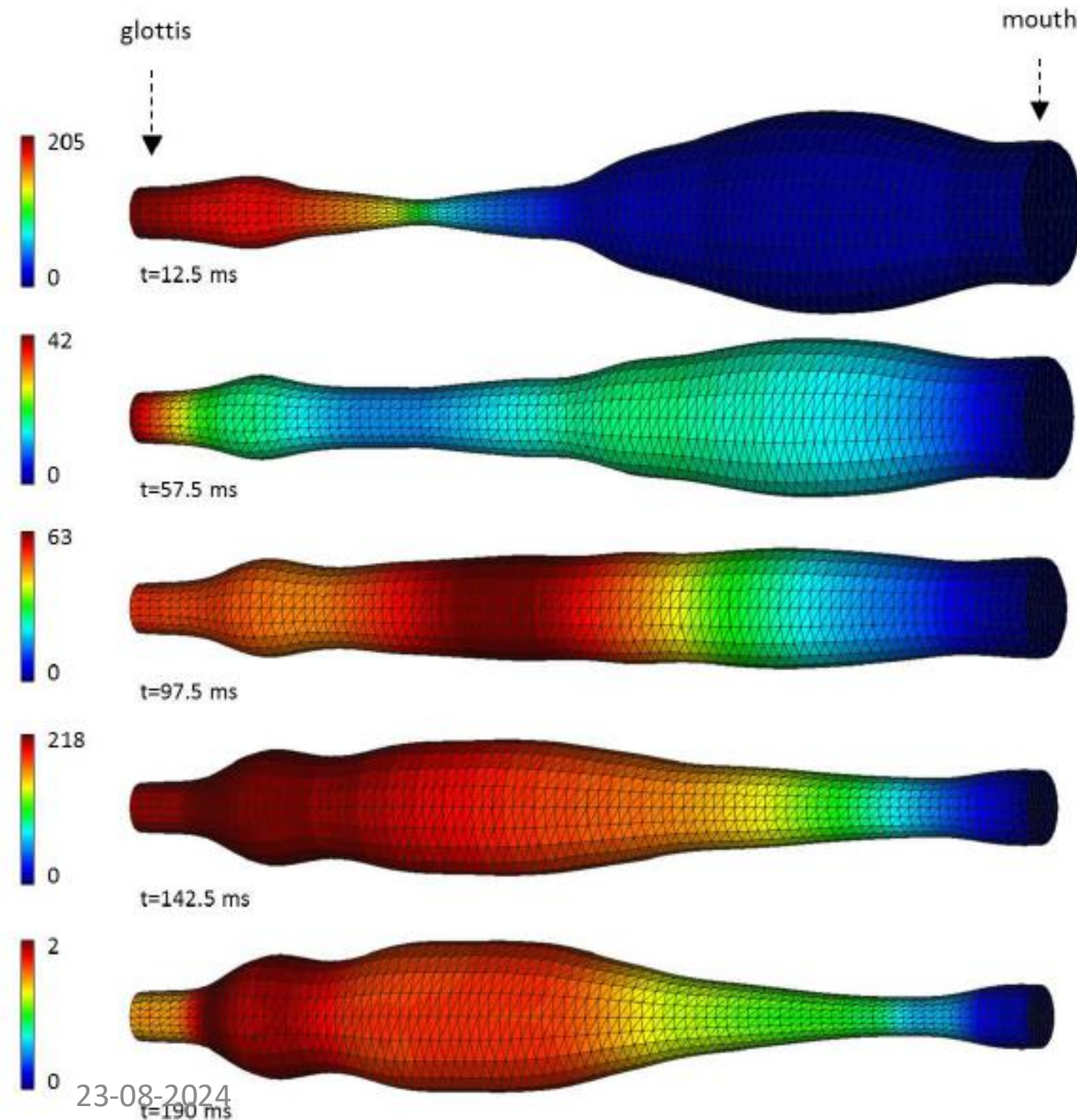- In terms of articulation?

- In terms of acoustics?

VOWELS

Where symbols appear in pairs, the one
to the right represents a rounded vowel.

Vowels

Height (close/ high ~ open/low)

Backness (front/ back)

Roundness (rounded/ unrounded)

Acoustics of vowels | Vocal tract
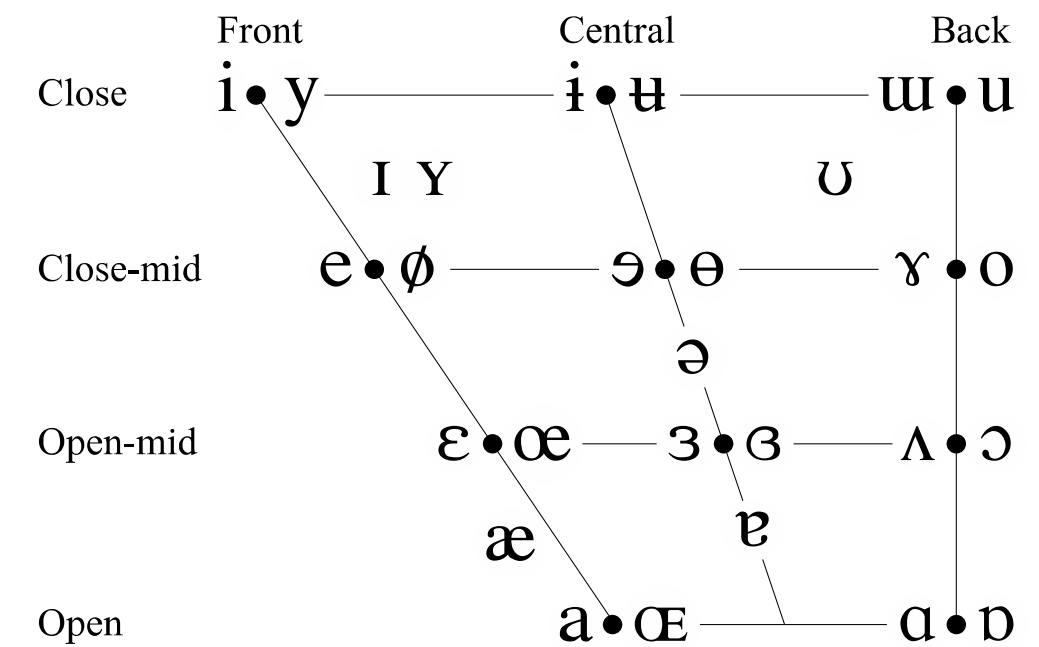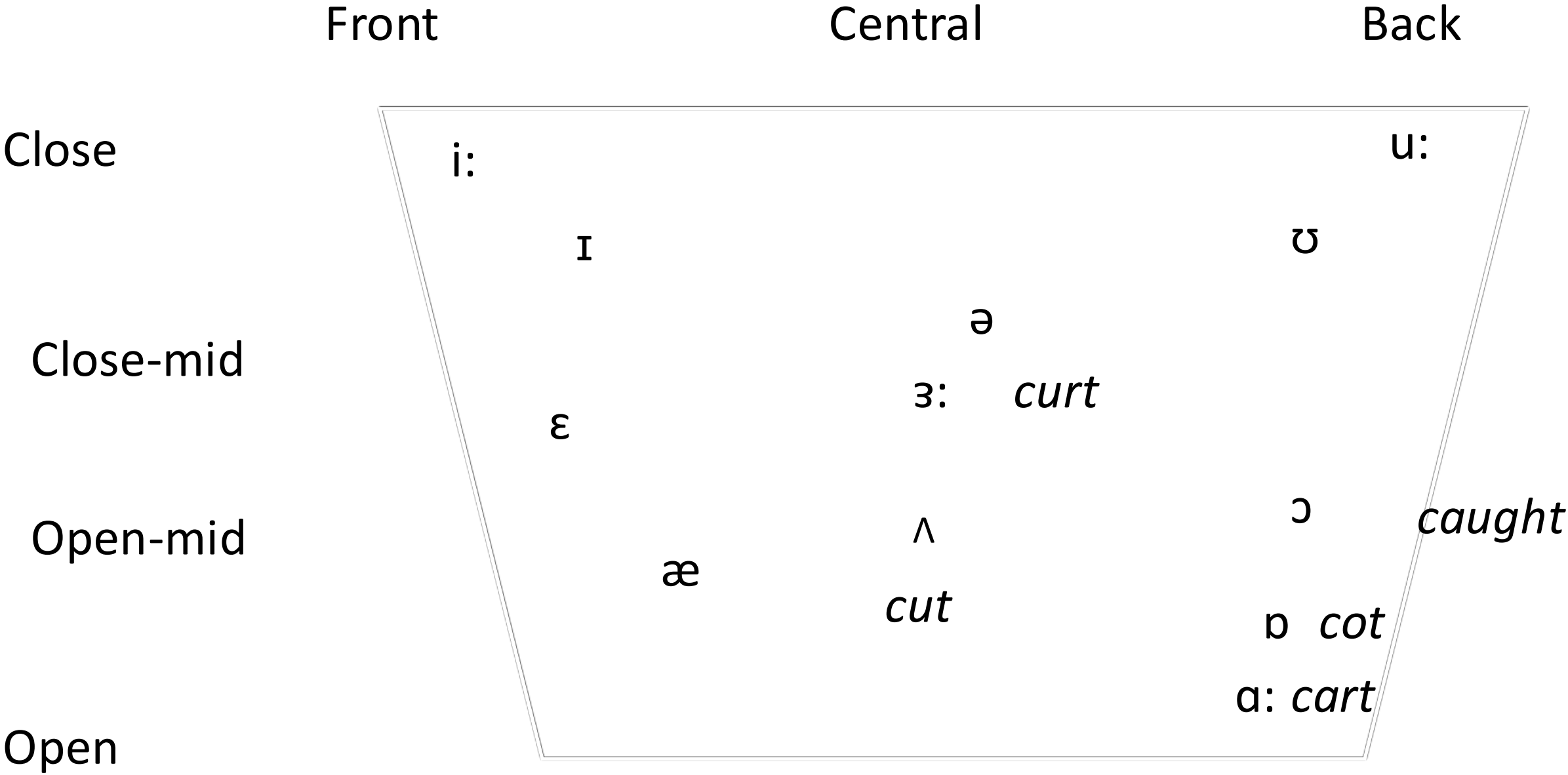

Guasch, O. et al. 2016. A Stabilized Finite Element Method for the Mixed Wave Equation in an ALE Framework With Application to Diphthong Production
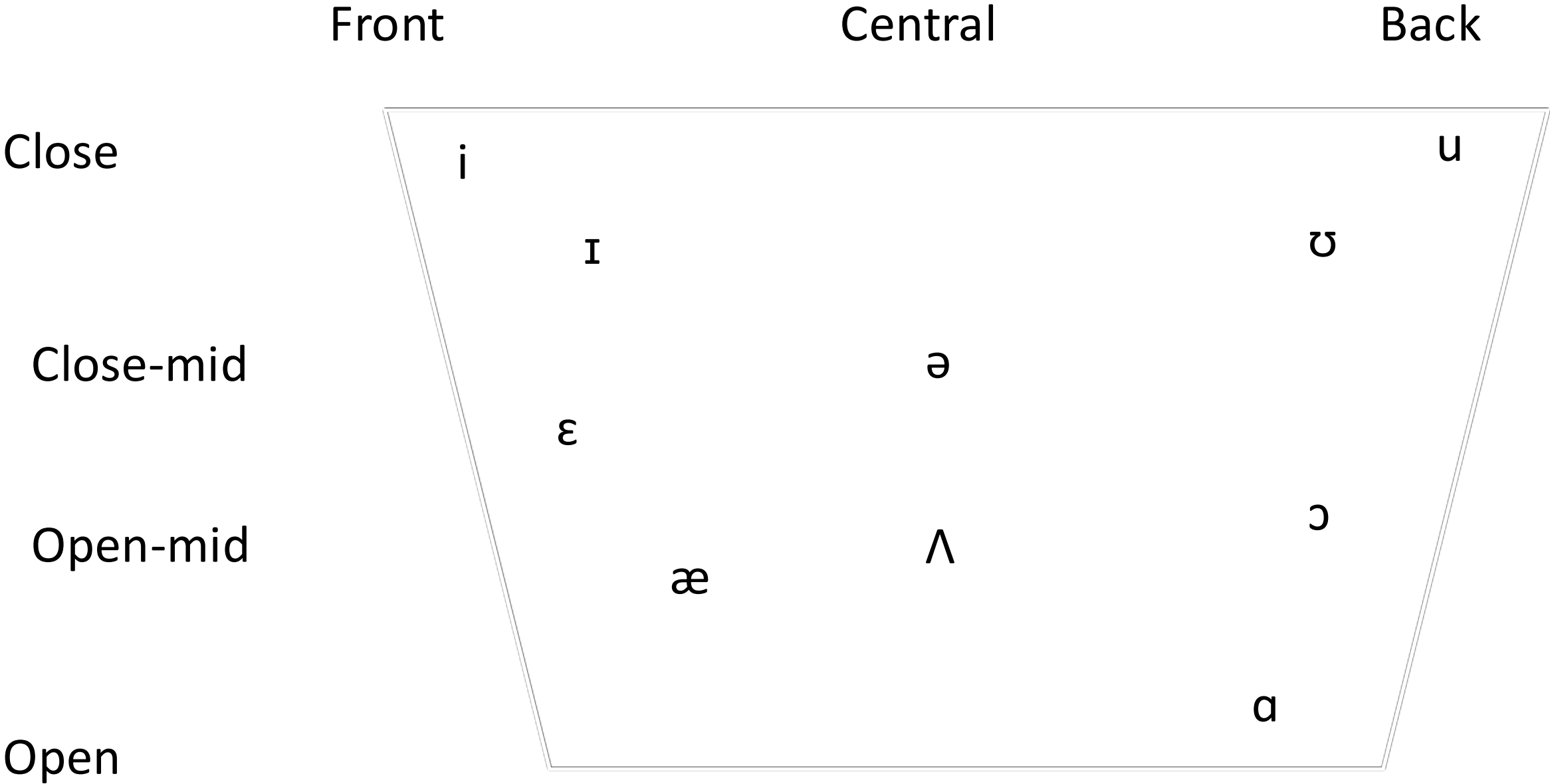
Vocal-tract Models VTM-N20

Takayuki Arai

(Sophia University)

English Vowels
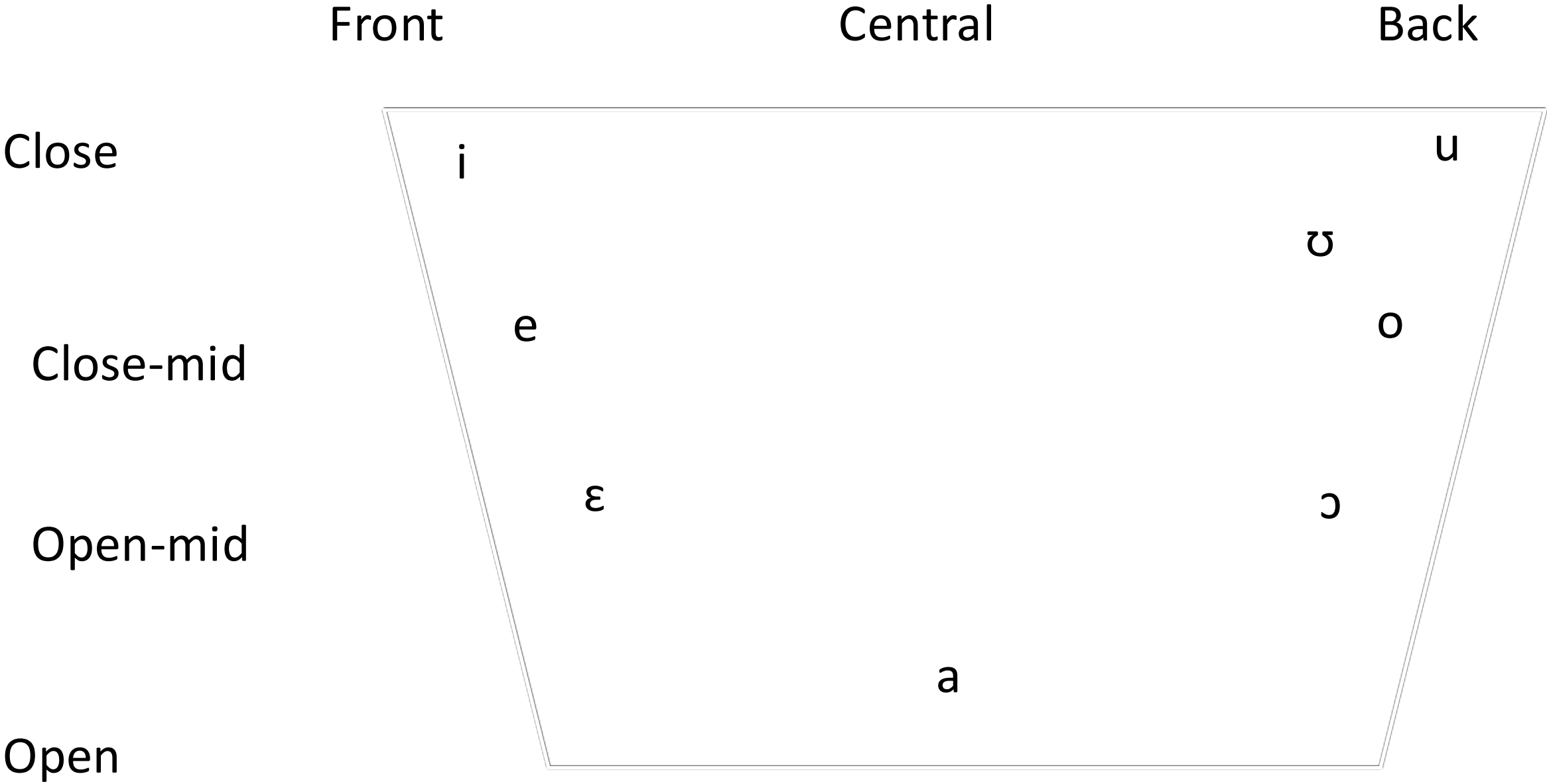
	Front	Central	Back
Close	iː		uː
	ɪ		ʊ
		ə	
Close-mid		ɜː *curt*	
	ɛ		
Open-mid		ʌ	ɔ *caught*
	æ	*cut*	
			ɒ *cot*
			ɑː *cart*
Open			

North American English

	Front	Central	Back
Close	i		u
	ɪ		ʊ
Close-mid		ə	
	ɛ		
Open-mid	æ	ʌ	ɔ
Open			ɑ

Assamese

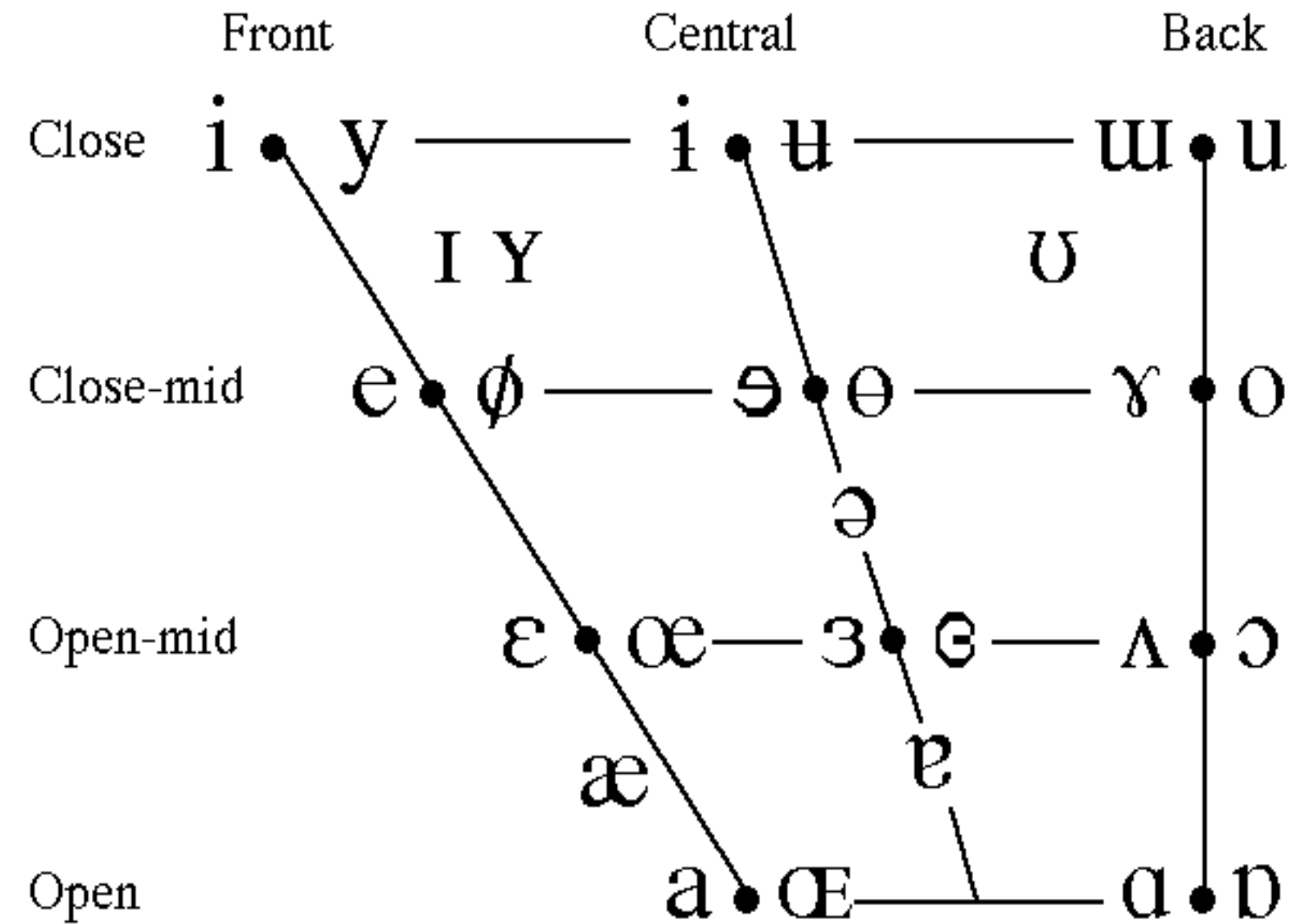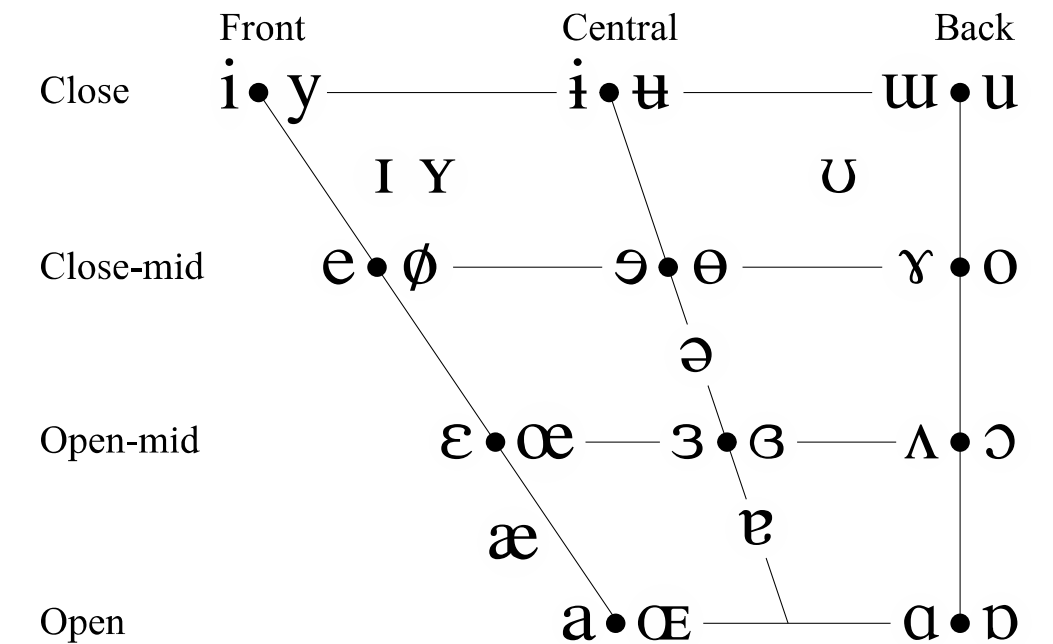|	Front	Central	Back
Close	i		u
			ʊ
Close-mid	e		o
Open-mid	ɛ		ɔ
Open		a	

Cardinal vowel system

Where symbols appear in pairs, the one to the right represents a rounded vowel.

Vowels

- Vowels are highly sonorous

- No control of the airflow

- Airflow is 'shaped' according to the vocal tract shape

VOWELS

	Front	Central	Back
Close	i • y	ɨ • ʉ	ɯ • u
	ɪ Y		ʊ
Close-mid	e • ø	ɘ • ɵ	ɤ • o
		ə	
Open-mid	ɛ • œ	ɜ • ɞ	ʌ • ɔ
	æ	ɐ	
Open	a • ɶ		ɑ • ɒ

Where symbols appear in pairs, the one to the right represents a rounded vowel.